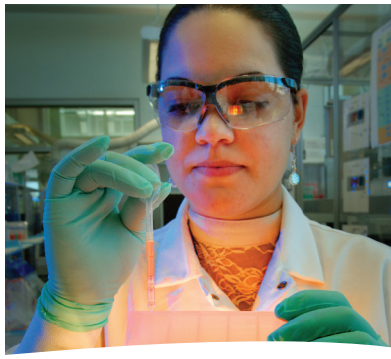
Fourth National Report on Human Exposure to Environmental Chemicals

Updated Tables, March 2021

Volume Two: NHANES 2011-2016



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

General Information

Overview of the Fourth National Report on Human Exposure to Environmental Chemicals: Updated Tables, March 2021

The *Fourth National Report on Human Exposure to Environmental Chemicals: Updated Tables, March 2021* (the *Updated Tables, March 2021*) presents nationally representative, cumulative biomonitoring data gathered from 1999–2000 through 2015–2016. It includes all the data from each of the previous *National Reports on Human Exposure to Environmental Chemicals* and each of the previous *Updated Tables* (collectively, the *Report* and *Updated Tables*).

In each survey period, the reported chemicals or their metabolites were measured in blood, serum, and urine samples from random subsamples of the National Health and Nutrition Examination Survey (NHANES). These subsamples typically consisted of about 2,500 participants – exact numbers are included in the tables. Survey data and samples are collected by the Centers for Disease Control and Prevention (CDC) National Center for Health Statistics. CDC's Environmental Health Laboratory (Division of Laboratory Sciences (DLS), National Center for Environmental Health) used mass spectrometry methods to obtain the blood, serum, and urine exposure measurements presented in the *Report* and *Updated Tables*.

The term *environmental chemical* refers to a chemical compound or chemical element present in air, water, food, soil, dust, or other environmental media (e.g., consumer products). Biomonitoring is the assessment of human exposure to chemicals by measuring the chemicals or their metabolites in human specimens such as blood or urine. A metabolite is a chemical alteration of the original compound produced by body tissues. Blood, serum, and urine levels reflect the amount of the chemical that gets into the body by all routes of exposure, including ingestion, inhalation, and dermal absorption. The measurement of an environmental chemical in a person's blood or urine is a measure of exposure; it does not by itself mean that the chemical causes disease or an adverse effect. Research studies, separate from these data, are required to determine which blood or urine levels are safe and which are associated with disease or an adverse effect.

The *Report* and *Updated Tables* provide geometric means and percentiles of environmental chemicals by age group, gender, and race/ethnicity for blood, serum, and urine levels measured in individual samples. For serum levels measured in pooled samples, weighted arithmetic means, and unadjusted standard errors are provided for categories defined by race/ethnicity, gender, age group, and survey years. More in-depth statistical analysis, including multivariate analysis incorporating health endpoints and other predictive variables, is beyond the scope of this document. We encourage scientists to examine the data further through analysis of the raw data available at https://www.cdc.gov/nchs/nhanes/.

The *Updated Tables* has been reorganized and expanded into four volumes. Data on the general U.S. population from NHANES 1999–2000 through 2015–2016 is now divided chronologically into Volumes One and Two.

- **Volume One: NHANES 1999-2010** provides data on the general U.S. population from NHANES 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008, and 2009–2010.
- **Volume Two: NHANES 2011-2016** provides data on the general U.S. population from NHANES 2011-2012, 2013–2014, and 2015-2016.

The table titles include the survey periods for which data are displayed in that table. Of note, not all chemicals have data for all survey cycles.

Data for chemicals measured in pooled samples and data from special samples are now found Volumes Three and Four.

- **Volume Three: Analysis of Pooled Serum Samples for Select Chemicals, NHANES 2005-2016** provides data for chemicals measured in pooled samples from NHANES 2005–2006, 2007–2008, 2009–2010, 2011-2012, 2013–2014, and 2015-2016. Some of these chemicals were previously measured in individual samples from the general U.S. population; these data can be found in Volume One: NHANES 1999-2010.
- **Volume Four: Analysis of Chemicals Found in Cigarette Smoke in a Special Sample of U.S. Adults, NHANES 2011-2016** provides data for a sample of adult cigarette smokers and nonsmokers from NHANES 2011-2012, 2013–2014, and 2015-2016. The Special Sample was created to determine the effectiveness of tobacco product standards under The Family Smoking Prevention and Tobacco Control Act of 2009. Of note, the age for eligibility in the Special Sample decreased from 20 years and older in NHANES 2011–2012 to 18 years and older in NHANES 2013–2014 and 2015–2016 (NHANES lowered the age for asking the smoking questions in 2013).

The *Updated Tables, March 2021* provides data for more than 400 chemicals, of which 73 are reported for the first time or measured in a new matrix and 108 have been updated since the *Updated Tables, January 2019*. Hyperlinks to biomonitoring summaries that have information about a specific chemical or chemical group can be found in the footnotes for many data tables. Several tables also contain a link to a factsheet about the chemical or chemical group within the footnotes. Two appendices are updated to include information pertinent to the chemicals reported in the *Updated Tables, March 2021* (Appendix C. Limit of Detection Table; Appendix D. References for Biomonitoring Methods).

The National Report on Human Exposure to Environmental Chemicals website is the best resource for updates of available data. It includes the document, "Chemicals in the Fourth Report and Updated Tables," which is a complete list of the chemicals in *Updated Tables, March 2021.* The *Fourth National Report on Human Exposure to Environmental Chemicals, 2009*, can also be downloaded from this website.

Public Health Uses of the *Report* and *Updated Tables*

The overall purpose of the *Report* and *Updated Tables* is to provide specific information to scientists, physicians, and health officials to help prevent exposure to environmental chemicals. Some public health uses of the exposure information in the *Report* and *Updated Tables* include the following:

- To determine which chemicals are getting into U.S. residents and at what concentrations.
- To determine the prevalence of people with levels of chemicals above known toxicity levels (e.g., blood lead level greater than or equal to a specific concentration).
- To determine the prevalence of people with levels of chemicals that put them at increased risk for toxicity.
- To establish reference ranges that physicians and scientists can use to determine whether a person or group has an unusually high exposure. (This information is especially helpful to identify population groups that merit further assessment of exposure sources or health effects.)
- To assess the effectiveness of public health efforts to reduce exposure of U.S. residents to specific chemicals.
- To determine whether exposure levels are higher among potentially vulnerable groups, such as minorities and children.
- To track trends in levels of exposure of the population.
- To set priorities for research on human health effects.

What's New and Different?

The *Updated Tables, March 2021* includes chemicals that have results available from the NHANES survey periods 1999–2000 through 2015–2016.

Updated Tables **in Four Volumes**

The *Updated Tables, March 2021* has been reorganized and expanded into **four volumes**, each a separate document. Data for chemicals measured in individual samples from the general U.S. population are found in Volumes One and Two. Other types of data, such as measurements in pooled samples or from special subsets of the NHANES population, are in Volumes Three and Four. The format of each document is compliant with Section 508 Accessibility requirements to assist visually impaired users.

Volumes are organized chronologically, with **Volume One** containing data from NHANES 1999-2010 and **Volume Two** containing data from NHANES 2011-2016. Within each volume, chemical groups and their analytes are listed in a navigable table of contents on the left side pane.

As an example, if users are interested in blood lead data from NHANES 2013-2014, they would open Volume Two, scroll down to the "Metals and Metalloids" section within the navigable table of contents in the left side pane, expand the section, select "Lead," and then find the rows containing summary data for NHANES 2013-2014. Users interested in analyzing trends in biomonitoring data may wish to access tables in both volumes, which together contain all the years of available data for the general U.S. population.

Volume Three: Analysis of Pooled Serum Samples for Select Chemicals, NHANES 2005-2016 presents data tables for persistent organic pollutants and pesticides that were measured in pooled samples. Data tables for these chemicals that are based on individual samples can be found in Volume One: NHANES 1999-2010.

Volume Four: Analysis of Chemicals Found in Cigarette Smoke in a Special Sample of U.S. Adults, NHANES 2011-2016 presents data for a sample of adult cigarette smokers and nonsmokers from NHANES 2011-2012 through 2015-2016.

New Chemicals

Chemicals reported for the first time and those measured in a new matrix include:

- Adducts of hemoglobin in the general population and in a special sample of adult smokers and nonsmokers
    - Formaldehyde
- Urinary tobacco alkaloids and metabolites in the general population and in a special sample of adult smokers and nonsmokers
    - Anabasine
    - Anatabine
    - Cotinine
    - Cotinine-n-oxide
    - Hydroxycotinine
    - Trans-3'-hydroxycotinine
    - 1-(3-Pyridyl)-1-butanol-4-carboxylic acid
    - Nicotine
    - Nicotine-N'-oxide

    - Nornicotine
- Urinary tobacco-specific nitrosamines (TSNAs)
    - N'-Nitrosoanabasine (NAB)
    - N'-Nitrosoanatabine (NAT)
    - N'-Nitrosonornicotine (NNN)
- Urinary volatile N-nitrosamine compounds (VNAs) in the general population and in a special sample of adult smokers and nonsmokers
    - N-Nitrosodiethylamine (NDEA)
    - N-Nitrosoethylmethylamine (NMEA)
    - N-Nitrosomorpholine (NMOR)
    - N-Nitrosopiperidine (NPIP)
    - N-Nitrosopyrrolidine (NPYR)
- Urinary flame retardants
    - Dicresyl phosphates (DCPs)
- Urinary insect repellent and metabolites
    - 3-(Ethylcarbamoyl) benzoic acid (ECBA)
- Urinary neonicotinoids
    - Acetamiprid
    - Clothianidin
    - N-desmethylacetamiprid
    - 5-hydroxyimidacloprid
    - Imidacloprid
    - Thiacloprid
- Urinary per- and polyfluoroalkyl substances (PFAS)
    - Perfluorobutanoic acid (PFBA)
    - Perfluorobutane sulfonic acid (PFBS)
    - Perfluorodecanoic acid (PFDA)
    - Perfluoroheptane sulfonic acid (PFHpS)
    - Perfluoroheptanoic acid (PFHpA)
    - Perfluorohexane sulfonic acid (PFHxS)
    - Perfluorohexanoic acid (PFHxA)
    - Perfluorononanoic acid (PFNA)
    - N-perfluorooctanoic acid (n-PFOA)
    - Branched perfluorooctanoic acid isomers (Sb-PFOA)
    - N-perfluorooctane sulfonic acid (n-PFOS)
    - Branched perfluoromethylheptane sulfonic acid isomers (Sm-PFOS)
    - Perfluoropentanoic acid (PFPeA)
    - Perfluoroundecanoic acid (PFUnDA)
    - 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
    - Adona (ammonium salt of 4,8-dioxa-3H-perfluorononanoic acid)
    - GenX (ammonium salt of 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (HFPO-DA))
- Serum sex steroid hormones
    - Estradiol
    - Sex hormone-binding globulin (SHBG)
    - Total testosterone
- Urinary volatile organic compound (VOC) metabolites

    - N-Acetyl-S-(1-cyano-2-hydroxyethyl)-L-cysteine
    - N-Acetyl-S-(2-hydroxy-3-methyl-3-buten-1-yl)-L-cysteine + N-Acetyl-S-[1-(hydroxymethyl)-2-methyl-2-propen-1-yl]-L-cysteine
    - N-Acetyl-S-(4-hydroxy-2-methyl-2 buten-1-yl)-L-cysteine
- Serum aldehydes in the general population and in a special sample of adult smokers and nonsmokers
    - Benzaldehyde
    - Butyraldehyde
    - Crotonaldehyde
    - Decanaldehyde
    - Heptanaldehyde
    - Hexanaldehyde
    - Isopentanaldehyde
    - Nonanaldehyde
    - Octanaldehyde
    - Pentanaldehyde
    - Propanaldehyde
    - O-Tolualdehyde
- Urinary aromatic amines in the general population and in a special sample of adult smokers and nonsmokers
    - 4-Aminobiphenyl
    - 1-Aminonaphthalene
    - 2-Aminonaphthalene
    - O-Anisidine
    - 2,6-Dimethylaniline
    - O-Toluidine
- Urinary aromatic diamines
    - 4,4'-Diaminodiphenylmethane (4MDA)
    - 1,5-Diaminonaphthalene (5NDA)
    - 2,4-Diaminotoluene (4TDA)
    - 2,6-Diaminotoluene (6TDA)
    - P-Phenylenediamine (PPDA)

Updated Data

Chemical groups with updated data in this release are:

- Adducts of Hemoglobin
- Tobacco Alkaloids and Metabolites
- Tobacco-Specific Nitrosamines
- Personal Care and Consumer Product Chemicals and Metabolites
- Flame Retardant Metabolites
- Herbicides and Metabolites
- Insect Repellent and Metabolites
- Organophosphorus Insecticides: Dialkyl Phosphate Metabolites
- Organochlorine Pesticides and Metabolites
- Polybrominated diphenyl ethers and PBB 153
- Dioxin-like Polychlorinated Biphenyls: mono-ortho-substituted PCBs

- Polychlorinated Biphenyls: Non-Dioxin-Like
- Metals and metalloids
- Perchlorate and Other Anions
- Phthalate and Phthalate Alternative Metabolites
- Volatile Organic Compound (VOC) Metabolites

Stratification by Cigarette Smoking Status

For the first time, summary statistics for chemicals within the following sections have been stratified by cigarette smoking status, which is defined as a serum cotinine concentration more than 10 ng/mL in adults participants from NHANES, excluding those who reported using other tobacco products.

- Tobacco alkaloids and metabolites
- TSNAs
- Aromatic amines

Change in the Population Sampled for Urinary Chemicals: NHANES 2015–2016

Beginning with the NHANES 2015–2016 survey period, the age for urine collection was lowered from age 6 years to age 3 years. This change was made to obtain data for younger children, a vulnerable population with limited urinary data. The urinary environmental chemicals are measured in a full sample (i.e., all children able to provide a urine specimen) of children 3 to 5 years old. For ages 6 years and older, the urinary environmental chemicals are measured in a representative one-third sample of participants.

The addition of ages 3 to 5 years to the survey population will mean that descriptive statistics (geometric mean, selected percentiles) for the total population and non-age-related demographic groups in NHANES 2015–2016 will not be directly comparable to descriptive statistics in earlier NHANES survey periods. This is because the populations sampled are not equivalent.

PFOS and PFOA Results for NHANES 2013–2014 and 2015–2016

Starting in 2013, we began measuring linear and branched isomers of both PFOS and PFOA and no longer measured total PFOS and total PFOA. Collectively, the isomers of each chemical represent more than 95% of what was previously reported as PFOS and PFOA. Data tables for each of the four isomers are also presented.

PFOS and PFOA are calculated by summing the linear and branched isomers for each participant before applying the appropriate sample weight. Because the 2013–2014 and 2015–2016 values are a calculated sum, there is no limit of detection (LOD) for PFOS and PFOA. See Calculation of PFOS and PFOA as the Sum of Isomers for more details. The calculated PFOS and PFOA results can be used to compare with previous measurements and to examine trends in the general U.S. population.

"What's New and Different" Archives

The "What's New and Different" sections from previous releases of *Updated Tables* are available in the archives from *Updated Tables* at: https://www.cdc.gov/exposurereport/.

Overview of Volume Three: Analysis of Pooled Serum Samples for Select Chemicals, NHANES 2005-2016

Background

In the National Biomonitoring Program, pooling samples to make chemical measurements is used to address:

- The need to improve the sensitivity of the measurement; that is, the chemical concentrations are so low that a larger sample volume is necessary to achieve lower limits of detection and greater likelihood of detectable results; and
- The need to reduce the number of samples analyzed, based on weighing the costs of the analysis against a low frequency of detectable results.

Pooled Samples in the *Updated Tables*

Volume Three of the *Updated Tables, March 2021* includes results for chemicals that were measured in samples created from pools of serum samples from NHANES 2005-2006, 2007-2008, 2009-2010, 2011-2012, 2013-2014, and 2015-2016. Some of these chemicals were previously measured in individual samples from the general U.S. population; these data can be found in Volume One: NHANES 1999-2010.

Overview of Sample Pooling

Beginning with NHANES 2005-2006, the CDC used a weighted pooled-sample design to measure serum concentrations of dioxins, furans, polychlorinated biphenyls (PCBs), organochlorine pesticides and metabolites, and the brominated flame retardants (polybrominated diphenyl ethers and the polybrominated diphenyl, PBB 153). In previous NHANES survey periods, measurements were made on individual serum samples from the U.S. population using stratified multistage selection.

Although NHANES sampling weights can be incorporated to make pooled sample estimates representative of the non-institutionalized U.S. population, there are statistical estimation challenges. Measurements of these chemicals in individuals tend to have a log-normal distribution with central tendency best estimated using a geometric mean. However, the measured value for a pooled sample is comparable to an arithmetic average of measurements in individuals. Consequently, the pooled sample result is expected to be higher than the geometric mean of multiple individual results. Another challenge is that direct calculation of the design effects required for accurate standard error and confidence interval estimation is not possible because samples are pooled across the design cells of the original survey. For these reasons, data tables showing the pooled sample results present only weighted arithmetic means and unadjusted standard errors for each category.

Interpreting the Data

The following cautions and suggestions apply to the pooled sample results and data tables:

a) Individual sample data, as explained above, tend to be log-normally distributed with central tendency best estimated using a geometric mean. Pooled data are comparable to an arithmetic mean of individual sample results and therefore, pooled data results are expected to be higher than the geometric mean of individual sample results. Therefore, the weighted arithmetic means from pooled samples are expected to be higher than the geometric means provided in the historical (companion) data tables or in other publications based on data provided on individual results.

b) The standard errors are unadjusted and therefore, do not reflect the design effects of the survey. In many cases, the standard errors are based on very few pooled sample measurements and cannot be expected to accurately reflect the true imprecision of the weighted arithmetic mean estimates. Therefore, when the unadjusted standard error was more than 30% of the weighted arithmetic mean, this is noted with a double asterisk (**) and footnoted.

Additional information about sample pooling is available from the following sources:

Geometric mean estimation from pooled samples (2007)

https://pubmed.ncbi.nlm.nih.gov/17618673/

Characterizing populations of individuals using pooled samples (2010)

https://pubmed.ncbi.nlm.nih.gov/19002216/

Use of pooled samples from the National Health and Nutrition Examination Survey (2012)

https://pubmed.ncbi.nlm.nih.gov/22492247/

Estimation of exposure distributions from pooled samples (2014)

https://pubmed.ncbi.nlm.nih.gov/25213192/

Overview of Volume Four: Analysis of Chemicals Found in Cigarette Smoke in a Special Sample of U.S. Adults, NHANES 2011-2016

Background

The Family Smoking Prevention and Tobacco Control Act of 2009 gave the Food and Drug Administration regulatory authority over tobacco products. In Section 907(a)[1], the Act states that the Secretary of Health and Human Services shall establish tobacco product standards. These product standards will include provisions for the testing of tobacco products. To determine the effectiveness of these product standards, surveillance systems need to be in place before the standards are enacted to determine their impact on exposure among people who continue to use tobacco products. NHANES is an ideal source of samples of clinical specimens from humans for assessing smokers in multiple locations around the country. NHANES will provide a robust dataset for identifying changes in exposure of smokers that follow enactment of tobacco product standards.

Special Sample in NHANES

Beginning with NHANES 2011-2012, a Special Sample was selected for measurement of certain groups of chemicals associated with tobacco smoke exposure. The Special Sample consists of: 1) a nationally representative sample of adults; and 2) all adults who reported being current cigarette smokers. For this sample, adults were defined as ages 20 years and older in 2011-2012 and 18 years and older beginning in 2013.

Cigarette smokers were defined by their responses to the Smoking-Cigarette Use (SMQ_G) questionnaire: "Have you smoked at least 100 cigarettes in your life?" (SMQ020=1), and then, confirmed that they smoke every day (SMQ040=1) or some days (SMQ040=2). The nonsmoker category was comprised of the remaining adults in the Special Sample who were not categorized as smokers of any tobacco products. Excluded from the nonsmoker category was any adult who reported that they used any of the following non-cigarette tobacco products: cigars; pipes; chewing tobacco; snuff; or nicotine patch, gum or other replacement product. This resulted in exclusion of 3.54% (weighted) from the total sample for NHANES 2011-2012, 4.85% (weighted) in NHANES 2013-2014, and 4.18% (weighted) in NHANES 2015-2016.

Too few adults reported use of non-cigarette tobacco products to allow separate categories for these products. We did not use serum cotinine concentrations to distinguish between smokers and nonsmokers because not all adults in the sample had results: for example, 4.17% (weighted) and 3.68% (weighted) of the 2011-2012 and 2013-2014 samples, respectively, were missing serum cotinine results. In 2013-2014 and 2015-2016 four additional non-cigarette tobacco products were included in the NHANES questionnaire, but in order to maintain consistency across surveys, users of these products were not included in the nonsmoker category in the later surveys. If these products had been included in the later surveys, the weighted percentages of subjects in the non-smoker category would have changed by only 1.3% and 2.0%, respectively, for the 2013-2014 and 2015-2016 surveys; and the smoker category would have changed by only 0.04% and 0.24%, respectively.

Results are displayed separately for adult cigarette smokers and nonsmokers. Each data table shows geometric mean and selected percentiles by three categories: total, age group (20-49 or 18-49 years, 50 years and older), and sex (male, female). Racial/ethnic categories are not presented because the sample sizes were too small to yield reliable estimates in one or more of the categories.

[1] https://www.fda.gov/tobacco-products/rules-regulations-and-guidance/section-907-federal-food-drug-and-cosmetic-act-tobacco-product-standards

Data Sources and Data Analysis

Blood, serum, and urine samples from NHANES

Biomonitoring measurements for CDC's *National Report on Human Exposure to Environmental Chemicals* and *Updated Tables* (referred to as the *Report* and *Updated Tables*, respectively) are made using samples from participants in the National Health and Nutrition Examination Survey (NHANES), conducted by CDC's National Center for Health Statistics (NCHS). NHANES is designed to collect data on the health and nutritional status of the U.S. population. NHANES collects information about a wide range of health-related behaviors, performs physical examinations, and collects clinical samples for laboratory tests. Beginning in 1999, NHANES became a continuous survey, sampling the U.S. population annually and releasing the data in 2-year cycles. The sampling plan follows a complex, stratified, multistage, probability-cluster design to select a representative sample of the civilian, noninstitutionalized population in the United States based on age, gender, and race/ethnicity.

The NHANES protocol includes a home interview, followed by a standardized physical examination in a mobile examination center. As part of the examination, blood is obtained by venipuncture from participants aged 1 year and older, and urine specimens are collected from participants aged 6 years and older. Starting with the 2015–2016 survey, urine specimens were collected from children ages 3–5 years. Additional detailed information on the design and conduct of the NHANES survey is available at https://www.cdc.gov/nchs/nhanes/.

NHANES measures environmental chemicals in blood, serum, or urine collected from participants. Most of the environmental chemicals are measured in randomly selected subsamples within specific age groups. Randomization of subsample selection is built into the NHANES design before sample collection begins. Different random subsamples include different participants. Subsampling is needed to ensure an adequate quantity of sample for analysis and the mass spectrometry analytical methods.

- Data tables in the *Report* and *Updated Tables* specify age groups and sample sizes for each exposure measurement.
- Blood measurements in children younger than 12 years are limited by the amount of blood that can be collected.
- Blood metals are measured in participants aged 1 year and older.
- Beginning in 2011, the blood mercury species methyl mercury and ethyl mercury were added.
- Most measurements of chemicals in serum are made in samples from participants ages 12 years and older.
- Urine was collected from participants ages 6 years and older until 2015, when it became possible to collect urine from children as young as 3 years.
- Most urine chemicals are measured in a representative one-third subsample, but a full sample is used for participants ages 3–5 years.

If a particular chemical or an entire chemical group has no detectable results for three survey periods, it is usually not measured in subsequent survey periods. Some examples include:

- The sulfonyl urea herbicide group was measured in NHANES 2003–2004, 2005–2006, and 2007–2008 with no detections, even at the 95th percentile, so this group is no longer measured in the ongoing survey.
- Mono-*n*-octyl phthalate (MOP), a phthalate urinary metabolite, was not detected above the 95th percentile for more than three survey cycles, so it was no longer reported after 2010.

- Several banned organophosphate and organochlorine pesticides have become largely undetectable and are no longer measured.
- Some chemicals are widely detected but have had unchanging levels in the population (e.g., phytoestrogens) and are no longer measured.

By discontinuing measurements of chemicals that are rarely or not detected, and well-characterized chemicals for which the source of exposure is consistent, CDC's Division of Laboratory Sciences can better focus its resources on assessing exposure to chemicals of highest priority. In addition to performing measurements on NHANES samples, these efforts include developing new and improving existing biomonitoring methods for chemicals of concern.

Beginning with NHANES 2005–2006, CDC used a weighted pooled-sample design to measure serum concentrations of dioxins, furans, polychlorinated biphenyls (PCBs), organochlorine pesticides and metabolites, and brominated flame retardants (polybrominated diphenyl ethers and polybrominated biphenyl [PBB] 153). Pooled samples are used when larger sample volumes are needed to improve the sensitivity of the measurements and to reduce the number of samples being analyzed, balancing the cost of the analysis against a low frequency of detectable results.

The following considerations guided the selection of chemicals in the *Report* and *Updated Tables*:

- Scientific data suggested exposure in the U.S. population.
- Health effects known or suspected to result from some levels of exposure were serious enough to cause concern.
- Data were needed to assess the effectiveness of public health actions to reduce exposure to a chemical.
- Biomonitoring analytical methods could provide results with adequate accuracy, precision, sensitivity, specificity, and throughput.
- Adequate blood or urine samples were available.
- Incremental analytical costs to perform the biomonitoring analysis for the chemical were reasonable.

The availability of biomonitoring methods with adequate performance and acceptable cost was a major consideration. Details on the prioritization process for scoring nominated chemicals and the resulting scores are available at: https://www.cdc.gov/exposurereport/chemical_selection.html.

Laboratory Analysis

CDC's Division of Laboratory Sciences made the blood, serum, and urine exposure measurements in the *Report* and *Updated Tables*. The following analytical techniques were used for measuring the environmental chemicals or their metabolites in blood, serum, and urine:

- Isotope dilution mass spectrometry
- Inductively coupled plasma mass spectrometry
- Graphite furnace atomic absorption spectrometry

Laboratory measurements underwent extensive quality control and quality assurance review:

- Tolerance limits for operational parameters were maintained.
- Quality control samples were measured in each analytical run to detect unacceptable performance in accuracy or precision.
- Traceable calibration materials were verified.

Appendix D lists references for the analytical methods used to measure the different chemicals.

Data Analysis

NHANES is a complex, stratified, multistage, probability-cluster design survey. This survey design requires sample weights to be used to adjust for the unequal probability of selection into the survey. Sample weights are also used to adjust for possible bias resulting from nonresponse and are post-stratified to U.S. Census Bureau estimates of the U.S. population. Data were analyzed using Statistical Analysis System (SAS) (SAS Institute Inc.) and the SUDAAN (RTI International, NC) statistical software packages. SUDAAN uses sample weights and calculates variance estimates that account for the complex survey design. The design does not permit straightforward analysis of exposure levels by non-targeted strata such as locality, state, or region; seasons of the year; proximity to sources of exposure; or by use of particular products. NCHS guidelines for analysis of NHANES data are available at https://wwwn.cdc.gov/nchs/nhanes/analyticguidelines.aspx.

The *Report* and *Updated Tables* present descriptive statistics on the blood, serum, or urine levels for each environmental chemical reported. Statistics include unadjusted geometric means and percentiles with confidence intervals. In each table, results are given for the total population and by age group, gender, and race/ethnicity, as defined in NHANES. For these analyses, based on the sample design, race/ethnicity is categorized as Mexican American, non-Hispanic black, and non-Hispanic white. Beginning in 2011–2012, two additional categories were added: all Hispanic and non-Hispanic Asian (referred to as Asian in the tables). Other racial/ethnic groups are sampled, but the proportion of the total U.S. population represented by other racial/ethnic groups is not large enough to produce valid estimates. Other racial/ethnic groups are included in estimates that are based on the entire population sample. Age groups are as described for each chemical in each data table. Gender is coded as male or female.

Units

For chemicals measured in urine, levels are presented per volume of urine and per gram of creatinine. Urinary levels are expressed both ways in the literature and used for different purposes. Levels per gram of creatinine (i.e., creatinine corrected) adjust for urine dilution. For example, a person who drinks more fluids than another person will likely have a higher, but more dilute, urine output. Interpretation of creatinine-corrected results should also recognize that creatinine correction can partially adjust for differences in lean body mass or renal function among persons. Children and young adolescents typically have less muscle mass than adults. Because muscle is an important source of creatinine in urine, children have lower urinary creatinine concentrations than do adults. The lower urine creatinine concentration can result in higher creatinine-corrected results in children in comparison with adults.

For dioxins, furans, PCBs, and organochlorine pesticides, serum levels are presented per gram of total lipid and per whole weight of serum. These compounds are lipophilic and concentrate in the body's lipid stores, including the lipid in serum. Serum levels reported per gram of total lipid reflect the amount of these compounds stored in body fat. Serum levels per whole weight of serum are also included for easier comparison with studies investigating exposure to these chemicals that reported levels in these units. Other, mostly non-lipophilic chemicals, measured in serum are expressed per liter of serum (e.g., micrograms per liter). Hemoglobin adducts are expressed in nanomoles or picomoles per gram of blood hemoglobin.

Results are reported in standard units, generally conforming to those most commonly used in biomonitoring measurements. The table below shows some useful unit conversions.

Table: Units of measurement and abbreviations

Unit	Abbreviation	Value
liter	L	--
deciliter	dL	10^{-1} liters
milliliter	mL	10^{-3} liters
gram	g	--
milligram	mg	10^{-3} grams
microgram	µg	10^{-6} grams
nanogram	ng	10^{-9} grams
picogram	pg	10^{-12} grams
femtogram	fg	10^{-15} grams

Geometric means

A geometric mean gives a better estimate of central tendency for data that are distributed with a long tail at the upper end of the distribution. This type of distribution is common when measuring environmental chemicals in blood or urine. The geometric mean is influenced less by high values than is the arithmetic mean. In the *Report* and *Updated Tables*, geometric means are calculated by taking the log of each concentration and then using SUDAAN software to compute the weighted mean of those log-transformed values. Ninety-five percent confidence intervals around the weighted mean are calculated by adding and subtracting an amount equal to the product of a Student's *t*-statistic and the standard error of the weighted mean estimate. The degrees of freedom of the *t*-statistic was determined by subtracting the number of strata from the number of primary sampling units, according to the data available from the complex survey design. The standard error was computed with SUDAAN's PROC DESCRIPT procedure and "with replacement" design option (design = WR), with Taylor series linearization used for variance estimation. The weighted geometric mean and its confidence limits were obtained by taking the antilog of this weighted mean and its upper and lower confidence limits.

The measured value for a pooled sample is comparable to an arithmetic average of measurements in individuals. Consequently, the pooled sample result is expected to be higher than the geometric mean of multiple individual results. In addition, direct calculation of the design effects required for accurate standard error and confidence interval estimation is not possible because samples are pooled across the design cells of the original survey. For these reasons, data tables showing the pooled sample results present only weighted arithmetic means and unadjusted standard errors for each category. The standard errors are unadjusted and therefore, do not reflect the design effects of the survey. In many cases, the standard errors are based on very few pooled sample measurements and cannot be expected to accurately reflect the true imprecision of the weighted arithmetic mean estimates. Therefore, when the unadjusted standard error was more than 30% of the weighted arithmetic mean, this is noted with a double asterisk (**) and footnoted.

Limit of detection

The limit of detection (LOD) is the level at which the measurement has a 95% probability of being greater than zero (Taylor, 1987). In the *Updated Tables*, the LODs for each chemical and survey period are provided in a footnote to each data table and collectively in Appendix C. Concentrations less than the LOD are assigned a value equal to the LOD divided by the square root of two for calculation of geometric means (Hornung and Reed, 1990). Assigning concentrations less than the LOD a value equal to the LOD divided by the square root of two made little difference in geometric mean estimates. If the proportion of results below the LOD was greater than 40%, geometric means were not calculated. For the same chemical, LOD values sometimes change over time as a result of improvements to analytical

methods. One possible consequence is that results reported as "< LOD" in the 1999–2000 data might be reported as a concentration value above the LOD in 2001–2002 or 2003–2004 because the analytical method had improved. Thus, for proper interpretation of LODs in the data tables, care must be taken to use the LOD that applies to the survey period. Percentile estimates (see below) that are less than the LOD for the chemical analysis were reported as "< LOD."

For most chemicals, the LOD is constant for each specimen analyzed. Dioxins, furans, PCBs, organochlorine pesticides, and a few other pesticides are different: these have an individual LOD for each sample, mostly because the sample volume used for each analysis was different. A higher volume of the specimen results in a lower LOD (i.e., a better ability to detect low levels). The maximum LOD values are given in each data table and in Appendix C. The maximum LOD was the highest LOD among all samples analyzed. Typically, the mean LOD is about 40%–50% of the maximum LOD. The same procedure for imputing values below the LOD in calculations of geometric means was used for chemicals with individual LODs for each sample. Concentrations less than the individual LOD were assigned a value equal to the individual LOD divided by the square root of two. When reporting percentiles for chemicals with individual sample LODs, if any sample LOD in the demographic group was above the percentile estimate, then the percentile estimate was not reported.

For chemicals measured in urine, separate tables are presented for the chemical concentration expressed per volume of urine (uncorrected table) and the chemical concentration expressed per gram of creatinine (creatinine corrected table). Geometric mean and percentile calculations were performed separately for each of these concentrations. LOD calculations were performed using the chemical concentration expressed per volume of urine, because this concentration determines the analytical sensitivity. For this reason, LOD results for urine measurements in each data table and in Appendix C are in units of weight per volume of urine. In the creatinine corrected tables, a result for a geometric mean or percentile was reported as < LOD if the corresponding geometric mean or percentile was < LOD in the table using weight per volume of urine. For example, if the 50th percentile for males was < LOD in the table using weight per volume of urine, it would also be < LOD in the creatinine corrected table.

For chemicals measured in serum lipid, separate tables are presented for the chemical concentration expressed per volume of serum (lipid unadjusted or whole weight table) and the chemical concentration expressed per amount of lipid (lipid adjusted table). Geometric mean and percentile calculations were performed separately for each of these concentrations. LOD calculations were performed using the chemical concentration expressed per amount of lipid, because this concentration determines the analytical sensitivity. For this reason, LOD results for chemicals measured in each data table and in Appendix C are expressed in units of weight per amount of lipid. In the lipid unadjusted tables, a result for a geometric mean or percentile was reported as < LOD if the corresponding geometric mean or percentile was < LOD in the lipid adjusted table.

Percentiles

Percentiles (50th, 75th, 90th, and 95th) provide additional information about the shape of the distribution. Percentile estimates and 95% confidence interval estimates less than the limit of detection in the data tables are indicated as <LOD. An explanation of the procedure for estimating percentiles is provided in Appendix A and an example using SAS-callable SUDAAN is provided on the website (see "SAS Code Example" at: https://www.cdc.gov/exposurereport/).

References

Taylor JK. 1987. Quality assurance of chemical measurements. Boca Raton, FL: Lewis Publishers.

Hornung RW, Reed LD. 1990. Estimation of average concentration in the presence of nondetectable values. Appl Occup Environ Hyg 5(1):46-51.

Interpretation of Report and Updated Tables Data: Important Considerations

Research studies, separate from the *Report* and *Updated Tables*, are required to determine whether blood or urine levels are safe or are associated with disease or adverse effects.

The measurement of an environmental chemical in a person's blood or urine does not mean, by itself, that the chemical causes disease. Advances in analytical methods allow us to measure low levels of environmental chemicals in people, but separate studies of varying exposure levels and health effects are needed to determine whether blood or urine levels result in disease. These studies must also consider other factors such as duration of exposure. The *Report* and *Updated Tables* do not present new data on health risks from different exposures.

For some environmental chemicals, such as lead, research studies have given us a good understanding of the health risks associated with different blood levels. However, for many environmental chemicals, we need more research to assess health risks from different blood or urine levels. The results shown in the *Report* and *Updated Tables* should help prioritize and foster research on human health risks that result from exposure to environmental chemicals. For more information about exposure to environmental chemicals, see the section in this document titled "Chemical and Toxicological Information," which includes Internet reference sites.

Persistent and non-persistent chemicals; Use of percentiles; Comparison of levels between groups

In the *Report* and *Updated Tables*, most measurements in urine quantify chemical metabolites of non-persistent chemicals (those that do not stay in the body a long time). Metals and some tobacco biomarkers (e.g., heterocyclic amines) measured in urine are exceptions for they are not metabolites. Persistent chemicals (those that stay in the body for a long time) are usually measured in serum as the parent chemical.

The higher percentiles (75th, 90th, 95th) provided for each chemical convey useful information about the upper distribution and range of levels in the population. The 95th percentile is helpful when determining whether levels observed in separate public health investigations or other studies are unusual.

Levels of chemicals are provided for the demographic groups as stratified by age, gender, and race/ethnicity. Demographic groups may not be equal in their composition with respect to other variables. Chemicals measured in pooled serum samples are stratified by combined demographic groups (e.g., non-Hispanic black females, ages 12-19 years). CDC scientists publish separate scientific papers that make detailed comparisons of levels of chemicals in different demographic groups. See https://www.cdc.gov/exposurereport/ for a list of peer-reviewed biomonitoring papers.

Not all the chemicals in the *Report* and *Updated Tables* are measured in the same individuals. Therefore, it is not possible to determine the fraction of all measured chemicals that were found at detectable levels in each person.

Blood, serum, and urine levels of a chemical should not be confused with levels of the chemical in air, water, food, soil, or dust.

Concentrations of environmental chemicals in blood or urine are not the same as those in air, water, food, soil, or dust. For example, a chemical concentration of 10 µg/L in water does not produce a level of 10 µg/L in blood or urine. Blood or urine levels may reflect exposure from one or more sources, including air, water, food, soil, and dust.

Levels of a chemical in blood, serum, and urine are determined by how much of the chemical has entered the body through all routes of exposure, including ingestion, inhalation, and dermal absorption, and how the chemical is distributed in body tissues, transformed into metabolites, and eliminated from the body. Although the levels in the blood, serum and urine are measures of the amount of a chemical that has entered the body by all routes of exposure, the blood or urine level alone does not indicate the specific exposure source or route of exposure.

Calculation of Inorganic-related Arsenic Species

We present data for the urinary inorganic-related arsenic species. The values are calculated using results for each NHANES survey period for the following four arsenic species: arsenic (V) acid, arsenous (III) acid, dimethylarsinic acid (DMA), and monomethylarsonic acid (MMA). The sum of the four species is calculated for each individual NHANES participant. If the value of a species is less than the limit of detection (LOD), then the imputed value is used. The imputed value is calculated as the LOD divided by the square root of two (Hornung and Reed, 1990) and imputed values are provided in the NHANES public release file. If all four arsenic species are reported as less than the LOD, then the sum will be the sum of the four imputed values.

The geometric means, selected percentiles, and confidence intervals are calculated using sums with detectable values of 60 percent or higher. If the detection frequency for a category is less than 60 percent, this is indicated by an asterisk (*). There is no LOD for the inorganic-related arsenic species because the values are calculated, rather than measured.

Reference

Hornung RW, Reed LD. 1990. Estimation of average concentration in the presence of nondetectable values. Appl Occup Environ Hyg 5(1):46-51.

Calculation of PFOS and PFOA as the Sum of Isomers

Whereas we directly measured and reported serum total PFOS and PFOA prior to 2013, beginning with NHANES 2013-14 we began measuring linear and branched isomers of serum PFOS and PFOA and summing them to arrive at total PFOS and PFOA. This calculated sum of PFOS (or PFOA) isomers is comparable to the total PFOS (or PFOA) that we reported previously.

The decision to measure linear and branched isomers relates to the processes historically used to produce PFOS and PFOA. From the early 1950s to the early 2000s, electrochemical fluorination (ECF) was the primary process used to synthesize these compounds; thereafter, fluorotelomerization became the primary method. While ECF yielded linear and branched isomers, fluorotelomerization produced almost exclusively linear compounds. Measurement of the two types of isomers is informative because branched isomers may be eliminated from the body more rapidly than linear isomers (Benskin et al, 2009a). In some cases, measurement of the two isomers provides information that is helpful for evaluating exposure source contributions (Benskin et al, 2010, 2009b).

The value of PFOS is calculated as the sum of branched PFOS isomers (perfluoromethylheptane sulfonate isomers, Sm-PFOS) plus the linear isomer (*n*-PFOS). PFOA is calculated as the sum of branched PFOA isomers (Sb-PFOA) plus the linear isomer (*n*-PFOA). For each chemical (PFOS and PFOA), the sum of the branched and linear isomers is calculated for each individual NHANES participant. If the value for any isomer is below the limit of detection (LOD), then the imputed value is used. The imputed value is calculated as the LOD divided by the square root of two (Hornung and Reed, 1990) and imputed values are provided in the NHANES public release file. If both isomers for calculating either PFOS or PFOA are reported as less than the LOD, then two imputed values are summed. These calculated PFOA and PFOS results can be used to compare with previous measurements and examine trends in the U.S. population.

The geometric means, selected percentiles, and confidence intervals are calculated using sums with detectable values of 60 percent or higher. If the detection frequency for a category is less than 60 percent, this is indicated by an asterisk (*). Because the 2013-2014 and 2015-2016 values for PFOA and PFOS are a calculated sum, there is no limit of detection (LOD) for either of these two chemicals.

The branched isomers of PFOS (Sm-PFOS) and PFOA (Sb-PFOA) are a mixture of isomers. The isomers known to be included in Sm-PFOS are perfluoro-3-methylheptane sulfonate, perfluoro-4-methylheptane sulfonate, perfluoro-5-methylheptane sulfonate, and perfluoro-6-methylheptane sulfonate. The isomers known to be included in Sb-PFOA are perfluoro-3-methylheptanoic acid, perfluoro-4-methyheptanoic acid, perfluoro-5-methyheptanoic acid, perfluoro-6-methyheptanoic acid, perfluoro-4,4-dimethylhexanoic acid, perfluoro-5,5-dimethylhexanoic acid, perfluoro-3,5-dimethylhexanoic acid, and perfluoro-4,5-dimethylhexanoic acid. The linear isomers of PFOS (*n*-PFOS) and PFOA (*n*-PFOA) are single chemicals. Data tables are also presented for each of the four isomers that were measured.

References

Benskin JP, Hold A, Martin JW. 2009a. Isomer-specific biotransformation rates of a perfluorooctane sulfonate (PFOS) precursor by cytochrome P450 isozymes and human liver microsomes. Environ Sci Technol 43:8566-8572.

Benskin JP, DeSilver AO, Martin LJ, Arsenault G, McCrindle R, Riddell N, et al. 2009b. Disposition of perfluorinated acid isomers in Sprague-Dawley rats: part 1: single dose. Environ Toxicol Chem 28:542-554.

Benskin JP, DeSilver AG, Martin JW. 2010. Isomer profiling of perfluorinated substances as a tool for source tracking: a review of early findings and future applications. Rev Environ Contamin Toxicol 208:111-160.

Hornung RW, Reed LD. 1990. Estimation of average concentration in the presence of nondetectable values. Appl Occup Environ Hyg 5(1):46-51.

Chemical and Toxicological Information

The *National Report on Human Exposure to Environmental Chemicals* and *Updated Tables (*referred to as the *Report* and *Updated Tables*, respectively*)* present biomonitoring data on the exposure of the U.S. population to environmental chemicals. The measurement of an environmental chemical in a person's blood or urine does not mean, by itself, that the chemical causes disease or adverse effects. Advances in analytical methods allow us to measure lower and lower levels of environmental chemicals in people. Separate studies of varying exposure levels and health effects associated with these levels are required to determine whether blood, serum, and urine levels result in disease or adverse effects. The data and information in the *Report* and *Updated Tables* do not establish health effects nor do they create guidelines.

Where can I find more information?

For more information about environmental chemicals, web links are provided below. Links to nonfederal organizations are provided solely as a service to our readers. These links do not constitute an endorsement of these organizations or their programs by CDC or the federal government. CDC is not responsible for the content of an individual organization's Web pages found at these links.

U.S. Governmental Sources

Centers for Disease Control and Prevention (CDC)

National Center for Health Statistics (NCHS)
https://www.cdc.gov/nchs/

National Health and Nutrition Examination Survey (NHANES)
https://www.cdc.gov/nchs/nhanes.htm

National Institute for Occupational Safety and Health (NIOSH)
https://www.cdc.gov/niosh/data/

- Registry of Toxic Effects of Chemical Substances (RTECS)
  https://www.cdc.gov/niosh/rtecs/

National Center for Environmental Health (NCEH)
https://www.cdc.gov/nceh/

National Biomonitoring Program
https://www.cdc.gov/biomonitoring/

Agency for Toxic Substances and Disease Registry (ATSDR)

Toxicological Profiles and ToxFAQs

- ToxFAQs
  https://www.atsdr.cdc.gov/toxfaqs/
- Toxicological Profiles
  https://www.atsdr.cdc.gov/ToxProfiles/

Toxic Substances Portal
https://www.atsdr.cdc.gov/substances/

U.S. Food and Drug Administration (FDA)

Center for Food Safety and Applied Nutrition
https://www.fda.gov/AboutFDA/CentersOffices/OfficeofFoods/CFSAN/

National Center for Toxicological Research
https://www.fda.gov/AboutFDA/CentersOffices/OC/OfficeofScientificandMedicalPrograms/NCTR/

U.S. Environmental Protection Agency (EPA)

Integrated Risk Information System (IRIS)
https://www.epa.gov/iris/

Office of Chemical Safety and Pollution Prevention (OCSPP)
https://www.epa.gov/aboutepa/about-office-chemical-safety-and-pollution-prevention-ocspp

Office of Drinking Water
https://www.epa.gov/ground-water-and-drinking-water

U.S. Geological Survey (USGS)
https://www.usgs.gov/

U.S. Department of Agriculture (USDA)

Food Safety and Inspection Service
https://www.fsis.usda.gov/wps/portal/fsis/home

National Institutes of Health (NIH)

National Institute for Environmental Health Sciences (NIEHS)
https://www.niehs.nih.gov/

National Toxicology Program (NTP)
http://ntp.niehs.nih.gov

14th Report on Carcinogens
https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html

National Library of Medicine (NLM), Toxicology Data Network
https://toxnet.nlm.nih.gov/

National Library of Medicine (NLM); MedlinePlus Health Topics: Poisoning, Toxicology, and Environmental Health
https://medlineplus.gov/poisoningtoxicologyenvironmentalhealth.html

National Library of Medicine (NLM), Environmental Health and Toxicology, online Toxicology Tutorial
https://toxtutor.nlm.nih.gov/

Professional and Academic Organizations

American Conference of Governmental Industrial Hygienists
http://www.acgih.org/home

Association of Public Health Laboratories
http://www.aphl.org/

Pediatric Environmental Health Specialty Units (PEHSUs)
http://www.PEHSU.net/

International Labour Organization

- International Chemical Safety Cards
  http://www.ilo.org/safework/info/publications/WCMS_113134/lang--en/index.htm

The EXtension TOXicology NETwork (EXTOXNET)

- Pesticide Information Profiles
  http://extoxnet.orst.edu/pips/ghindex.html

World Health Organization

International Programme on Chemical Safety (IPCS)
https://www.who.int/health-topics/chemical-safety

- Monographs of the Joint FAO/WHO Meeting on Pesticide Residues
  http://www.inchem.org/pages/jmpr.html
- Environmental Health Criteria documents
  http://www.who.int/ipcs/publications/ehc/en/

International Agency for Research on Cancer (IARC)
https://www.iarc.fr/

- Monographs on the Evaluation of Carcinogenic Risks to Humans
  https://monographs.iarc.fr/

Adducts of Hemoglobin

Acrylamide (2013 - 2016)

CAS Number 79-06-1

Geometric mean and selected percentiles of hemoglobin adduct concentrations (in pmol/g hemoglobin) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	48.4 (46.1-50.7)	42.5 (41.1-43.7)	59.2 (55.6-61.7)	113 (95.9-127)	167 (142-203)	2348
Total population	15-16	47.7 (45.0-50.6)	42.3 (40.5-44.6)	59.8 (54.0-67.0)	107 (87.7-125)	146 (125-185)	2413
Age 6-11 years	13-14	43.6 (42.4-44.7)	43.7 (41.7-45.0)	50.6 (47.6-53.5)	62.2 (55.6-68.1)	70.8 (58.3-81.1)	312
Age 6-11 years	15-16	43.2 (41.8-44.6)	43.0 (41.4-45.0)	50.2 (47.4-53.2)	59.6 (54.7-65.2)	66.4 (61.0-74.0)	323
Age 12-19 years	13-14	43.3 (40.4-46.4)	38.0 (34.9-40.7)	51.4 (46.4-58.0)	72.0 (59.2-141)	147 (74.6-246)	387
Age 12-19 years	15-16	42.5 (40.2-44.9)	40.9 (38.5-42.6)	50.0 (48.5-52.3)	63.2 (57.0-73.0)	84.0 (63.0-185)	365
Age 20-59 years	13-14	52.9 (50.1-55.9)	44.0 (42.6-46.8)	69.6 (63.2-77.1)	138 (119-164)	202 (171-231)	1134
Age 20-59 years	15-16	51.9 (47.8-56.4)	45.0 (41.0-48.1)	71.4 (62.7-82.5)	124 (108-141)	171 (137-220)	1152
Age 60+ years	13-14	41.6 (38.3-45.3)	39.1 (35.1-42.9)	51.9 (47.2-56.8)	71.3 (60.9-85.1)	99.5 (74.0-117)	515
Age 60+ years	15-16	42.0 (38.8-45.4)	38.6 (35.2-43.2)	53.2 (47.6-56.0)	83.0 (62.0-111)	118 (83.4-210)	573
Males	13-14	51.2 (49.1-53.4)	44.2 (43.0-46.3)	61.7 (59.6-65.2)	128 (101-152)	197 (164-229)	1158
Males	15-16	50.9 (47.5-54.5)	44.5 (41.5-47.1)	65.6 (54.7-80.4)	125 (99.3-148)	185 (148-210)	1187
Females	13-14	45.8 (42.6-49.2)	41.0 (38.7-42.8)	54.4 (50.4-60.4)	100 (87.6-115)	140 (120-173)	1190
Females	15-16	44.9 (42.0-48.1)	40.6 (38.6-43.2)	56.0 (51.5-64.2)	92.0 (74.1-112)	123 (103-140)	1226
Mexican Americans	13-14	45.7 (43.6-47.9)	43.3 (40.9-45.4)	53.9 (51.0-55.7)	67.4 (62.8-78.1)	107 (72.6-138)	394
Mexican Americans	15-16	46.1 (43.0-49.3)	42.3 (39.2-45.6)	53.5 (48.1-62.3)	80.1 (70.7-96.9)	120 (90.2-177)	467
Non-Hispanic blacks	13-14	52.0 (48.7-55.5)	42.2 (39.9-45.6)	70.3 (58.6-83.6)	164 (130-198)	234 (198-269)	490
Non-Hispanic blacks	15-16	54.0 (50.3-57.9)	47.9 (45.2-50.4)	74.8 (62.1-95.6)	146 (114-182)	246 (152-330)	478
Non-Hispanic whites	13-14	49.3 (46.0-52.9)	42.9 (41.3-44.6)	60.0 (55.0-66.3)	116 (94.1-137)	170 (134-229)	921
Non-Hispanic whites	15-16	48.0 (44.0-52.3)	41.9 (39.6-45.5)	60.3 (52.3-72.1)	111 (84.2-135)	144 (119-195)	757
All Hispanics	13-14	44.8 (43.4-46.2)	41.3 (39.9-43.1)	53.9 (51.1-56.1)	74.6 (66.7-89.6)	115 (87.6-148)	605
All Hispanics	15-16	45.2 (42.7-47.9)	41.3 (39.1-44.6)	53.5 (49.4-59.0)	82.4 (71.3-96.9)	125 (102-148)	800
Asians	13-14	39.4 (36.4-42.5)	39.0 (34.8-44.4)	53.6 (47.7-59.8)	70.9 (56.9-86.6)	85.8 (70.9-100)	246
Asians	15-16	39.1 (36.6-41.8)	38.8 (36.1-42.2)	50.4 (47.7-54.3)	71.1 (64.1-80.5)	86.8 (73.9-98.8)	274

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.110 and 0.110 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Acrylamide_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Acrylamide_FactSheet.html

Formaldehyde (2013 - 2014)

CAS Number 50-00-0

Geometric mean and selected percentiles of hemoglobin adduct concentrations (in nmol/g hemoglobin) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	135 (132-139)	135 (131-140)	148 (144-153)	160 (155-164)	167 (162-172)	2149
Age 6-11 years	13-14	134 (130-138)	135 (128-142)	147 (141-152)	155 (151-160)	160 (153-172)	296
Age 12-19 years	13-14	134 (131-138)	134 (129-141)	146 (141-154)	160 (153-166)	170 (158-180)	364
Age 20-59 years	13-14	136 (132-139)	135 (131-141)	149 (144-154)	161 (156-165)	168 (162-173)	1025
Age 60+ years	13-14	134 (130-139)	135 (129-140)	148 (143-153)	159 (153-164)	165 (160-172)	464
Males	13-14	134 (131-138)	134 (130-139)	147 (142-151)	158 (154-161)	163 (160-171)	1049
Females	13-14	136 (132-140)	136 (131-142)	149 (144-155)	162 (156-167)	169 (163-173)	1100
Mexican Americans	13-14	140 (134-147)	141 (134-148)	154 (147-161)	167 (161-175)	178 (171-185)	386
Non-Hispanic blacks	13-14	129 (123-136)	132 (126-138)	148 (137-156)	160 (152-173)	171 (160-181)	443
Non-Hispanic whites	13-14	135 (131-138)	134 (130-140)	147 (142-150)	157 (152-162)	163 (158-168)	784
All Hispanics	13-14	138 (133-144)	140 (131-146)	153 (147-159)	164 (160-172)	175 (169-182)	603
Asians	13-14	141 (137-146)	142 (137-145)	154 (149-157)	165 (160-172)	176 (165-191)	231

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.670.

Glycidamide (2013 - 2016)

CAS Number 486-56-6

Geometric mean and selected percentiles of hemoglobin adduct concentrations (in pmol/g hemoglobin) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	41.1 (39.3-43.0)	38.7 (36.8-40.2)	53.4 (50.9-55.8)	85.5 (76.6-93.6)	119 (106-135)	2318
Total population	15-16	40.8 (38.6-43.1)	38.4 (36.2-40.6)	54.2 (50.1-57.8)	79.7 (70.2-90.7)	110 (90.7-136)	2267
Age 6-11 years	13-14	47.0 (44.4-49.8)	47.1 (43.7-50.1)	56.8 (53.2-60.8)	68.4 (61.0-78.4)	78.1 (63.9-138)	320
Age 6-11 years	15-16	46.6 (44.8-48.5)	47.4 (44.5-49.9)	57.4 (54.6-60.0)	65.8 (62.1-72.7)	76.3 (66.3-82.0)	303
Age 12-19 years	13-14	37.9 (35.6-40.2)	35.0 (31.3-38.6)	47.1 (43.5-52.0)	75.1 (59.7-94.0)	108 (75.1-163)	389
Age 12-19 years	15-16	37.3 (34.7-40.0)	35.4 (33.0-39.0)	47.0 (44.0-51.3)	59.3 (55.2-70.0)	77.7 (58.2-147)	341
Age 20-59 years	13-14	43.7 (41.7-45.9)	39.8 (38.7-41.5)	57.2 (53.7-61.6)	100 (92.6-113)	138 (122-150)	1116
Age 20-59 years	15-16	43.1 (39.9-46.6)	39.5 (36.9-42.3)	59.1 (52.6-65.6)	88.1 (76.8-103)	124 (93.9-169)	1092
Age 60+ years	13-14	34.7 (32.0-37.6)	33.4 (31.1-37.0)	43.9 (40.2-50.6)	60.9 (54.5-70.1)	72.2 (60.9-83.6)	493
Age 60+ years	15-16	35.3 (32.7-38.2)	34.6 (29.6-36.7)	44.8 (41.4-47.7)	67.0 (56.8-85.9)	95.1 (70.2-156)	531
Males	13-14	42.0 (40.1-43.9)	39.3 (36.8-41.4)	55.1 (51.8-56.8)	91.2 (75.4-101)	133 (117-143)	1144
Males	15-16	41.8 (39.6-44.2)	38.8 (36.5-41.2)	54.9 (51.0-60.5)	85.0 (74.9-110)	126 (100-149)	1121
Females	13-14	40.3 (37.7-43.1)	38.1 (36.1-39.8)	51.5 (48.5-56.9)	83.3 (70.4-93.2)	108 (93.2-130)	1174
Females	15-16	39.9 (37.2-42.8)	38.0 (35.4-41.5)	53.2 (47.6-58.2)	74.5 (64.9-85.4)	91.4 (81.1-115)	1146
Mexican Americans	13-14	42.9 (40.0-46.1)	42.7 (40.4-45.4)	53.0 (49.1-56.4)	67.3 (60.3-78.6)	89.1 (69.3-106)	390
Mexican Americans	15-16	42.8 (39.7-46.1)	41.7 (38.2-45.2)	52.7 (49.2-56.2)	76.3 (64.3-91.2)	99.3 (81.2-156)	421
Non-Hispanic blacks	13-14	38.7 (36.8-40.6)	36.3 (34.3-38.1)	50.9 (47.1-57.8)	91.4 (74.6-116)	139 (112-155)	483
Non-Hispanic blacks	15-16	39.7 (37.2-42.3)	37.1 (35.5-39.3)	54.9 (51.6-59.0)	81.1 (65.8-107)	121 (90.1-158)	473
Non-Hispanic whites	13-14	41.9 (39.5-44.5)	38.9 (36.2-41.1)	54.5 (50.8-57.4)	89.6 (76.9-102)	130 (113-144)	899
Non-Hispanic whites	15-16	41.3 (37.9-45.1)	38.4 (35.1-41.5)	55.0 (47.0-62.6)	80.9 (69.9-97.4)	115 (89.8-149)	707
All Hispanics	13-14	41.9 (40.0-43.8)	40.6 (38.0-43.1)	53.7 (49.7-58.2)	72.2 (67.5-77.2)	93.7 (75.9-108)	599
All Hispanics	15-16	40.8 (38.2-43.6)	39.7 (37.0-43.8)	51.8 (48.5-55.5)	72.8 (66.1-81.2)	96.9 (82.3-119)	733
Asians	13-14	33.7 (31.3-36.4)	35.6 (31.3-37.3)	45.7 (41.2-49.0)	60.2 (52.9-68.2)	70.1 (60.2-90.1)	242
Asians	15-16	34.8 (32.0-37.8)	36.2 (32.2-38.6)	47.4 (43.7-52.1)	62.4 (54.7-63.8)	65.3 (62.4-83.6)	256

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.660 and 0.660 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Acrylamide_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Acrylamide_FactSheet.html

Tobacco Alkaloids and Metabolites

Urinary Total Anabasine in Smokers (2013 - 2016)

CAS Number 13078-04-1

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	4.74 (4.17-5.39)	5.56 (4.87-6.26)	10.5 (9.23-12.3)	20.8 (16.2-23.3)	28.4 (23.3-33.1)	395
Total population	15-16	5.00 (4.02-6.21)	6.27 (4.93-7.40)	12.0 (9.19-17.8)	23.3 (18.1-29.1)	30.9 (23.3-37.8)	373
Age 18-49 years	13-14	4.65 (3.96-5.47)	5.75 (4.68-6.83)	10.5 (8.72-13.8)	20.8 (15.3-23.3)	31.8 (23.2-34.0)	262
Age 18-49 years	15-16	4.32 (3.13-5.97)	5.38 (3.79-7.09)	11.8 (7.58-17.8)	25.5 (16.1-30.9)	30.9 (19.5-51.9)	219
Age 50+ years	13-14	4.96 (3.89-6.33)	5.25 (4.31-6.11)	10.1 (6.11-15.6)	20.4 (14.8-23.5)	23.5 (16.2-30.4)	133
Age 50+ years	15-16	6.41 (4.88-8.40)	7.68 (5.53-9.54)	14.0 (10.0-18.3)	23.3 (17.3-35.1)	32.9 (20.5-37.8)	154
Males	13-14	4.36 (3.78-5.02)	5.40 (4.44-6.04)	9.29 (7.88-10.9)	20.8 (13.3-23.5)	27.1 (21.6-33.7)	222
Males	15-16	4.94 (3.62-6.74)	6.29 (4.34-8.57)	11.7 (9.25-16.3)	23.4 (15.6-33.5)	30.9 (19.5-43.3)	230
Females	13-14	5.17 (4.39-6.10)	5.75 (4.75-7.63)	12.3 (9.53-14.7)	20.4 (16.1-26.5)	31.8 (19.3-39.9)	173
Females	15-16	5.08 (4.09-6.31)	6.17 (3.79-8.25)	13.7 (7.70-19.5)	23.3 (18.1-26.5)	29.1 (19.8-37.8)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.510 and 0.510 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Anabasine in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 13078-04-1

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	5.01 (4.47-5.61)	5.24 (4.45-6.68)	12.5 (10.7-14.8)	20.3 (17.0-24.2)	27.9 (23.4-34.9)	394
Total population	15-16	4.93 (4.00-6.08)	6.37 (5.27-8.38)	12.3 (9.90-15.3)	17.4 (16.4-19.9)	23.0 (17.0-45.6)	373
Age 18-49 years	13-14	4.47 (3.88-5.16)	4.42 (3.44-6.26)	11.1 (9.27-13.6)	19.2 (15.7-27.3)	29.2 (19.1-39.3)	262
Age 18-49 years	15-16	3.97 (2.99-5.28)	5.16 (2.70-6.85)	10.4 (8.72-14.3)	17.0 (14.8-17.8)	18.5 (17.0-23.8)	219
Age 50+ years	13-14	6.70 (5.04-8.90)	7.80 (4.99-11.5)	14.3 (11.1-17.9)	20.3 (14.3-27.2)	27.2 (20.3-50.0)	132
Age 50+ years	15-16	7.14 (4.74-10.8)	8.52 (5.94-12.3)	14.5 (10.8-16.9)	20.5 (16.6-29.7)	31.4 (16.0-54.2)	154
Males	13-14	4.19 (3.49-5.04)	4.44 (3.18-6.68)	11.5 (8.62-15.5)	17.4 (14.8-24.0)	22.2 (16.1-36.5)	221
Males	15-16	4.25 (3.22-5.60)	5.85 (4.65-8.25)	10.8 (8.38-14.9)	16.1 (12.5-17.4)	17.4 (16.0-19.9)	230
Females	13-14	6.02 (5.22-6.94)	5.53 (4.88-8.50)	13.2 (11.1-17.0)	24.2 (17.4-34.9)	34.9 (22.7-50.0)	173
Females	15-16	6.04 (4.97-7.34)	7.23 (5.75-9.26)	14.5 (10.9-17.8)	22.8 (16.6-33.4)	29.7 (16.8-54.2)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Anatabine in Smokers (2013 - 2016)

CAS Number 2743-90-0

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	6.61 (5.68-7.70)	7.49 (6.52-9.38)	17.0 (15.1-20.0)	32.7 (27.7-37.6)	51.8 (37.2-55.5)	395
Total population	15-16	7.42 (5.65-9.74)	9.86 (7.00-12.5)	20.9 (16.0-29.5)	48.9 (29.5-58.9)	58.9 (47.7-67.6)	373
Age 18-49 years	13-14	6.43 (5.27-7.85)	7.77 (5.59-11.4)	18.4 (15.5-21.3)	32.7 (27.1-42.6)	52.0 (36.3-58.1)	262
Age 18-49 years	15-16	6.14 (4.22-8.93)	7.35 (3.76-11.5)	18.4 (12.3-27.9)	47.7 (23.1-60.6)	58.9 (44.6-84.3)	219
Age 50+ years	13-14	7.09 (5.36-9.38)	7.28 (5.77-11.0)	14.6 (11.0-25.3)	35.3 (22.6-37.9)	39.7 (32.1-54.6)	133
Age 50+ years	15-16	10.3 (6.91-15.3)	12.9 (8.37-17.7)	22.6 (18.5-30.4)	52.6 (29.5-62.1)	62.1 (38.2-99.9)	154
Males	13-14	5.92 (4.93-7.11)	7.28 (4.56-8.63)	15.7 (12.8-19.5)	32.1 (20.2-40.3)	42.6 (32.2-55.0)	222
Males	15-16	7.09 (4.74-10.6)	9.48 (5.16-13.8)	19.1 (13.5-32.0)	51.3 (24.4-58.9)	58.9 (45.7-67.7)	230
Females	13-14	7.44 (6.12-9.05)	7.76 (6.64-11.4)	19.3 (15.5-26.3)	35.3 (27.7-52.5)	54.6 (36.3-62.3)	173
Females	15-16	7.90 (6.25-9.99)	11.4 (7.05-12.9)	23.1 (14.7-29.8)	45.7 (29.5-58.8)	58.8 (44.6-99.9)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.390 and 0.390 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Anatabine in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 2743-90-0

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	7.02 (6.06-8.13)	8.16 (6.58-10.5)	20.0 (16.6-22.4)	34.1 (27.9-44.0)	59.2 (39.4-68.5)	394
Total population	15-16	7.32 (5.55-9.65)	10.7 (7.00-13.9)	22.6 (18.5-25.8)	35.9 (27.9-46.6)	50.7 (34.3-77.5)	373
Age 18-49 years	13-14	6.18 (5.17-7.39)	6.74 (5.32-9.69)	18.6 (15.3-21.8)	34.0 (26.3-59.2)	59.2 (31.8-68.5)	262
Age 18-49 years	15-16	5.63 (3.98-7.97)	7.01 (3.45-12.0)	18.9 (13.1-25.8)	31.6 (25.5-35.9)	35.9 (29.3-50.9)	219
Age 50+ years	13-14	9.75 (7.15-13.3)	11.6 (6.80-16.9)	24.0 (14.4-32.3)	39.2 (25.1-50.1)	50.1 (32.3-93.8)	132
Age 50+ years	15-16	11.5 (6.71-19.6)	14.5 (8.97-21.7)	26.9 (20.6-42.3)	47.2 (31.1-77.5)	60.2 (42.3-122)	154
Males	13-14	5.74 (4.57-7.22)	7.22 (4.43-11.4)	17.2 (13.3-21.5)	30.6 (20.3-43.2)	39.4 (25.1-65.9)	221
Males	15-16	6.10 (4.19-8.87)	8.85 (4.40-14.0)	21.5 (13.3-25.5)	31.6 (25.3-33.7)	42.3 (29.2-50.9)	230
Females	13-14	8.65 (7.18-10.4)	9.64 (6.80-12.0)	22.4 (16.2-27.8)	42.8 (28.2-68.5)	68.5 (36.0-103)	173
Females	15-16	9.40 (7.30-12.1)	13.4 (8.96-15.8)	26.9 (20.1-31.1)	46.6 (30.5-63.6)	63.6 (31.1-122)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Serum Cotinine in Non-smokers (2011 - 2016)

CAS Number 486-56-6

Metabolite of nicotine (component of tobacco smoke)

Geometric mean and selected percentiles of serum concentrations of (in ng/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.020 (.018-.023)	.059 (.049-.072)	.356 (.263-.500)	1.30 (.882-1.60)	6108
Total population	13-14	*	.017 (<LOD-.021)	.057 (.042-.082)	.388 (.246-.605)	1.53 (1.06-1.90)	6561
Total population	15-16	*	.017 (.015-.020)	.055 (.045-.073)	.319 (.240-.408)	1.12 (.745-1.60)	6381
Age 3-11 years	11-12	.058 (.045-.074)	.031 (.024-.045)	.172 (.100-.313)	1.02 (.627-1.94)	2.49 (1.56-3.36)	1348
Age 3-11 years	13-14	.048 (.036-.065)	.021 (.015-.039)	.128 (.081-.239)	.962 (.471-1.70)	2.15 (1.44-3.33)	1445
Age 3-11 years	15-16	.046 (.038-.056)	.027 (.021-.038)	.107 (.085-.152)	.563 (.320-.987)	1.37 (.902-1.97)	1388
Age 12-19 years	11-12	.049 (.040-.061)	.025 (.020-.037)	.147 (.083-.235)	.711 (.520-1.06)	1.47 (1.05-2.29)	990
Age 12-19 years	13-14	*	.023 (.016-.033)	.129 (.067-.246)	1.14 (.579-2.19)	2.87 (1.90-4.51)	1129
Age 12-19 years	15-16	.045 (.039-.050)	.022 (.019-.027)	.098 (.073-.131)	.798 (.486-1.24)	2.13 (1.60-2.88)	1032
Age 20+ years	11-12	*	.019 (.016-.020)	.047 (.040-.053)	.210 (.176-.263)	.835 (.566-1.38)	3770
Age 20+ years	13-14	*	.016 (<LOD-.019)	.047 (.037-.061)	.244 (.149-.380)	.861 (.605-1.64)	3987
Age 20+ years	15-16	*	.015 (<LOD-.018)	.045 (.037-.056)	.235 (.170-.300)	.750 (.556-1.15)	3961
Males	11-12	.041 (.037-.045)	.023 (.020-.026)	.076 (.065-.095)	.530 (.397-.715)	1.76 (1.35-2.42)	2903
Males	13-14	*	.018 (.016-.024)	.068 (.049-.095)	.491 (.341-.743)	1.84 (1.35-2.41)	3063
Males	15-16	*	.019 (.016-.021)	.059 (.045-.082)	.385 (.299-.533)	1.72 (1.25-2.10)	2960
Females	11-12	*	.019 (.016-.021)	.048 (.040-.059)	.244 (.189-.314)	.819 (.572-1.31)	3205
Females	13-14	*	.016 (<LOD-.020)	.049 (.036-.075)	.309 (.182-.482)	1.15 (.722-1.71)	3498
Females	15-16	*	.015 (<LOD-.019)	.052 (.041-.066)	.254 (.180-.339)	.790 (.516-1.26)	3421
Mexican Americans	11-12	.033 (.027-.042)	.021 (.016-.027)	.055 (.040-.081)	.230 (.106-.386)	.668 (.349-2.07)	886
Mexican Americans	13-14	*	.016 (<LOD-.019)	.045 (.034-.056)	.144 (.104-.316)	.550 (.362-1.24)	1261
Mexican Americans	15-16	*	.015 (<LOD-.021)	.045 (.033-.059)	.188 (.144-.308)	.919 (.478-1.58)	1368
Non-Hispanic blacks	11-12	.076 (.054-.107)	.045 (.032-.071)	.259 (.127-.513)	1.10 (.678-2.02)	2.86 (1.46-4.20)	1576
Non-Hispanic blacks	13-14	.086 (.070-.106)	.052 (.041-.073)	.296 (.236-.394)	1.70 (1.26-2.16)	3.17 (2.50-3.97)	1297
Non-Hispanic blacks	15-16	.072 (.057-.093)	.043 (.031-.060)	.247 (.141-.411)	1.35 (.870-1.83)	2.70 (1.82-3.93)	1230
Non-Hispanic whites	11-12	*	.017 (<LOD-.020)	.048 (.039-.061)	.277 (.207-.363)	1.10 (.627-1.50)	1841
Non-Hispanic whites	13-14	*	<LOD	.044 (.029-.075)	.287 (.137-.602)	1.09 (.687-1.84)	2309
Non-Hispanic whites	15-16	*	.015 (<LOD-.019)	.048 (.036-.068)	.254 (.162-.324)	.742 (.516-1.11)	1860
All Hispanics	11-12	.033 (.028-.040)	.021 (.017-.026)	.054 (.041-.074)	.233 (.123-.387)	.834 (.377-2.37)	1587
All Hispanics	13-14	*	.017 (.015-.020)	.048 (.038-.060)	.239 (.140-.378)	.905 (.486-1.78)	1926
All Hispanics	15-16	*	.015 (<LOD-.020)	.046 (.035-.058)	.211 (.147-.304)	1.09 (.581-1.66)	2270
Asians	11-12	.030 (.026-.035)	.023 (.020-.027)	.046 (.037-.058)	.123 (.083-.201)	.308 (.201-.594)	878
Asians	13-14	.030 (.026-.036)	.021 (.017-.025)	.052 (.041-.063)	.140 (.091-.250)	.475 (.244-.841)	766
Asians	15-16	.026 (.022-.031)	.020 (.017-.022)	.039 (.031-.051)	.092 (.055-.213)	.213 (.100-.777)	741

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.015, 0.015, and 0.015 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Serum Cotinine in Smokers (2011 - 2016)

CAS Number 486-56-6

Metabolite of nicotine (component of tobacco smoke)

Geometric mean and selected percentiles of serum concentrations of (in ng/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	161 (143-182)	202 (186-217)	295 (278-313)	387 (360-413)	449 (411-472)	1096
Total population	13-14	164 (146-186)	215 (196-238)	318 (292-339)	403 (388-430)	481 (453-519)	1264
Total population	15-16	161 (147-175)	203 (189-214)	288 (268-317)	394 (360-431)	455 (426-490)	1096
Age 18-29 years	11-12	116 (92.4-144)	147 (116-186)	229 (197-257)	285 (264-309)	335 (287-418)	270
Age 18-29 years	13-14	123 (106-141)	171 (132-207)	284 (241-314)	368 (314-401)	401 (370-476)	296
Age 18-29 years	15-16	104 (88.4-123)	130 (99.5-159)	221 (186-260)	338 (241-447)	410 (266-557)	233
Age 30-44 years	11-12	151 (123-185)	204 (163-242)	307 (276-335)	383 (342-422)	429 (370-496)	311
Age 30-44 years	13-14	161 (138-188)	205 (184-229)	309 (283-342)	417 (367-494)	499 (392-566)	373
Age 30-44 years	15-16	158 (136-184)	198 (172-222)	284 (257-321)	395 (345-442)	462 (426-527)	308
Age 45-59 years	11-12	202 (186-221)	219 (187-262)	343 (312-358)	441 (387-470)	480 (449-540)	286
Age 45-59 years	13-14	201 (162-250)	243 (205-292)	343 (300-382)	451 (379-519)	519 (459-568)	355
Age 45-59 years	15-16	198 (179-219)	230 (207-257)	306 (278-346)	386 (353-430)	460 (414-541)	297
Age 60+ years	11-12	189 (171-209)	229 (189-250)	294 (271-314)	383 (355-405)	405 (387-459)	229
Age 60+ years	13-14	192 (172-213)	231 (193-268)	330 (282-384)	408 (385-465)	480 (411-629)	240
Age 60+ years	15-16	202 (169-240)	235 (193-269)	329 (279-387)	410 (351-506)	480 (399-634)	258
Males	11-12	160 (138-184)	204 (186-217)	300 (277-319)	383 (354-429)	459 (411-475)	661
Males	13-14	165 (143-189)	210 (189-241)	332 (304-359)	412 (388-459)	509 (460-533)	687
Males	15-16	160 (143-180)	202 (175-225)	297 (266-343)	410 (367-448)	464 (447-527)	646
Females	11-12	164 (145-184)	199 (182-225)	287 (263-320)	387 (355-418)	436 (407-463)	435
Females	13-14	164 (143-189)	220 (195-243)	292 (267-332)	394 (384-417)	461 (417-509)	577
Females	15-16	161 (147-175)	203 (186-218)	282 (249-318)	373 (329-410)	431 (376-502)	450
Non-Hispanic blacks	11-12	150 (136-165)	188 (170-207)	316 (285-338)	434 (390-459)	466 (451-497)	351
Non-Hispanic blacks	13-14	181 (165-198)	230 (203-255)	356 (327-385)	500 (411-562)	598 (533-638)	337
Non-Hispanic blacks	15-16	168 (146-193)	205 (188-226)	321 (284-349)	422 (391-454)	485 (447-551)	325
Non-Hispanic whites	11-12	180 (158-204)	215 (190-233)	305 (279-336)	389 (358-422)	458 (411-515)	461
Non-Hispanic whites	13-14	178 (153-207)	228 (198-255)	320 (288-359)	401 (387-439)	480 (423-519)	617
Non-Hispanic whites	15-16	180 (164-199)	218 (201-235)	297 (270-332)	395 (357-448)	462 (426-527)	395
All Hispanics	11-12	101 (83.0-122)	128 (74.6-186)	230 (191-262)	319 (280-361)	371 (319-379)	169
All Hispanics	13-14	96.4 (76.5-121)	111 (73.9-157)	236 (182-279)	367 (280-385)	414 (317-479)	176
All Hispanics	15-16	85.7 (68.5-107)	103 (70.0-126)	202 (171-237)	323 (247-380)	387 (337-486)	245

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.015, 0.015, and 0.015 respectively.

^ Smoking is defined as a serum cotinine concentration greater than 10 ng/mL, excluding other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Cotinine in Non-smokers (2013 - 2016)†

CAS Number 486-56-6

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.374 (.321-.435)	.241 (.199-.282)	.834 (.675-1.11)	5.05 (3.59-7.39)	21.7 (13.0-32.6)	1901
Total population	15-16	.310 (.260-.370)	.203 (.181-.237)	.650 (.499-.926)	3.56 (2.48-5.84)	12.7 (7.61-24.4)	2209
Age 3-5 years	15-16	.466 (.288-.753)	.362 (.232-.593)	2.11 (.921-3.68)	7.95 (3.31-17.2)	16.8 (6.70-32.4)	320
Age 6-11 years	13-14	.526 (.375-.739)	.336 (.201-.515)	1.62 (.764-3.27)	17.0 (5.73-25.7)	29.4 (17.0-50.3)	300
Age 6-11 years	15-16	.409 (.326-.514)	.302 (.204-.440)	1.40 (.882-2.56)	7.03 (3.01-10.3)	11.0 (7.54-14.7)	297
Age 12-19 years	13-14	.677 (.472-.972)	.438 (.248-.682)	2.46 (1.38-3.65)	21.6 (4.03-46.0)	42.8 (13.7-68.6)	355
Age 12-19 years	15-16	.457 (.294-.708)	.278 (.213-.441)	1.46 (.637-2.83)	9.22 (2.96-25.3)	27.8 (6.68-73.8)	323
Age 20+ years	13-14	.327 (.274-.390)	.220 (.188-.264)	.697 (.518-.924)	3.52 (2.43-5.00)	13.5 (6.82-26.9)	1246
Age 20+ years	15-16	.279 (.234-.331)	.191 (.168-.216)	.522 (.416-.730)	2.75 (1.92-3.90)	9.40 (4.40-23.9)	1269
Males	13-14	.442 (.371-.527)	.279 (.225-.338)	.932 (.753-1.21)	6.82 (4.13-15.5)	29.5 (21.2-40.2)	897
Males	15-16	.397 (.312-.506)	.239 (.200-.317)	.859 (.573-1.51)	6.05 (3.55-14.5)	32.9 (9.88-72.2)	1037
Females	13-14	.321 (.265-.390)	.206 (.180-.257)	.758 (.498-1.23)	3.83 (2.62-6.63)	13.1 (6.68-25.7)	1004
Females	15-16	.250 (.213-.295)	.183 (.162-.205)	.522 (.401-.727)	2.43 (1.68-3.47)	7.53 (3.50-10.9)	1172
Non-Hispanic blacks	13-14	.897 (.689-1.17)	.633 (.402-.909)	3.27 (2.43-5.08)	22.4 (7.93-32.6)	34.9 (22.4-63.2)	359
Non-Hispanic blacks	15-16	.540 (.404-.722)	.319 (.213-.465)	1.80 (.997-2.86)	11.5 (6.90-14.7)	17.6 (13.9-36.1)	415
Non-Hispanic whites	13-14	.338 (.279-.410)	.208 (.179-.256)	.755 (.553-1.08)	4.23 (2.80-7.39)	22.4 (9.59-36.0)	665
Non-Hispanic whites	15-16	.288 (.228-.363)	.191 (.164-.228)	.613 (.407-1.21)	3.46 (2.08-5.84)	10.8 (5.44-33.4)	619
All Hispanics	13-14	.342 (.286-.408)	.241 (.206-.279)	.653 (.509-.886)	3.87 (1.81-7.76)	15.5 (8.16-20.8)	578
All Hispanics	15-16	.299 (.246-.362)	.204 (.164-.270)	.640 (.530-.783)	2.83 (1.78-4.56)	12.6 (5.57-33.7)	799

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.030 and 0.030 respectively.

† Participants are age 6+ in Survey 13-14, while participants are 3+ in Survey 15-16.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Cotinine in Non-smokers (creatinine corrected, 2013 - 2016)†

CAS Number 486-56-6

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.454 (.389-.531)	.309 (.264-.364)	.979 (.778-1.17)	5.58 (3.72-8.53)	24.5 (15.3-30.5)	1901
Total population	15-16	.370 (.311-.441)	.249 (.208-.302)	.713 (.536-1.04)	4.07 (2.49-5.82)	13.1 (7.40-29.1)	2206
Age 3-5 years	15-16	1.17 (.762-1.78)	.815 (.464-1.62)	5.22 (3.15-6.44)	19.4 (6.57-41.6)	41.6 (15.9-84.0)	319
Age 6-11 years	13-14	.796 (.589-1.08)	.432 (.345-.690)	2.72 (1.26-5.00)	18.7 (6.08-28.8)	30.6 (19.3-69.8)	300
Age 6-11 years	15-16	.609 (.479-.774)	.404 (.300-.617)	2.17 (1.15-3.90)	9.12 (4.34-14.5)	16.7 (9.44-22.4)	297
Age 12-19 years	13-14	.633 (.442-.907)	.372 (.270-.533)	1.42 (.900-3.14)	17.8 (4.61-38.1)	38.1 (15.8-67.9)	355
Age 12-19 years	15-16	.446 (.296-.671)	.290 (.183-.432)	1.11 (.621-2.11)	5.74 (2.86-22.7)	26.7 (4.94-68.3)	323
Age 20+ years	13-14	.404 (.339-.481)	.289 (.254-.332)	.813 (.629-1.05)	3.64 (2.40-6.22)	16.4 (7.24-27.3)	1246
Age 20+ years	15-16	.326 (.275-.387)	.223 (.193-.275)	.564 (.472-.767)	2.54 (1.72-4.80)	7.95 (5.32-28.6)	1267
Males	13-14	.452 (.376-.545)	.303 (.249-.352)	.900 (.655-1.20)	7.73 (4.10-13.5)	26.0 (15.8-37.6)	897
Males	15-16	.397 (.318-.496)	.252 (.191-.325)	.774 (.497-1.51)	5.50 (3.29-13.1)	36.8 (9.04-56.7)	1037
Females	13-14	.456 (.374-.556)	.310 (.262-.387)	1.05 (.767-1.31)	4.24 (2.72-7.67)	17.8 (6.63-33.8)	1004
Females	15-16	.349 (.295-.412)	.244 (.211-.313)	.673 (.522-.925)	2.77 (1.81-4.09)	7.52 (3.72-14.5)	1169
Non-Hispanic blacks	13-14	.719 (.566-.913)	.489 (.331-.706)	2.57 (1.87-4.32)	15.0 (6.96-25.9)	28.3 (15.1-47.1)	359
Non-Hispanic blacks	15-16	.466 (.333-.653)	.264 (.180-.463)	1.36 (.806-2.24)	10.5 (6.36-16.9)	27.6 (13.1-43.6)	413
Non-Hispanic whites	13-14	.435 (.351-.541)	.289 (.240-.369)	.937 (.621-1.20)	5.41 (2.94-9.68)	27.3 (12.9-36.1)	665
Non-Hispanic whites	15-16	.362 (.288-.455)	.234 (.186-.329)	.718 (.477-1.28)	3.52 (2.33-5.40)	10.9 (5.77-29.8)	619
All Hispanics	13-14	.391 (.342-.448)	.278 (.237-.315)	.751 (.628-.936)	4.01 (2.46-6.23)	12.2 (5.62-24.2)	578
All Hispanics	15-16	.345 (.290-.411)	.244 (.200-.282)	.588 (.464-.759)	2.85 (1.67-4.41)	12.3 (4.30-29.6)	798

† Participants are age 6+ in Survey 13-14, while participants are 3+ in Survey 15-16.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Cotinine in Smokers (2013 - 2016)

CAS Number 486-56-6

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1800 (1590-2040)	2020 (1810-2260)	3910 (2950-4490)	6490 (5390-7020)	7500 (7010-8870)	395
Total population	15-16	2010 (1740-2310)	2340 (2080-2620)	4090 (3500-4590)	6220 (4930-7510)	7750 (6110-13700)	373
Age 18-49 years	13-14	1800 (1540-2110)	2020 (1690-2440)	4130 (2980-4700)	6550 (5680-7420)	7740 (6740-9640)	262
Age 18-49 years	15-16	1780 (1470-2150)	2220 (1740-2630)	4340 (3240-4660)	6690 (5220-8050)	9400 (6110-14300)	219
Age 50+ years	13-14	1790 (1530-2100)	2030 (1560-2290)	2930 (2500-3850)	5430 (4330-7370)	7370 (4730-8300)	133
Age 50+ years	15-16	2470 (2230-2720)	2590 (2240-2680)	3830 (3190-4700)	5200 (4570-6350)	6350 (5040-7510)	154
Males	13-14	1790 (1570-2040)	2020 (1670-2440)	4290 (3210-4960)	6990 (5910-7370)	7420 (6830-7740)	222
Males	15-16	2100 (1710-2590)	2460 (2090-2810)	4420 (3200-4930)	6350 (4630-9400)	9400 (5040-14300)	230
Females	13-14	1810 (1500-2180)	2040 (1700-2270)	3510 (2690-4140)	5780 (4620-7890)	8870 (5780-10200)	173
Females	15-16	1880 (1670-2110)	2150 (1620-2800)	3740 (3020-4570)	6110 (4570-6690)	6690 (5470-7510)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.030 and 0.030 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Cotinine in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 486-56-6

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1880 (1670-2130)	2480 (2000-2800)	3960 (3370-4420)	6070 (5230-7470)	8210 (6710-9580)	394
Total population	15-16	1980 (1730-2260)	2570 (1940-2970)	3970 (3500-4340)	5890 (4300-7380)	7150 (5620-8860)	373
Age 18-49 years	13-14	1730 (1510-1990)	2260 (1610-2640)	3750 (3230-4210)	5600 (5020-7010)	8120 (5600-9480)	262
Age 18-49 years	15-16	1630 (1360-1950)	2210 (1610-2700)	3680 (2740-4260)	5000 (4230-5770)	5890 (4840-7040)	219
Age 50+ years	13-14	2330 (1820-2990)	2970 (2070-3400)	4650 (3170-6070)	7470 (4650-10700)	9310 (4800-23800)	132
Age 50+ years	15-16	2750 (2140-3540)	3050 (2200-3920)	4340 (3130-7470)	7470 (4160-9400)	8860 (5710-10900)	154
Males	13-14	1690 (1410-2030)	2200 (1500-2700)	3530 (3210-4210)	5470 (4790-8210)	8210 (5100-9480)	221
Males	15-16	1810 (1540-2130)	2290 (1690-2740)	3680 (2740-4380)	5520 (3940-7380)	6830 (4230-7660)	230
Females	13-14	2110 (1770-2510)	2770 (2070-3100)	4340 (3310-4800)	6710 (4750-8120)	8140 (6010-14500)	173
Females	15-16	2230 (1920-2600)	2800 (2200-3560)	4260 (3870-4840)	6820 (4460-8860)	8860 (5600-10000)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Cotinine N-Oxide in Smokers (2013 - 2016)

CAS Number 36508-80-2

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	209 (182-241)	239 (192-288)	456 (381-516)	775 (654-1030)	1160 (775-1690)	395
Total population	15-16	250 (211-295)	295 (228-365)	574 (456-685)	891 (693-1150)	1150 (870-1410)	373
Age 18-49 years	13-14	206 (173-245)	243 (180-304)	460 (351-638)	775 (654-1020)	1140 (756-1740)	262
Age 18-49 years	15-16	220 (179-270)	272 (189-327)	631 (425-792)	891 (665-1260)	1240 (891-1410)	219
Age 50+ years	13-14	218 (180-265)	234 (179-304)	410 (331-488)	995 (554-1350)	1350 (770-1780)	133
Age 50+ years	15-16	310 (262-368)	339 (247-435)	551 (437-663)	829 (636-1140)	1140 (685-1530)	154
Males	13-14	207 (176-244)	256 (181-314)	480 (434-612)	773 (654-1140)	1140 (750-1610)	222
Males	15-16	265 (218-324)	327 (228-397)	631 (435-836)	917 (750-1260)	1260 (891-1510)	230
Females	13-14	212 (175-256)	221 (183-285)	386 (302-579)	821 (517-1100)	1220 (874-1780)	173
Females	15-16	229 (184-285)	257 (161-425)	516 (350-663)	829 (663-1110)	1140 (725-1600)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 2.02 and 2.02 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Cotinine N-Oxide in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 36508-80-2

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	220 (193-250)	266 (223-301)	452 (363-506)	675 (570-860)	902 (772-1050)	394
Total population	15-16	246 (223-271)	314 (282-353)	445 (380-516)	597 (519-686)	686 (593-962)	373
Age 18-49 years	13-14	198 (172-228)	248 (194-289)	398 (351-469)	648 (525-718)	842 (648-918)	262
Age 18-49 years	15-16	202 (176-232)	290 (216-314)	394 (343-481)	528 (414-622)	612 (516-711)	219
Age 50+ years	13-14	287 (236-351)	328 (272-365)	540 (360-729)	1030 (610-1290)	1170 (729-1400)	132
Age 50+ years	15-16	346 (305-393)	374 (322-434)	571 (435-603)	659 (597-799)	816 (603-966)	154
Males	13-14	196 (166-233)	248 (214-283)	415 (327-550)	648 (529-743)	789 (634-1050)	221
Males	15-16	228 (201-259)	305 (224-364)	424 (364-520)	537 (434-612)	612 (529-962)	230
Females	13-14	246 (205-296)	289 (219-341)	469 (351-494)	842 (494-1040)	1020 (639-1290)	173
Females	15-16	273 (242-308)	338 (290-365)	483 (387-593)	647 (537-799)	799 (603-966)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Serum Hydroxycotinine in Non-smokers (2013 - 2016)

CAS Number 34834-67-8

Metabolite of nicotine (component of tobacco smoke)

Geometric mean and selected percentiles of serum concentrations of (in ng/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.023 (.018-.031)	.121 (.084-.221)	.553 (.414-.744)	6561
Total population	15-16	*	<LOD	.020 (.017-.026)	.107 (.074-.167)	.429 (.306-.602)	6381
Age 3-11 years	13-14	*	<LOD	.044 (.028-.070)	.314 (.161-.531)	.667 (.462-.984)	1445
Age 3-11 years	15-16	*	<LOD	.034 (.025-.049)	.170 (.103-.296)	.425 (.296-.570)	1388
Age 12-19 years	13-14	*	<LOD	.038 (.020-.073)	.407 (.181-.627)	.848 (.447-1.35)	1129
Age 12-19 years	15-16	*	<LOD	.031 (.021-.040)	.218 (.146-.340)	.771 (.408-.873)	1032
Age 20+ years	13-14	*	<LOD	.020 (.016-.025)	.088 (.062-.127)	.437 (.253-.695)	3987
Age 20+ years	15-16	*	<LOD	.018 (.015-.023)	.084 (.061-.123)	.368 (.273-.533)	3961
Males	13-14	*	<LOD	.024 (.018-.034)	.168 (.098-.274)	.673 (.481-.960)	3063
Males	15-16	*	<LOD	.021 (.016-.028)	.129 (.084-.208)	.674 (.403-.859)	2960
Females	13-14	*	<LOD	.022 (.017-.030)	.095 (.070-.185)	.447 (.300-.646)	3498
Females	15-16	*	<LOD	.020 (.017-.026)	.094 (.068-.148)	.340 (.235-.499)	3421
Mexican Americans	13-14	*	<LOD	<LOD	.058 (.038-.105)	.224 (.118-.437)	1261
Mexican Americans	15-16	*	<LOD	.015 (<LOD-.019)	.066 (.040-.124)	.322 (.161-.674)	1368
Non-Hispanic blacks	13-14	*	.015 (<LOD-.019)	.085 (.059-.116)	.476 (.314-.612)	.881 (.688-1.10)	1297
Non-Hispanic blacks	15-16	*	<LOD	.071 (.039-.110)	.390 (.232-.599)	.843 (.569-1.22)	1230
Non-Hispanic whites	13-14	*	<LOD	.021 (.015-.033)	.095 (.066-.254)	.588 (.330-.896)	2309
Non-Hispanic whites	15-16	*	<LOD	.020 (.015-.027)	.091 (.063-.146)	.349 (.270-.561)	1860
All Hispanics	13-14	*	<LOD	.015 (<LOD-.021)	.083 (.050-.141)	.378 (.192-.498)	1926
All Hispanics	15-16	*	<LOD	.016 (<LOD-.020)	.072 (.049-.096)	.328 (.194-.685)	2270
Asians	13-14	*	<LOD	.015 (<LOD-.019)	.040 (.032-.051)	.115 (.052-.388)	766
Asians	15-16	*	<LOD	<LOD	.027 (.018-.054)	.059 (.027-.195)	741

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.015 and 0.015 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Serum Hydroxycotinine in Smokers (2013 - 2016)

CAS Number 34834-67-8

Metabolite of nicotine (component of tobacco smoke)

Geometric mean and selected percentiles of serum concentrations of (in ng/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	60.7 (53.0-69.5)	76.7 (65.1-87.7)	135 (122-143)	200 (184-215)	238 (230-259)	1264
Total population	15-16	59.3 (53.4-65.9)	75.8 (70.5-80.1)	117 (109-132)	176 (157-205)	232 (197-270)	1096
Age 18-29 years	13-14	37.4 (31.3-44.7)	47.7 (36.2-57.0)	86.1 (67.2-109)	139 (118-168)	175 (133-259)	296
Age 18-29 years	15-16	32.6 (27.0-39.4)	39.0 (32.4-42.6)	69.8 (61.3-83.2)	112 (83.4-158)	157 (103-301)	233
Age 30-44 years	13-14	59.0 (50.0-69.5)	76.6 (61.9-85.0)	134 (110-150)	184 (158-203)	205 (199-225)	373
Age 30-44 years	15-16	57.4 (48.1-68.6)	70.5 (65.1-81.5)	113 (104-132)	172 (143-233)	234 (165-257)	308
Age 45-59 years	13-14	79.7 (66.5-95.6)	95.8 (84.3-108)	151 (137-170)	233 (208-255)	279 (235-335)	355
Age 45-59 years	15-16	81.3 (71.7-92.2)	92.0 (85.6-102)	141 (117-168)	208 (168-235)	291 (205-384)	297
Age 60+ years	13-14	88.0 (76.8-101)	99.8 (90.4-118)	165 (137-195)	245 (204-288)	291 (260-438)	240
Age 60+ years	15-16	79.8 (64.9-98.0)	90.9 (78.1-105)	137 (108-174)	197 (152-248)	235 (197-314)	258
Males	13-14	55.4 (47.1-65.2)	70.4 (57.1-84.3)	128 (118-141)	192 (168-206)	229 (195-262)	687
Males	15-16	56.1 (49.3-63.7)	71.6 (66.2-77.4)	112 (102-132)	173 (148-205)	233 (177-270)	646
Females	13-14	66.8 (55.6-80.3)	83.0 (61.7-99.7)	141 (120-154)	213 (172-266)	266 (215-314)	577
Females	15-16	63.8 (57.7-70.6)	81.3 (72.1-86.4)	122 (112-140)	191 (159-210)	228 (200-317)	450
Non-Hispanic blacks	13-14	52.3 (45.1-60.8)	59.2 (53.4-72.5)	111 (101-130)	185 (153-204)	253 (200-264)	337
Non-Hispanic blacks	15-16	46.6 (38.0-57.1)	57.0 (50.7-61.6)	102 (91.8-112)	153 (136-184)	208 (172-291)	325
Non-Hispanic whites	13-14	72.9 (63.2-84.1)	87.7 (74.1-102)	145 (137-154)	208 (192-232)	259 (235-283)	617
Non-Hispanic whites	15-16	73.8 (66.1-82.5)	87.6 (82.9-92.7)	133 (113-155)	197 (162-231)	235 (197-334)	395
All Hispanics	13-14	32.3 (24.8-42.0)	39.1 (22.1-52.5)	75.1 (58.2-100)	131 (96.2-181)	181 (130-233)	176
All Hispanics	15-16	31.3 (22.6-43.2)	33.8 (25.2-49.0)	78.8 (66.3-93.0)	124 (98.0-158)	166 (124-228)	245

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.015 and 0.015 respectively.

^ Smoking is defined as a serum cotinine concentration greater than 10 ng/mL, excluding other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total trans-3'-Hydroxycotinine in Non-smokers (2013 - 2016)†

CAS Number 34834-67-8

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.628 (.538-.734)	.406 (.343-.481)	1.58 (1.31-2.05)	12.8 (8.26-16.7)	41.7 (26.6-64.0)	1901
Total population	15-16	.542 (.456-.645)	.410 (.330-.479)	1.24 (.962-1.74)	7.42 (5.21-11.5)	26.6 (15.7-51.4)	2209
Age 3-5 years	15-16	.982 (.602-1.60)	.798 (.460-1.32)	4.12 (1.84-6.72)	18.2 (6.84-41.3)	42.4 (14.3-105)	320
Age 6-11 years	13-14	.919 (.640-1.32)	.607 (.443-.946)	2.66 (1.40-10.2)	32.8 (14.7-60.2)	63.8 (33.7-121)	300
Age 6-11 years	15-16	.767 (.602-.977)	.494 (.386-.769)	2.94 (1.92-3.93)	12.6 (5.27-25.7)	31.7 (17.1-47.8)	297
Age 12-19 years	13-14	1.11 (.758-1.62)	.706 (.439-1.25)	5.55 (2.21-12.2)	39.5 (14.5-69.8)	69.8 (31.7-110)	355
Age 12-19 years	15-16	.771 (.495-1.20)	.516 (.385-.684)	2.77 (1.07-5.82)	16.3 (5.29-42.7)	42.7 (15.5-155)	323
Age 20+ years	13-14	.549 (.458-.658)	.355 (.323-.448)	1.35 (1.01-1.68)	7.58 (5.38-11.0)	34.7 (16.5-59.5)	1246
Age 20+ years	15-16	.483 (.411-.567)	.367 (.307-.436)	.996 (.784-1.30)	6.20 (3.58-8.22)	20.4 (10.1-51.4)	1269
Males	13-14	.735 (.615-.878)	.461 (.372-.607)	1.68 (1.43-2.09)	19.3 (7.23-30.9)	59.3 (38.4-88.6)	897
Males	15-16	.697 (.547-.888)	.488 (.411-.599)	1.60 (1.11-2.38)	11.5 (5.94-31.7)	77.5 (20.4-119)	1037
Females	13-14	.546 (.444-.671)	.351 (.298-.459)	1.40 (.946-2.27)	10.3 (6.89-15.7)	30.5 (15.7-59.1)	1004
Females	15-16	.437 (.370-.516)	.319 (.278-.388)	.963 (.721-1.38)	5.29 (3.58-7.80)	12.7 (6.50-28.4)	1172
Non-Hispanic blacks	13-14	1.90 (1.43-2.51)	1.34 (.874-2.18)	8.47 (5.73-11.3)	44.8 (19.2-90.6)	110 (60.8-161)	359
Non-Hispanic blacks	15-16	1.18 (.862-1.60)	.719 (.524-1.00)	4.98 (2.89-7.42)	24.4 (17.5-35.5)	51.7 (30.9-101)	415
Non-Hispanic whites	13-14	.579 (.472-.710)	.352 (.300-.456)	1.40 (1.07-1.79)	12.8 (6.85-16.7)	49.3 (19.3-81.8)	665
Non-Hispanic whites	15-16	.506 (.402-.638)	.379 (.305-.471)	1.14 (.767-2.13)	7.23 (4.01-11.1)	22.9 (9.35-77.5)	619
All Hispanics	13-14	.551 (.465-.652)	.395 (.351-.452)	1.33 (1.08-1.58)	6.38 (3.67-14.7)	24.9 (10.9-41.2)	578
All Hispanics	15-16	.504 (.400-.636)	.364 (.280-.471)	1.24 (.946-1.49)	5.21 (2.87-6.65)	24.3 (9.40-72.2)	799

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.030 and 0.030 respectively.

† Participants are age 6+ in Survey 13-14, while participants are 3+ in Survey 15-16.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total trans-3'-Hydroxycotinine in Non-smokers (creatinine corrected, 2013 - 2016)†

CAS Number 34834-67-8

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.764 (.652-.896)	.501 (.416-.627)	1.72 (1.33-2.30)	10.2 (6.88-17.8)	44.7 (31.6-57.5)	1901
Total population	15-16	.647 (.545-.767)	.448 (.364-.524)	1.23 (1.01-1.90)	7.16 (4.77-11.2)	26.2 (14.3-57.5)	2206
Age 3-5 years	15-16	2.46 (1.59-3.79)	1.83 (1.09-3.21)	10.5 (4.71-16.8)	36.1 (18.8-63.5)	75.0 (37.5-153)	319
Age 6-11 years	13-14	1.39 (1.01-1.91)	.821 (.575-1.32)	5.28 (1.91-11.9)	38.6 (11.9-69.9)	76.6 (38.6-138)	300
Age 6-11 years	15-16	1.14 (.892-1.46)	.852 (.600-1.41)	3.92 (2.23-6.16)	13.6 (8.40-20.6)	35.6 (16.2-67.9)	297
Age 12-19 years	13-14	1.04 (.729-1.47)	.590 (.412-1.03)	4.31 (2.01-6.60)	33.9 (10.1-54.5)	54.5 (26.5-77.5)	355
Age 12-19 years	15-16	.753 (.502-1.13)	.519 (.377-.763)	2.06 (1.04-3.93)	11.5 (3.78-52.1)	51.9 (9.32-98.8)	323
Age 20+ years	13-14	.680 (.569-.812)	.468 (.386-.562)	1.42 (1.09-1.85)	6.69 (4.99-11.6)	33.5 (17.5-45.9)	1246
Age 20+ years	15-16	.565 (.481-.663)	.395 (.330-.468)	1.04 (.852-1.24)	4.90 (3.12-7.68)	19.8 (10.2-45.4)	1267
Males	13-14	.752 (.621-.909)	.456 (.364-.606)	1.51 (1.09-2.33)	15.0 (6.58-26.7)	53.0 (32.1-77.7)	897
Males	15-16	.695 (.556-.870)	.448 (.336-.519)	1.46 (.960-2.43)	10.3 (5.62-27.1)	68.2 (25.7-97.6)	1037
Females	13-14	.775 (.632-.951)	.531 (.424-.682)	1.85 (1.41-2.35)	8.48 (5.73-19.0)	38.8 (19.0-54.2)	1004
Females	15-16	.607 (.519-.712)	.448 (.364-.562)	1.20 (.967-1.55)	5.03 (3.23-10.0)	14.3 (7.47-33.1)	1169
Non-Hispanic blacks	13-14	1.52 (1.19-1.94)	1.05 (.709-1.54)	6.69 (3.61-8.00)	34.0 (18.3-53.0)	68.4 (38.4-150)	359
Non-Hispanic blacks	15-16	1.01 (.710-1.44)	.583 (.411-.988)	3.53 (2.20-6.07)	20.4 (12.9-37.5)	67.9 (33.1-91.9)	413
Non-Hispanic whites	13-14	.746 (.598-.930)	.480 (.352-.679)	1.56 (1.11-2.46)	8.39 (5.68-24.4)	48.8 (25.9-77.5)	665
Non-Hispanic whites	15-16	.637 (.507-.799)	.448 (.322-.564)	1.20 (.884-2.17)	6.76 (3.92-11.4)	22.3 (10.2-69.5)	619
All Hispanics	13-14	.631 (.552-.721)	.437 (.382-.522)	1.25 (.978-1.62)	6.36 (4.74-11.5)	28.4 (11.5-43.1)	578
All Hispanics	15-16	.582 (.471-.718)	.410 (.327-.524)	1.14 (.943-1.39)	4.44 (2.64-8.91)	29.6 (8.81-74.6)	798

† Participants are age 6+ in Survey 13-14, while participants are 3+ in Survey 15-16.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total trans-3'-Hydroxycotinine in Smokers (2013 - 2016)

CAS Number 34834-67-8

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	3050 (2730-3420)	3500 (2950-4080)	7010 (6070-8000)	12500 (10300-13600)	15000 (12700-20000)	395
Total population	15-16	3580 (3060-4180)	4270 (3320-5360)	9270 (7380-10100)	13200 (11200-15900)	16600 (12300-31400)	373
Age 18-49 years	13-14	3080 (2680-3540)	3670 (2910-4430)	7090 (5630-8220)	12400 (9380-13500)	13600 (12200-16300)	262
Age 18-49 years	15-16	3010 (2450-3700)	3590 (2820-4430)	8500 (6580-12300)	14200 (9700-17600)	17400 (12400-30000)	219
Age 50+ years	13-14	2980 (2390-3730)	3130 (2100-4670)	6780 (5040-8000)	12600 (8000-22500)	22500 (8470-27000)	133
Age 50+ years	15-16	4810 (4180-5540)	5360 (4050-6900)	9540 (6650-10700)	11500 (9740-15900)	13400 (10800-24600)	154
Males	13-14	2920 (2540-3360)	3240 (2550-4350)	7100 (6290-8650)	12500 (9650-13600)	14800 (12200-22500)	222
Males	15-16	3880 (3130-4810)	4750 (3910-5870)	9540 (7810-11200)	14200 (10400-17400)	17400 (12400-30000)	230
Females	13-14	3200 (2720-3770)	3550 (2850-4420)	6750 (4890-8000)	12200 (8650-13700)	15600 (12400-26500)	173
Females	15-16	3200 (2460-4170)	3320 (2180-5950)	7760 (5360-10100)	12300 (10100-13600)	14000 (10600-37500)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.030 and 0.030 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total trans-3'-Hydroxycotinine in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 34834-67-8

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	3210 (2900-3560)	3900 (3350-4470)	6630 (6310-7320)	10900 (9000-14100)	15400 (10700-20900)	394
Total population	15-16	3530 (3190-3910)	4740 (3500-5520)	7370 (6250-8190)	10200 (8850-11800)	12500 (9620-17100)	373
Age 18-49 years	13-14	2960 (2620-3350)	3570 (3100-4400)	6540 (5610-6800)	10000 (7440-10900)	13800 (9640-18700)	262
Age 18-49 years	15-16	2770 (2300-3330)	3390 (2440-5000)	6120 (5200-7510)	9020 (7470-10700)	11100 (9070-15800)	219
Age 50+ years	13-14	3950 (3150-4960)	4540 (3310-5950)	8840 (5950-12300)	14300 (8840-24300)	17600 (12300-28600)	132
Age 50+ years	15-16	5370 (4750-6070)	5890 (4820-6690)	8580 (6570-10400)	12000 (8580-25700)	16900 (9510-29700)	154
Males	13-14	2780 (2300-3370)	3440 (2630-4080)	6610 (5170-7570)	10600 (7720-14900)	14900 (7880-20600)	221
Males	15-16	3340 (2910-3830)	4240 (3180-5400)	6770 (5690-8560)	9110 (7520-12000)	12000 (9020-24400)	230
Females	13-14	3730 (3140-4420)	4400 (3410-5380)	7050 (6350-8240)	11900 (8240-15600)	16300 (10700-24300)	173
Females	15-16	3810 (3050-4760)	5220 (3410-5890)	7890 (6040-8930)	11000 (8850-14700)	14700 (10900-17300)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary 1-(3-Pyridyl)-1-butanol-4-carboxylic acid in Smokers (2015 - 2016)

CAS Number 15569-97-8

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	351 (294-420)	454 (367-549)	816 (666-1020)	1350 (1040-1790)	1790 (1250-2530)	373
Age 18-49 years	15-16	282 (223-356)	374 (256-519)	763 (591-1030)	1180 (848-1790)	1790 (1110-3250)	219
Age 50+ years	15-16	513 (437-601)	559 (444-703)	870 (666-1250)	1440 (961-2240)	2100 (1260-2530)	154
Males	15-16	350 (266-460)	454 (341-591)	818 (654-1030)	1350 (1000-1980)	1790 (1120-2710)	230
Females	15-16	354 (286-438)	454 (333-550)	816 (573-1190)	1350 (1070-2280)	1730 (1180-3320)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 1.38.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary 1-(3-Pyridyl)-1-butanol-4-carboxylic acid in Smokers (creatinine corrected, 2015 - 2016)

CAS Number 15569-97-8

Metabolite of Nicotine

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	347 (294-409)	434 (357-567)	813 (691-930)	1310 (1060-1510)	1560 (1310-1930)	373
Age 18-49 years	15-16	259 (207-323)	362 (259-435)	608 (569-716)	939 (802-1250)	1310 (939-1560)	219
Age 50+ years	15-16	572 (431-758)	691 (398-954)	1170 (929-1400)	1510 (1170-1930)	1930 (1260-2430)	154
Males	15-16	301 (242-373)	393 (271-509)	717 (560-863)	991 (863-1400)	1400 (963-2220)	230
Females	15-16	421 (330-538)	567 (366-682)	1150 (716-1280)	1510 (1250-1650)	1620 (1360-1930)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Nicotine in Smokers (2013 - 2016)

CAS Number 54-11-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	607 (486-758)	837 (625-1120)	1870 (1590-2140)	3120 (2650-4050)	4590 (3340-5410)	395
Total population	15-16	715 (552-926)	1010 (652-1390)	2140 (1750-2820)	3850 (3250-5450)	5680 (4340-6870)	373
Age 18-49 years	13-14	573 (441-745)	837 (556-1220)	1860 (1600-2120)	3120 (2280-4180)	4720 (3550-5450)	262
Age 18-49 years	15-16	594 (448-788)	883 (541-1150)	2050 (1420-2880)	3600 (2820-5620)	5620 (3600-6620)	219
Age 50+ years	13-14	700 (518-948)	818 (620-1170)	2010 (1310-2400)	3080 (2340-4590)	4590 (2390-9080)	133
Age 50+ years	15-16	984 (680-1420)	1380 (861-1750)	2230 (1910-3320)	4690 (2720-5670)	6740 (4400-9840)	154
Males	13-14	591 (473-739)	747 (557-1120)	1860 (1530-2070)	3020 (2180-4390)	4590 (2960-5700)	222
Males	15-16	671 (459-981)	947 (533-1380)	2120 (1440-3110)	3600 (2820-5300)	5300 (3600-6740)	230
Females	13-14	624 (471-827)	887 (620-1220)	1880 (1500-2280)	3280 (2580-4520)	4760 (3280-5450)	173
Females	15-16	781 (623-979)	1070 (712-1450)	2140 (1750-2950)	4750 (2910-6750)	6620 (4690-9450)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 10.5 and 10.5 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Nicotine in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 54-11-5

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	632 (517-772)	921 (742-1060)	1920 (1570-2180)	3600 (2790-4450)	5200 (3610-6060)	394
Total population	15-16	706 (530-940)	1030 (758-1310)	2040 (1660-2380)	3860 (2760-5250)	5410 (4050-6990)	373
Age 18-49 years	13-14	551 (442-687)	812 (563-998)	1720 (1460-1960)	3090 (2340-4450)	5070 (3060-6890)	262
Age 18-49 years	15-16	546 (408-730)	948 (618-1160)	1760 (1310-2170)	2800 (2180-4280)	4280 (2300-5250)	219
Age 50+ years	13-14	900 (651-1240)	1180 (756-1520)	2240 (1500-3050)	3960 (2410-5200)	5200 (2530-9170)	132
Age 50+ years	15-16	1100 (654-1840)	1390 (904-1940)	2730 (1720-5200)	5720 (3370-7920)	7760 (3400-10900)	154
Males	13-14	553 (447-684)	901 (604-1080)	1710 (1420-1920)	2800 (1920-3600)	3600 (2410-6060)	221
Males	15-16	577 (409-814)	948 (652-1260)	1720 (1200-2120)	2350 (2120-3370)	3760 (2730-5070)	230
Females	13-14	726 (549-959)	977 (675-1150)	2230 (1570-2940)	4370 (2900-6580)	6580 (3960-9820)	173
Females	15-16	929 (658-1310)	1300 (849-1940)	2820 (1770-4770)	5250 (3720-6990)	6990 (5200-10900)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Cotinine_FactSheet.html

Urinary Total Nicotine 1'-Oxide in Smokers (2013 - 2016)

CAS Number 51095-86-4

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	174 (140-217)	209 (171-284)	452 (405-535)	731 (586-1040)	1050 (844-1650)	395
Total population	15-16	193 (158-235)	263 (211-298)	510 (401-618)	922 (714-1190)	1290 (1060-1570)	373
Age 18-49 years	13-14	164 (123-218)	194 (139-323)	452 (399-535)	706 (574-934)	1040 (706-2010)	262
Age 18-49 years	15-16	159 (128-196)	212 (154-295)	454 (338-564)	776 (564-1300)	1320 (956-1640)	219
Age 50+ years	13-14	204 (153-274)	236 (176-356)	477 (356-606)	929 (499-1210)	1050 (661-1210)	133
Age 50+ years	15-16	269 (219-331)	311 (247-383)	618 (432-826)	1010 (720-1290)	1230 (1010-1310)	154
Males	13-14	167 (129-217)	194 (145-277)	458 (379-567)	809 (570-1120)	1200 (683-2010)	222
Males	15-16	186 (138-251)	245 (165-339)	498 (383-583)	822 (583-1230)	1230 (816-1600)	230
Females	13-14	182 (137-242)	239 (175-352)	452 (394-538)	706 (586-1000)	1040 (706-1340)	173
Females	15-16	202 (166-245)	275 (190-334)	534 (309-833)	966 (703-1290)	1320 (966-1640)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 2.50 and 2.50 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Nicotine 1'-Oxide in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 51095-86-4

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	182 (148-224)	260 (220-308)	471 (405-541)	769 (638-954)	1010 (776-1260)	394
Total population	15-16	190 (158-229)	248 (195-314)	484 (390-589)	768 (616-936)	1010 (744-1340)	373
Age 18-49 years	13-14	157 (124-200)	231 (168-284)	389 (347-484)	728 (541-797)	797 (619-1140)	262
Age 18-49 years	15-16	146 (124-172)	210 (161-242)	378 (315-444)	589 (496-748)	812 (589-1330)	219
Age 50+ years	13-14	263 (191-364)	360 (289-379)	655 (424-769)	1060 (691-1370)	1260 (1010-1620)	132
Age 50+ years	15-16	300 (210-429)	373 (259-502)	705 (462-864)	936 (604-1330)	1190 (706-2650)	154
Males	13-14	157 (124-199)	223 (169-286)	420 (359-495)	714 (522-797)	797 (666-1160)	221
Males	15-16	160 (125-205)	221 (158-288)	392 (316-496)	603 (461-774)	757 (616-936)	230
Females	13-14	212 (161-279)	291 (244-348)	500 (405-618)	944 (627-1260)	1260 (828-1530)	173
Females	15-16	240 (195-295)	293 (236-407)	655 (475-755)	970 (700-1330)	1250 (864-1480)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Nornicotine in Smokers (2013 - 2016)

CAS Number 5746-86-1

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	37.3 (32.0-43.5)	45.6 (40.0-51.3)	84.2 (76.1-97.9)	143 (126-176)	194 (143-221)	395
Total population	15-16	40.3 (33.5-48.5)	46.9 (39.1-55.6)	97.0 (71.7-121)	163 (134-213)	221 (156-409)	373
Age 18-49 years	13-14	36.8 (30.6-44.2)	49.0 (37.8-62.6)	87.7 (73.5-101)	140 (120-176)	189 (138-220)	262
Age 18-49 years	15-16	34.9 (27.0-45.2)	39.4 (33.2-52.1)	90.8 (62.3-141)	166 (108-228)	221 (130-476)	219
Age 50+ years	13-14	38.7 (30.4-49.3)	40.8 (31.5-46.9)	79.9 (59.8-104)	179 (117-199)	199 (103-254)	133
Age 50+ years	15-16	51.7 (43.1-61.9)	60.3 (44.9-65.1)	102 (77.5-121)	158 (121-191)	191 (142-270)	154
Males	13-14	36.4 (31.2-42.4)	48.1 (34.4-57.7)	82.7 (71.4-101)	146 (117-191)	199 (146-211)	222
Males	15-16	41.6 (32.5-53.3)	47.5 (36.0-63.2)	96.8 (66.1-142)	161 (109-228)	221 (134-358)	230
Females	13-14	38.3 (31.3-46.8)	44.6 (35.0-56.6)	84.2 (73.5-98.0)	138 (110-176)	189 (127-271)	173
Females	15-16	38.6 (31.4-47.4)	44.8 (30.5-64.5)	102 (68.6-126)	163 (111-191)	201 (163-240)	143

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 2.50 and 2.50 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Urinary Total Nornicotine in Smokers (creatinine corrected, 2013 - 2016)

CAS Number 5746-86-1

Metabolite of Nicotine

Geometric mean and selected percentiles of urine concentrations (in µg/g creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	38.9 (33.9-44.7)	47.1 (42.2-52.1)	88.4 (78.8-102)	130 (119-157)	177 (152-217)	394
Total population	15-16	39.8 (34.1-46.4)	55.5 (42.5-65.1)	85.6 (78.1-96.5)	124 (108-143)	161 (119-208)	373
Age 18-49 years	13-14	35.3 (30.4-41.1)	42.9 (35.0-49.6)	85.3 (67.5-96.2)	126 (103-157)	159 (145-217)	262
Age 18-49 years	15-16	32.1 (26.0-39.5)	44.9 (31.3-55.6)	74.9 (62.7-85.6)	106 (92.0-124)	124 (104-151)	219
Age 50+ years	13-14	50.0 (37.9-66.1)	61.3 (44.0-81.1)	101 (78.8-120)	149 (119-198)	203 (125-450)	132
Age 50+ years	15-16	57.6 (42.1-78.8)	70.0 (41.4-101)	108 (82.6-136)	161 (113-237)	208 (136-237)	154
Males	13-14	34.2 (28.8-40.6)	43.3 (33.7-50.2)	84.6 (65.3-106)	119 (92.2-150)	150 (113-217)	221
Males	15-16	35.8 (29.5-43.5)	50.7 (36.8-59.9)	78.1 (62.1-90.9)	108 (94.9-115)	124 (108-150)	230
Females	13-14	44.6 (36.2-54.8)	50.2 (44.2-63.2)	97.0 (78.8-103)	157 (111-203)	228 (149-325)	173
Females	15-16	45.9 (39.8-53.0)	62.8 (48.7-70.2)	102 (79.5-125)	151 (112-202)	202 (136-237)	143

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cotinine_BiomonitoringSummary.html

Tobacco-Specific Nitrosamines (TSNAs)

Urinary N'-Nitrosoanabasine (NAB) in Non-smokers (2013 - 2014)

CAS Number 37620-20-5

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5968
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	999
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1095
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	3874
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2802
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	3166
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1170
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	2122
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1741

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.60.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary N'-Nitrosoanabasine (NAB) in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 37620-20-5

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5965
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	999
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1095
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	3871
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2801
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	3164
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1170
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	2121
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1739

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary N'-Nitrosoanabasine (NAB) in Smokers (2013 - 2014)

CAS Number 37620-20-5

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	11.0 (9.85-12.3)	13.6 (12.4-15.3)	30.7 (27.3-33.6)	55.0 (50.0-65.2)	79.1 (68.8-82.3)	1210
Age 18-29 years	13-14	7.98 (6.41-9.93)	9.30 (5.90-12.6)	22.3 (16.8-27.2)	41.9 (33.6-52.4)	54.6 (42.5-68.8)	285
Age 30-44 years	13-14	13.0 (10.4-16.2)	15.9 (12.4-21.2)	34.6 (29.4-40.8)	62.0 (50.7-77.3)	85.4 (66.9-99.3)	361
Age 45-59 years	13-14	12.2 (10.1-14.8)	16.4 (12.2-19.7)	30.7 (25.3-36.2)	67.2 (47.5-79.1)	81.4 (70.4-89.8)	342
Age 60+ years	13-14	11.3 (9.28-13.8)	12.8 (9.00-17.4)	32.0 (25.7-39.0)	50.7 (39.5-67.4)	72.5 (45.4-104)	222
Males	13-14	10.7 (9.38-12.3)	13.4 (11.5-15.8)	31.5 (26.5-33.9)	53.5 (43.2-66.0)	73.4 (61.5-81.8)	667
Females	13-14	11.3 (10.0-12.8)	13.6 (11.9-15.8)	28.3 (26.4-34.1)	62.0 (50.7-68.8)	82.9 (70.8-90.8)	543
Non-Hispanic blacks	13-14	7.42 (6.10-9.02)	8.40 (6.40-10.4)	19.7 (15.7-24.7)	37.3 (27.7-53.9)	54.8 (38.6-68.4)	326
Non-Hispanic whites	13-14	13.1 (11.3-15.2)	16.4 (14.6-18.2)	35.6 (31.3-39.2)	64.4 (52.5-73.4)	81.6 (73.4-87.5)	581
All Hispanics	13-14	7.27 (5.68-9.30)	8.10 (5.30-11.2)	22.2 (12.7-31.8)	44.4 (31.8-57.3)	65.5 (39.5-82.9)	171

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.60.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary N'-Nitrosoanabasine (NAB) in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 37620-20-5

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	11.1 (9.29-13.3)	15.2 (11.9-17.7)	30.5 (27.0-34.9)	52.7 (45.7-59.6)	72.6 (61.7-78.4)	1208
Age 18-29 years	13-14	6.64 (5.31-8.32)	8.50 (5.24-11.5)	18.5 (13.8-24.7)	32.4 (26.0-41.9)	47.8 (31.8-77.9)	285
Age 30-44 years	13-14	12.0 (9.49-15.3)	16.0 (11.9-19.8)	30.5 (25.4-36.9)	51.7 (44.2-57.2)	74.1 (53.4-93.8)	360
Age 45-59 years	13-14	15.1 (10.3-22.0)	20.5 (13.7-28.8)	40.1 (27.4-56.5)	63.6 (50.3-73.2)	73.4 (67.7-93.7)	341
Age 60+ years	13-14	12.9 (10.1-16.5)	17.1 (11.7-23.5)	32.5 (24.6-37.7)	62.1 (38.7-78.4)	90.2 (55.0-130)	222
Males	13-14	9.30 (7.84-11.0)	13.7 (10.4-16.6)	27.2 (23.0-31.6)	45.0 (39.3-54.6)	63.1 (51.3-75.0)	665
Females	13-14	13.5 (10.7-16.9)	16.7 (13.0-20.9)	35.8 (31.4-40.1)	57.6 (51.1-70.0)	74.5 (64.2-93.8)	543
Non-Hispanic blacks	13-14	5.37 (4.68-6.16)	6.52 (5.00-7.86)	15.7 (12.3-18.0)	25.6 (21.1-32.6)	34.1 (27.5-42.2)	326
Non-Hispanic whites	13-14	14.7 (11.6-18.6)	18.2 (15.4-23.9)	36.9 (30.3-43.6)	59.6 (51.3-71.4)	75.0 (68.2-93.7)	580
All Hispanics	13-14	6.55 (5.30-8.10)	6.80 (5.00-8.57)	21.9 (16.0-25.4)	40.7 (26.1-54.2)	58.5 (38.7-90.2)	171

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary N'-Nitrosoanatabine (NAT) in Non-smokers (2013 - 2014)

CAS Number 71267-22-6

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5961
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	999
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1094
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	3868
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2800
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	3161
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1167
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	2120
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1739

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 4.20.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary N'-Nitrosoanatabine (NAT) in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 71267-22-6

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5958
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	999
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1094
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	3865
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2799
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	3159
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1167
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	2119
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1737

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary N'-Nitrosoanatabine (NAT) in Smokers (2013 - 2014)

CAS Number 71267-22-6

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	62.2 (55.7-69.4)	85.1 (74.8-92.9)	190 (172-204)	353 (319-369)	457 (405-486)	1207
Age 18-29 years	13-14	42.8 (34.3-53.4)	55.1 (36.5-80.6)	138 (95.5-177)	256 (170-344)	348 (257-430)	285
Age 30-44 years	13-14	75.6 (58.3-98.0)	109 (80.7-129)	226 (194-255)	383 (329-445)	495 (378-586)	361
Age 45-59 years	13-14	70.3 (57.9-85.3)	95.5 (71.0-123)	194 (162-241)	361 (320-419)	464 (374-580)	339
Age 60+ years	13-14	63.3 (49.0-81.9)	72.0 (52.8-101)	218 (133-273)	327 (267-401)	465 (310-661)	222
Males	13-14	59.8 (52.3-68.3)	81.7 (68.7-98.9)	193 (166-226)	351 (305-362)	384 (362-457)	665
Females	13-14	64.8 (57.7-72.7)	86.9 (72.1-103)	186 (157-217)	359 (299-431)	486 (431-524)	542
Non-Hispanic blacks	13-14	38.5 (30.8-48.1)	45.1 (36.2-68.1)	125 (95.5-148)	232 (157-329)	354 (258-476)	326
Non-Hispanic whites	13-14	77.1 (67.8-87.8)	108 (91.2-120)	227 (198-255)	369 (345-407)	465 (437-524)	576
All Hispanics	13-14	37.1 (28.5-48.2)	43.3 (33.9-61.1)	121 (72.8-182)	240 (182-302)	316 (218-501)	172

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 4.20.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary N'-Nitrosoanatabine (NAT) in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 71267-22-6

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	62.6 (52.5-74.6)	90.1 (72.5-108)	193 (155-236)	334 (295-386)	468 (404-544)	1205
Age 18-29 years	13-14	35.6 (28.5-44.5)	52.5 (32.3-62.2)	125 (75.8-155)	229 (147-281)	329 (186-565)	285
Age 30-44 years	13-14	69.9 (53.0-92.1)	97.1 (74.5-124)	197 (161-244)	343 (276-434)	447 (328-579)	360
Age 45-59 years	13-14	86.6 (58.5-128)	132 (85.8-175)	242 (179-313)	417 (290-544)	544 (361-712)	338
Age 60+ years	13-14	72.3 (54.3-96.2)	93.6 (66.3-128)	215 (147-268)	357 (256-688)	620 (295-1060)	222
Males	13-14	52.0 (43.7-61.9)	75.8 (56.9-96.0)	167 (137-213)	290 (242-358)	399 (307-544)	663
Females	13-14	76.3 (61.6-94.6)	100 (80.6-125)	223 (177-270)	400 (324-443)	510 (443-579)	542
Non-Hispanic blacks	13-14	27.9 (23.5-33.0)	39.0 (28.0-47.9)	89.3 (75.4-118)	163 (135-199)	216 (166-268)	326
Non-Hispanic whites	13-14	86.5 (69.9-107)	121 (93.5-148)	237 (208-268)	400 (334-452)	534 (441-656)	575
All Hispanics	13-14	33.2 (26.8-41.0)	36.2 (25.3-50.7)	117 (83.5-150)	210 (155-337)	362 (180-447)	172

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary N'-Nitrosonornicotine (NNN) in Non-smokers (2013 - 2014)

CAS Number 16543-55-8

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5972
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	999
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1097
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	3876
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2804
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	3168
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1168
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	2126
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1741

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 2.80.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary N'-Nitrosonornicotine (NNN) in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 16543-55-8

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5969
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	999
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1097
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	3873
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2803
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	3166
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1168
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	2125
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1739

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary N'-Nitrosonornicotine (NNN) in Smokers (2013 - 2014)

CAS Number 16543-55-8

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	8.01 (6.93-9.25)	8.50 (7.10-10.3)	18.1 (14.8-22.2)	31.3 (25.8-37.9)	40.9 (36.9-48.4)	1196
Age 18-29 years	13-14	6.64 (5.24-8.41)	6.60 (4.10-9.10)	14.9 (10.5-20.6)	29.4 (20.2-37.0)	37.1 (29.4-49.0)	285
Age 30-44 years	13-14	8.63 (6.85-10.9)	10.2 (6.20-13.5)	20.1 (16.6-23.2)	32.6 (26.3-41.9)	46.8 (37.6-51.4)	360
Age 45-59 years	13-14	8.84 (7.51-10.4)	9.30 (7.50-11.3)	19.6 (14.3-23.0)	33.6 (25.0-38.1)	40.1 (33.6-49.0)	338
Age 60+ years	13-14	7.84 (6.56-9.38)	8.80 (6.70-10.5)	15.0 (12.6-19.2)	29.5 (16.2-46.1)	46.1 (29.5-62.1)	213
Males	13-14	8.16 (7.05-9.45)	9.30 (7.50-10.9)	18.0 (14.4-23.3)	32.8 (26.0-40.1)	45.5 (38.8-49.7)	659
Females	13-14	7.84 (6.59-9.33)	8.30 (6.10-10.0)	18.5 (14.7-21.9)	30.8 (24.3-34.3)	38.5 (31.4-48.0)	537
Non-Hispanic blacks	13-14	7.36 (5.86-9.25)	7.90 (5.10-10.3)	16.5 (10.9-23.8)	29.5 (22.1-38.4)	38.4 (30.5-60.2)	322
Non-Hispanic whites	13-14	8.80 (7.59-10.2)	9.60 (8.40-11.0)	19.4 (15.5-23.1)	33.6 (26.9-39.2)	44.4 (37.6-49.7)	573
All Hispanics	13-14	*	4.10 (<LOD-6.40)	12.2 (8.00-18.5)	24.2 (16.6-26.6)	26.9 (23.9-39.2)	168

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 2.80.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary N'-Nitrosonornicotine (NNN) in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 16543-55-8

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	8.00 (6.65-9.62)	8.45 (6.83-10.6)	19.0 (15.9-21.8)	38.3 (27.9-50.0)	60.1 (45.0-76.6)	1194
Age 18-29 years	13-14	5.52 (4.43-6.87)	5.38 (3.57-7.54)	14.8 (8.89-19.7)	28.2 (21.3-36.9)	42.2 (34.1-51.4)	285
Age 30-44 years	13-14	7.96 (6.22-10.2)	7.92 (6.24-11.3)	18.4 (15.3-20.9)	34.3 (25.7-44.6)	60.0 (42.3-70.9)	359
Age 45-59 years	13-14	10.7 (7.76-14.6)	11.2 (8.45-15.9)	24.2 (17.3-35.4)	47.2 (32.3-76.6)	74.3 (39.9-115)	337
Age 60+ years	13-14	8.93 (7.07-11.3)	9.26 (7.42-11.0)	16.3 (12.5-25.5)	46.1 (25.5-69.3)	80.6 (34.5-200)	213
Males	13-14	6.98 (5.76-8.47)	7.58 (5.51-9.65)	17.3 (14.5-20.7)	36.4 (29.6-42.7)	56.0 (38.9-69.3)	657
Females	13-14	9.26 (7.26-11.8)	9.33 (7.17-12.1)	20.8 (16.0-23.7)	40.1 (24.6-71.9)	69.3 (40.0-98.7)	537
Non-Hispanic blacks	13-14	5.33 (4.47-6.36)	5.28 (4.13-6.85)	12.8 (8.84-16.4)	23.5 (17.9-28.2)	34.5 (23.7-56.1)	322
Non-Hispanic whites	13-14	9.73 (7.82-12.1)	9.85 (7.89-12.9)	21.4 (17.2-27.6)	43.6 (32.3-62.8)	66.7 (47.2-96.3)	572
All Hispanics	13-14	*	4.22 (2.67-6.07)	11.9 (8.00-16.8)	23.6 (18.8-30.9)	34.8 (23.5-40.8)	168

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary Total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol) (NNAL) in Non-smokers (2011 - 2014)

CAS Number 76014-81-8

Metabolite of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.800 (.700-.900)	2.30 (2.00-2.60)	7.40 (6.10-8.90)	15.7 (11.7-21.0)	5486
Total population	13-14	*	<LOD	2.00 (1.50-2.80)	7.10 (5.70-9.00)	14.5 (12.2-17.9)	5963
Age 6-11 years	11-12	1.91 (1.57-2.32)	1.30 (1.10-1.70)	5.10 (3.80-7.30)	21.1 (11.5-31.9)	36.7 (20.1-60.2)	955
Age 6-11 years	13-14	*	.900 (.600-1.40)	4.00 (2.40-6.60)	13.9 (9.90-21.4)	25.6 (19.3-39.8)	1000
Age 12-19 years	11-12	1.53 (1.35-1.73)	1.30 (1.10-1.40)	3.10 (2.20-4.30)	10.8 (7.60-14.4)	19.3 (13.2-27.0)	949
Age 12-19 years	13-14	*	.700 (<LOD-1.20)	3.70 (2.30-5.50)	14.5 (8.20-20.8)	24.9 (18.3-34.8)	1097
Age 20+ years	11-12	*	.700 (.600-.900)	2.00 (1.80-2.20)	5.70 (4.80-6.80)	11.7 (10.0-14.9)	3582
Age 20+ years	13-14	*	<LOD	1.70 (1.30-2.20)	5.90 (4.70-7.20)	11.5 (9.00-14.1)	3866
Males	11-12	1.32 (1.23-1.41)	1.00 (.900-1.10)	2.80 (2.40-3.10)	9.80 (7.60-11.2)	19.5 (13.5-26.4)	2616
Males	13-14	*	.600 (<LOD-.900)	2.30 (1.70-3.30)	8.30 (5.70-11.7)	16.9 (13.8-20.3)	2797
Females	11-12	*	.700 (.600-.800)	1.90 (1.70-2.20)	5.70 (4.60-7.20)	12.4 (9.00-18.5)	2870
Females	13-14	*	<LOD	1.70 (1.30-2.30)	6.60 (5.20-8.10)	12.7 (9.90-16.0)	3166
Non-Hispanic blacks	11-12	1.98 (1.57-2.48)	1.60 (1.30-2.10)	5.10 (3.30-8.70)	15.9 (9.40-28.8)	30.4 (18.5-46.7)	1393
Non-Hispanic blacks	13-14	1.68 (1.41-2.00)	1.20 (.900-1.80)	5.20 (4.10-6.00)	13.9 (12.0-16.8)	22.8 (19.0-25.6)	1162
Non-Hispanic whites	11-12	*	.800 (.600-.900)	2.10 (1.80-2.40)	6.70 (5.30-8.50)	14.4 (11.4-20.4)	1679
Non-Hispanic whites	13-14	*	<LOD	1.70 (1.10-2.20)	6.60 (4.80-8.40)	14.1 (10.7-18.3)	2126
All Hispanics	11-12	1.15 (.985-1.34)	.900 (.800-1.10)	2.10 (1.70-2.60)	5.90 (4.10-7.90)	11.3 (7.80-17.9)	1405
All Hispanics	13-14	*	.700 (<LOD-1.00)	2.30 (1.50-3.50)	6.70 (4.30-8.80)	10.6 (8.30-15.6)	1739

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.600 and 0.600 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/NNAL_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/NNAL_FactSheet.html

Urinary Total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol) (NNAL) in Non-smokers (creatinine corrected, 2011 - 2014)

CAS Number 76014-81-8

Metabolite of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)

Geometric mean and selected percentiles of urine concentrations (in pg/mg of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	1.06 (1.00-1.14)	2.47 (2.14-2.72)	6.57 (5.24-8.25)	14.3 (11.7-18.4)	5483
Total population	13-14	*	<LOD	2.25 (1.89-2.80)	6.88 (5.81-8.57)	13.6 (11.7-15.6)	5960
Age 6-11 years	11-12	2.57 (2.13-3.10)	1.91 (1.60-2.47)	5.93 (4.21-8.49)	23.5 (13.7-31.6)	39.1 (23.5-59.0)	954
Age 6-11 years	13-14	*	1.45 (1.14-1.97)	5.00 (3.50-7.50)	18.0 (13.4-25.2)	35.3 (25.4-46.4)	1000
Age 12-19 years	11-12	1.45 (1.31-1.60)	1.14 (1.05-1.25)	3.40 (2.50-3.99)	9.14 (5.71-13.4)	18.4 (12.2-22.2)	949
Age 12-19 years	13-14	*	.870 (<LOD-1.22)	2.86 (1.86-4.62)	10.6 (6.78-14.8)	19.2 (13.0-24.4)	1097
Age 20+ years	11-12	*	1.00 (.938-1.08)	2.12 (1.91-2.42)	5.00 (4.26-6.18)	10.5 (8.56-13.0)	3580
Age 20+ years	13-14	*	<LOD	2.06 (1.70-2.36)	5.75 (4.61-6.87)	10.9 (9.05-12.3)	3863
Males	11-12	1.19 (1.10-1.29)	.984 (.909-1.05)	2.38 (2.08-2.68)	7.36 (5.60-9.33)	15.2 (11.5-21.4)	2615
Males	13-14	*	.794 (<LOD-.940)	2.27 (1.69-2.99)	7.01 (5.98-8.73)	12.2 (10.1-15.6)	2796
Females	11-12	*	1.18 (1.04-1.30)	2.48 (2.17-2.86)	5.67 (4.69-8.21)	13.5 (10.3-18.0)	2868
Females	13-14	*	<LOD	2.23 (1.91-2.67)	6.75 (5.09-9.39)	14.4 (11.6-18.1)	3164
Non-Hispanic blacks	11-12	1.50 (1.18-1.91)	1.31 (1.02-1.63)	3.70 (2.36-6.09)	11.5 (6.69-19.0)	19.7 (11.5-33.7)	1392
Non-Hispanic blacks	13-14	1.31 (1.07-1.60)	.978 (.787-1.38)	3.79 (2.97-4.78)	9.73 (7.94-11.9)	16.0 (12.3-21.7)	1162
Non-Hispanic whites	11-12	*	1.04 (.984-1.14)	2.47 (2.06-2.79)	5.94 (5.14-7.72)	16.1 (11.5-18.9)	1677
Non-Hispanic whites	13-14	*	<LOD	2.11 (1.67-2.55)	6.43 (5.14-8.52)	14.0 (10.9-15.9)	2125
All Hispanics	11-12	1.20 (1.03-1.39)	1.04 (.926-1.21)	2.03 (1.68-2.63)	5.00 (3.70-7.20)	11.3 (7.36-15.3)	1405
All Hispanics	13-14	*	.952 (<LOD-1.23)	2.35 (1.67-3.46)	6.36 (4.74-8.57)	11.4 (7.62-16.7)	1737

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/NNAL_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/NNAL_FactSheet.html

Urinary Total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol) (NNAL) in Smokers (2011 - 2014)

CAS Number 76014-81-8

Metabolite of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	207 (174-246)	258 (205-308)	459 (412-535)	776 (655-891)	991 (831-1220)	1050
Total population	13-14	164 (146-184)	192 (170-210)	414 (357-490)	717 (606-836)	947 (754-1120)	1209
Age 18-29 years	11-12	133 (103-172)	149 (111-189)	343 (258-454)	626 (524-686)	804 (667-891)	261
Age 18-29 years	13-14	108 (88.3-132)	118 (83.2-167)	248 (195-344)	446 (387-543)	623 (447-910)	286
Age 30-44 years	11-12	179 (127-252)	256 (155-313)	444 (369-499)	784 (603-841)	932 (784-1560)	306
Age 30-44 years	13-14	179 (144-221)	218 (167-259)	477 (328-578)	739 (614-983)	1030 (720-1550)	363
Age 45-59 years	11-12	285 (245-330)	322 (238-360)	570 (450-680)	894 (711-996)	1050 (879-1280)	274
Age 45-59 years	13-14	190 (167-216)	229 (192-266)	509 (401-580)	754 (632-985)	985 (700-1210)	342
Age 60+ years	11-12	279 (237-328)	344 (239-420)	550 (412-640)	700 (626-953)	1010 (659-1900)	209
Age 60+ years	13-14	222 (194-254)	224 (182-293)	521 (339-706)	776 (600-1070)	1070 (756-1830)	218
Males	11-12	207 (172-249)	272 (194-349)	501 (443-584)	761 (643-861)	983 (776-1680)	635
Males	13-14	161 (141-183)	198 (167-222)	410 (372-495)	720 (569-910)	941 (706-1330)	668
Females	11-12	206 (167-255)	239 (202-282)	419 (351-548)	798 (562-955)	991 (831-1210)	415
Females	13-14	167 (146-191)	187 (148-229)	416 (334-509)	714 (623-805)	966 (737-1120)	541
Non-Hispanic blacks	11-12	193 (165-226)	226 (173-274)	414 (349-480)	624 (508-766)	766 (603-1190)	333
Non-Hispanic blacks	13-14	194 (165-228)	204 (182-240)	428 (318-549)	643 (567-920)	943 (643-1210)	324
Non-Hispanic whites	11-12	235 (191-290)	275 (222-353)	522 (423-626)	860 (689-991)	1050 (894-1280)	442
Non-Hispanic whites	13-14	176 (152-203)	201 (167-233)	447 (378-536)	743 (649-910)	985 (737-1260)	580
All Hispanics	11-12	120 (82.6-175)	152 (91.8-229)	342 (268-366)	523 (380-667)	667 (496-784)	167
All Hispanics	13-14	106 (79.6-140)	109 (75.3-194)	289 (207-403)	515 (400-664)	692 (515-1020)	172

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.600 and 0.600 respectively.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/NNAL_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/NNAL_FactSheet.html

Urinary Total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol) (NNAL) in Smokers (creatinine corrected, 2011 - 2014)

CAS Number 76014-81-8

Metabolite of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)

Geometric mean and selected percentiles of urine concentrations (in pg/mg of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	221 (185-264)	258 (212-306)	470 (409-553)	800 (665-1010)	1110 (827-1270)	1050
Total population	13-14	166 (137-200)	207 (165-244)	388 (323-464)	650 (492-865)	872 (691-1230)	1207
Age 18-29 years	11-12	104 (84.0-129)	113 (85.4-145)	206 (176-257)	358 (258-492)	498 (390-793)	261
Age 18-29 years	13-14	89.7 (72.5-111)	97.9 (76.2-123)	215 (181-278)	369 (254-568)	523 (345-854)	286
Age 30-44 years	11-12	192 (142-257)	241 (184-311)	452 (352-605)	786 (553-1130)	1110 (785-1270)	306
Age 30-44 years	13-14	166 (131-211)	215 (151-253)	367 (293-464)	630 (464-808)	808 (678-1090)	362
Age 45-59 years	11-12	350 (309-397)	360 (311-408)	609 (462-767)	1010 (672-1270)	1250 (827-2560)	274
Age 45-59 years	13-14	237 (173-326)	272 (230-344)	523 (344-691)	829 (619-1260)	1230 (691-1690)	341
Age 60+ years	11-12	355 (324-389)	369 (297-465)	660 (538-708)	933 (698-1230)	1140 (774-1640)	209
Age 60+ years	13-14	253 (214-300)	296 (224-341)	457 (358-585)	750 (554-1670)	1030 (629-3910)	218
Males	11-12	195 (168-227)	227 (207-256)	434 (375-458)	694 (525-856)	933 (698-1140)	635
Males	13-14	141 (119-167)	173 (139-209)	344 (281-411)	628 (474-744)	800 (634-1230)	666
Females	11-12	259 (206-326)	299 (240-362)	609 (470-738)	885 (774-1210)	1260 (870-1660)	415
Females	13-14	198 (158-247)	241 (202-286)	434 (337-553)	730 (536-921)	921 (669-1490)	541
Non-Hispanic blacks	11-12	133 (118-150)	162 (134-177)	241 (212-266)	386 (320-462)	511 (405-660)	333
Non-Hispanic blacks	13-14	140 (125-158)	161 (145-181)	282 (234-331)	480 (370-528)	604 (462-865)	324
Non-Hispanic whites	11-12	282 (237-335)	331 (292-360)	579 (458-698)	895 (765-1140)	1190 (815-1620)	442
Non-Hispanic whites	13-14	198 (156-251)	242 (193-292)	445 (351-575)	742 (607-971)	1030 (826-1460)	579
All Hispanics	11-12	117 (90.3-152)	132 (94.8-173)	291 (197-350)	492 (362-603)	652 (493-747)	167
All Hispanics	13-14	94.5 (71.6-125)	103 (67.5-161)	254 (204-333)	480 (382-600)	651 (464-770)	172

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/NNAL_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/NNAL_FactSheet.html

Volatile N-Nitrosamines (VNAs)

Urinary N-Nitrosodiethylamine (NDEA) (2013 - 2014)

CAS Number 55-18-5

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2470
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	363
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	424
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1683
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1238
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1232
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	435
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	522
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	888
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	678
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	282

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 5.02.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosodiethylamine (NDEA) (creatinine corrected) (2013 - 2014)

CAS Number 55-18-5

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2469
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	363
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	424
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1682
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1237
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1232
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	435
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	522
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	887
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	678
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	282

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosoethylmethylamine (NMEA) (2013 - 2014)

CAS Number 10595-95-6

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2509
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	369
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	431
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1709
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1262
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1247
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	433
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	539
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	911
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	675
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	283

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 3.64.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosoethylmethylamine (NMEA) (creatinine corrected) (2013 - 2014)

CAS Number 10595-95-6

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2508
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	369
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	431
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1708
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1261
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1247
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	433
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	539
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	910
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	675
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	283

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosomorpholine (NMOR) (2013 - 2014)

CAS Number 59-89-2

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2384
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	8.95 (<LOD-13.3)	353
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	7.88 (<LOD-9.91)	1622
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1179
Females	13-14	*	<LOD	<LOD	<LOD	8.34 (<LOD-11.8)	1205
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	410
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	8.83 (<LOD-14.6)	517
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	7.88 (<LOD-10.5)	854
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	646
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	272

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 7.84.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosomorpholine (NMOR) (creatinine corrected) (2013 - 2014)

CAS Number 59-89-2

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2383
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	32.6 (<LOD-36.9)	353
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	26.4 (<LOD-30.8)	1621
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1178
Females	13-14	*	<LOD	<LOD	<LOD	30.8 (<LOD-32.6)	1205
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	410
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	15.4 (<LOD-18.5)	517
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	29.2 (<LOD-32.6)	853
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	646
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	272

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosopiperidine (NPIP) (2013 - 2014)

CAS Number 100-75-4

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2529
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	5.32 (<LOD-7.17)	374
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	7.45 (<LOD-11.2)	434
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1721
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1257
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1272
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	6.49 (<LOD-14.6)	434
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	7.67 (<LOD-9.99)	544
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	921
All Hispanics	13-14	*	<LOD	<LOD	<LOD	8.24 (<LOD-12.3)	679
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	283

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 5.08.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosopiperidine (NPIP) (creatinine corrected) (2013 - 2014)

CAS Number 100-75-4

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2528
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	23.9 (<LOD-32.6)	374
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	14.7 (<LOD-19.9)	434
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1720
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1256
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1272
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	15.6 (<LOD-29.9)	434
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	12.0 (<LOD-16.1)	544
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	920
All Hispanics	13-14	*	<LOD	<LOD	<LOD	17.1 (<LOD-22.6)	679
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	283

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosopyrrolidine (NPYR) (2013 - 2014)

CAS Number 930-55-2

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2583
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	380
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	441
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1762
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1290
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1293
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	442
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	558
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	948
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	688
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 8.15.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Nitrosopyrrolidine (NPYR) (creatinine corrected) (2013 - 2014)

CAS Number 930-55-2

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2582
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	380
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	441
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1761
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1289
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1293
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	442
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	558
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	947
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	688
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Disinfection By-Products

Blood Bromodichloromethane (2011 - 2016)

CAS Number 75-27-4

Geometric mean and selected percentiles of concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.34 (1.07-1.67)	1.18 (.817-1.66)	2.94 (2.07-3.92)	5.89 (4.32-8.29)	8.95 (6.35-13.5)	2700
Total population	13-14	*	<LOD	<LOD	7.00 (<LOD-8.00)	10.0 (8.00-11.0)	3160
Total population	15-16	*	<LOD	<LOD	9.00 (6.00-13.0)	13.0 (9.00-21.0)	3077
Age 12-19 years	11-12	*	.956 (<LOD-1.21)	2.03 (1.51-3.00)	4.19 (3.06-6.62)	7.32 (4.56-12.1)	507
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	9.00 (6.00-10.0)	594
Age 12-19 years	15-16	*	<LOD	<LOD	6.00 (<LOD-10.0)	9.00 (<LOD-15.0)	543
Age 20 + years	11-12	1.38 (1.09-1.75)	1.22 (.826-1.82)	3.00 (2.19-4.14)	6.00 (4.35-8.62)	9.06 (6.49-13.7)	2193
Age 20 + years	13-14	*	<LOD	<LOD	7.00 (<LOD-9.00)	10.0 (8.00-12.0)	2566
Age 20 + years	15-16	*	<LOD	<LOD	9.00 (6.00-14.0)	14.0 (9.00-21.0)	2534
Males	11-12	1.33 (1.06-1.67)	1.17 (.756-1.69)	2.91 (2.08-3.88)	5.92 (4.48-8.29)	9.17 (6.65-13.3)	1363
Males	13-14	*	<LOD	<LOD	7.00 (<LOD-9.00)	10.0 (8.00-13.0)	1523
Males	15-16	*	<LOD	<LOD	9.00 (6.00-14.0)	15.0 (10.0-19.0)	1523
Females	11-12	1.35 (1.07-1.70)	1.22 (.828-1.70)	2.94 (1.96-4.06)	5.87 (4.05-8.63)	8.63 (5.87-13.3)	1337
Females	13-14	*	<LOD	<LOD	6.00 (<LOD-8.00)	9.00 (7.00-11.0)	1637
Females	15-16	*	<LOD	<LOD	8.00 (<LOD-13.0)	13.0 (7.00-21.0)	1554
Mexican Americans	11-12	1.53 (1.16-2.04)	1.19 (.761-2.16)	3.44 (2.41-5.20)	9.06 (5.21-15.4)	15.9 (6.55-40.0)	298
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	10.0 (<LOD-14.0)	500
Mexican Americans	15-16	*	<LOD	<LOD	9.00 (7.00-12.0)	13.0 (9.00-17.0)	552
Non-Hispanic blacks	11-12	1.84 (1.09-3.12)	1.72 (.734-3.80)	4.48 (2.11-8.95)	9.60 (5.03-15.2)	13.0 (8.47-22.3)	712
Non-Hispanic blacks	13-14	*	<LOD	<LOD	7.00 (<LOD-10.0)	9.00 (8.00-11.0)	603
Non-Hispanic blacks	15-16	*	<LOD	<LOD	7.00 (<LOD-13.0)	11.0 (6.00-18.0)	639
Non-Hispanic whites	11-12	1.18 (.909-1.53)	1.03 (<LOD-1.51)	2.55 (1.65-3.42)	4.83 (3.26-6.95)	7.54 (4.79-12.6)	933
Non-Hispanic whites	13-14	*	<LOD	<LOD	7.00 (<LOD-8.00)	9.00 (8.00-11.0)	1288
Non-Hispanic whites	15-16	*	<LOD	<LOD	9.00 (<LOD-15.0)	14.0 (8.00-21.0)	999
All Hispanics	11-12	1.70 (1.39-2.08)	1.52 (1.11-2.16)	3.66 (2.86-4.69)	8.08 (5.98-9.67)	12.9 (7.51-22.1)	587
All Hispanics	13-14	*	<LOD	<LOD	7.00 (<LOD-10.0)	11.0 (8.00-14.0)	798
All Hispanics	15-16	*	<LOD	<LOD	9.00 (7.00-12.0)	13.0 (9.00-17.0)	964
Asians	11-12	1.49 (1.20-1.84)	1.43 (.998-1.96)	3.04 (2.39-4.11)	5.23 (4.63-6.51)	7.44 (5.99-9.64)	388
Asians	13-14	*	<LOD	<LOD	9.00 (<LOD-12.0)	12.0 (9.00-15.0)	361
Asians	15-16	*	<LOD	<LOD	9.00 (6.00-13.0)	14.0 (12.0-15.0)	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.620, 6.00, and 6.00 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/THM-DBP_BiomonitoringSummary.html

Blood Dibromochloromethane (Chlorodibromomethane) (2011 - 2016)

CAS Number 124-48-1

Geometric mean and selected percentiles of concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	1.77 (1.31-2.09)	3.61 (2.73-4.87)	5.77 (3.93-9.82)	2639
Total population	13-14	*	<LOD	<LOD	<LOD	7.00 (6.00-10.0)	3195
Total population	15-16	*	<LOD	<LOD	6.00 (<LOD-14.0)	11.0 (5.00-24.0)	3087
Age 12-19 years	11-12	*	<LOD	1.02 (.797-1.37)	2.15 (1.81-3.55)	4.00 (2.30-8.73)	486
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	598
Age 12-19 years	15-16	*	<LOD	<LOD	5.00 (<LOD-11.0)	9.00 (<LOD-13.0)	546
Age 20 + years	11-12	*	<LOD	1.84 (1.38-2.21)	3.81 (2.84-5.03)	5.93 (4.09-9.89)	2153
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	7.00 (6.00-10.0)	2597
Age 20 + years	15-16	*	<LOD	<LOD	7.00 (<LOD-15.0)	11.0 (5.00-25.0)	2541
Males	11-12	*	<LOD	1.64 (1.14-2.07)	3.53 (2.51-4.72)	5.58 (3.79-8.69)	1336
Males	13-14	*	<LOD	<LOD	<LOD	7.00 (5.00-12.0)	1543
Males	15-16	*	<LOD	<LOD	6.00 (<LOD-14.0)	11.0 (5.00-20.0)	1527
Females	11-12	*	<LOD	1.88 (1.38-2.22)	3.66 (2.64-5.27)	5.99 (4.03-9.82)	1303
Females	13-14	*	<LOD	<LOD	<LOD	7.00 (5.00-9.00)	1652
Females	15-16	*	<LOD	<LOD	7.00 (<LOD-15.0)	10.0 (5.00-27.0)	1560
Mexican Americans	11-12	*	.921 (<LOD-1.10)	2.21 (1.88-2.99)	4.60 (2.61-19.9)	14.2 (4.05-28.8)	283
Mexican Americans	13-14	*	<LOD	<LOD	6.00 (<LOD-10.0)	10.0 (7.00-15.0)	505
Mexican Americans	15-16	*	<LOD	<LOD	8.00 (5.00-14.0)	12.0 (8.00-20.0)	557
Non-Hispanic blacks	11-12	*	.678 (<LOD-1.35)	2.05 (.975-3.79)	4.53 (1.97-14.4)	8.70 (2.96-27.4)	695
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	7.00 (<LOD-14.0)	612
Non-Hispanic blacks	15-16	*	<LOD	<LOD	5.00 (<LOD-18.0)	10.0 (<LOD-25.0)	641
Non-Hispanic whites	11-12	*	<LOD	1.69 (1.08-2.09)	3.27 (2.48-4.57)	5.22 (3.58-7.32)	924
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	6.00 (<LOD-8.00)	1301
Non-Hispanic whites	15-16	*	<LOD	<LOD	6.00 (<LOD-16.0)	11.0 (5.00-28.0)	1000
All Hispanics	11-12	*	.711 (<LOD-1.01)	2.10 (1.52-2.52)	4.10 (2.69-9.33)	9.96 (3.96-21.3)	570
All Hispanics	13-14	*	<LOD	<LOD	6.00 (<LOD-9.00)	10.0 (7.00-14.0)	809
All Hispanics	15-16	*	<LOD	<LOD	8.00 (5.00-12.0)	12.0 (7.00-20.0)	970
Asians	11-12	*	<LOD	1.52 (.951-2.25)	3.49 (2.17-4.41)	4.55 (3.78-5.56)	372
Asians	13-14	*	<LOD	<LOD	6.00 (<LOD-12.0)	10.0 (7.00-16.0)	363
Asians	15-16	*	<LOD	<LOD	6.00 (<LOD-8.00)	9.00 (5.00-20.0)	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.620, 5.00, and 5.00 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/THM-DBP_BiomonitoringSummary.html

Blood Tribromomethane (Bromoform) (2011 - 2016)

CAS Number 75-25-2

Geometric mean and selected percentiles of concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	1.88 (1.45-2.67)	3.43 (2.32-6.17)	2695
Total population	13-14	*	<LOD	<LOD	<LOD	8.00 (<LOD-10.0)	3158
Total population	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-16.0)	3046
Age 12-19 years	11-12	*	<LOD	<LOD	1.72 (1.19-2.68)	2.92 (2.26-5.22)	506
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	592
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-25.0)	540
Age 20 + years	11-12	*	<LOD	<LOD	1.94 (1.42-2.79)	3.81 (2.29-6.54)	2189
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	8.00 (<LOD-10.0)	2566
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-15.0)	2506
Males	11-12	*	<LOD	<LOD	1.72 (1.35-2.18)	2.87 (1.88-5.10)	1367
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1525
Males	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-15.0)	1506
Females	11-12	*	<LOD	<LOD	2.26 (1.43-3.83)	4.47 (2.47-6.80)	1328
Females	13-14	*	<LOD	<LOD	<LOD	9.00 (<LOD-12.0)	1633
Females	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-16.0)	1540
Mexican Americans	11-12	*	<LOD	1.51 (<LOD-3.16)	3.68 (1.64-7.50)	6.42 (3.15-13.4)	295
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	11.0 (<LOD-17.0)	503
Mexican Americans	15-16	*	<LOD	<LOD	9.00 (<LOD-27.0)	13.0 (8.00-28.0)	553
Non-Hispanic blacks	11-12	*	<LOD	<LOD	1.58 (<LOD-3.24)	3.05 (1.49-5.21)	704
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-19.0)	628
Non-Hispanic whites	11-12	*	<LOD	<LOD	1.85 (1.46-2.47)	3.02 (2.39-5.69)	941
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1282
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-18.0)	986
All Hispanics	11-12	*	<LOD	1.02 (<LOD-1.74)	2.54 (1.23-5.61)	4.63 (2.26-8.96)	583
All Hispanics	13-14	*	<LOD	<LOD	<LOD	11.0 (<LOD-14.0)	806
All Hispanics	15-16	*	<LOD	<LOD	8.00 (<LOD-20.0)	11.0 (<LOD-28.0)	963
Asians	11-12	*	<LOD	<LOD	1.48 (<LOD-2.38)	2.39 (1.42-4.98)	386
Asians	13-14	*	<LOD	<LOD	<LOD	11.0 (<LOD-12.0)	362
Asians	15-16	*	<LOD	<LOD	<LOD	8.00 (<LOD-14.0)	344

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.00, 8.00, and 8.00 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/THM-DBP_BiomonitoringSummary.html

Blood Trichloromethane (Chloroform) (2011 - 2016)

CAS Number 67-66-3

Geometric mean and selected percentiles of concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.32 (5.24-7.62)	6.06 (4.73-8.00)	12.6 (10.1-16.2)	22.5 (19.8-27.0)	33.5 (27.7-40.2)	2589
Total population	13-14	*	8.00 (<LOD-10.0)	16.0 (14.0-19.0)	27.0 (24.0-32.0)	40.0 (33.0-50.0)	3136
Total population	15-16	*	9.00 (8.00-11.0)	17.0 (15.0-20.0)	30.0 (28.0-33.0)	47.0 (42.0-54.0)	2989
Age 12-19 years	11-12	5.08 (4.10-6.29)	4.76 (3.42-6.21)	9.22 (7.76-12.4)	20.8 (15.5-25.8)	28.7 (21.5-34.6)	487
Age 12-19 years	13-14	*	<LOD	14.0 (12.0-18.0)	28.0 (21.0-33.0)	35.0 (28.0-53.0)	588
Age 12-19 years	15-16	*	<LOD	14.0 (11.0-17.0)	26.0 (19.0-35.0)	37.0 (26.0-53.0)	537
Age 20 + years	11-12	6.54 (5.41-7.89)	6.26 (4.91-8.40)	12.9 (10.5-16.7)	23.2 (19.9-27.3)	34.1 (28.0-43.1)	2102
Age 20 + years	13-14	*	8.00 (<LOD-10.0)	16.0 (14.0-19.0)	27.0 (25.0-32.0)	41.0 (34.0-50.0)	2548
Age 20 + years	15-16	*	9.00 (8.00-11.0)	17.0 (16.0-20.0)	30.0 (28.0-35.0)	47.0 (40.0-57.0)	2452
Males	11-12	6.27 (5.14-7.64)	6.18 (4.74-7.98)	12.3 (10.1-15.1)	22.3 (18.5-28.1)	35.6 (27.3-47.2)	1307
Males	13-14	*	<LOD	16.0 (14.0-19.0)	26.0 (22.0-35.0)	38.0 (31.0-51.0)	1512
Males	15-16	*	9.00 (<LOD-11.0)	17.0 (16.0-19.0)	31.0 (27.0-37.0)	51.0 (43.0-58.0)	1485
Females	11-12	6.38 (5.25-7.75)	5.85 (4.62-8.16)	12.9 (9.94-17.9)	22.9 (19.4-28.0)	32.1 (26.6-41.0)	1282
Females	13-14	*	9.00 (<LOD-10.0)	16.0 (14.0-19.0)	28.0 (25.0-34.0)	41.0 (33.0-52.0)	1624
Females	15-16	*	9.00 (8.00-10.0)	17.0 (15.0-20.0)	29.0 (26.0-33.0)	42.0 (35.0-55.0)	1504
Mexican Americans	11-12	6.14 (4.94-7.62)	5.91 (4.76-7.80)	11.7 (9.94-15.0)	23.1 (15.0-33.1)	32.5 (24.9-46.4)	269
Mexican Americans	13-14	*	<LOD	9.00 (<LOD-14.0)	16.0 (12.0-22.0)	22.0 (16.0-33.0)	503
Mexican Americans	15-16	*	8.00 (<LOD-10.0)	16.0 (12.0-21.0)	28.0 (23.0-35.0)	41.0 (32.0-46.0)	542
Non-Hispanic blacks	11-12	8.64 (6.08-12.3)	8.28 (5.22-13.6)	17.0 (10.8-27.0)	30.8 (20.0-45.2)	42.6 (32.3-56.5)	697
Non-Hispanic blacks	13-14	*	10.0 (<LOD-14.0)	18.0 (14.0-24.0)	30.0 (23.0-40.0)	40.0 (30.0-65.0)	595
Non-Hispanic blacks	15-16	11.6 (10.2-13.2)	10.0 (9.00-13.0)	18.0 (15.0-21.0)	28.0 (23.0-34.0)	38.0 (33.0-46.0)	619
Non-Hispanic whites	11-12	5.58 (4.50-6.90)	5.35 (3.85-7.41)	11.2 (7.93-14.6)	21.1 (16.7-25.4)	28.0 (24.0-37.0)	901
Non-Hispanic whites	13-14	*	9.00 (<LOD-11.0)	17.0 (14.0-20.0)	28.0 (23.0-36.0)	41.0 (32.0-57.0)	1266
Non-Hispanic whites	15-16	*	9.00 (<LOD-11.0)	17.0 (15.0-19.0)	30.0 (27.0-33.0)	49.0 (37.0-58.0)	989
All Hispanics	11-12	7.85 (6.08-10.1)	8.03 (5.44-10.9)	15.3 (10.6-22.3)	26.3 (21.2-35.6)	37.2 (31.6-47.0)	546
All Hispanics	13-14	*	<LOD	12.0 (<LOD-17.0)	23.0 (17.0-29.0)	30.0 (23.0-45.0)	806
All Hispanics	15-16	*	9.00 (<LOD-11.0)	18.0 (14.0-22.0)	32.0 (27.0-36.0)	46.0 (36.0-52.0)	909
Asians	11-12	7.71 (6.25-9.51)	7.99 (6.25-10.0)	14.2 (11.1-18.1)	22.9 (18.8-30.2)	31.3 (24.2-43.1)	371
Asians	13-14	*	<LOD	14.0 (10.0-20.0)	25.0 (17.0-39.0)	39.0 (27.0-47.0)	361
Asians	15-16	*	9.00 (<LOD-11.0)	16.0 (11.0-23.0)	32.0 (22.0-46.0)	47.0 (34.0-62.0)	346

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.10, 8.00, and 8.00 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/THM-DBP_BiomonitoringSummary.html

Personal Care and Consumer Product Chemicals and Metabolites

Urinary Benzophenone-3 (2011 - 2016)†

CAS Number 131-57-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	23.2 (17.2-31.3)	18.7 (13.6-27.0)	83.8 (50.8-142)	461 (290-861)	1200 (861-1610)	2489
Total population	13-14	25.2 (20.4-31.2)	21.0 (16.8-25.3)	87.9 (72.7-102)	417 (269-642)	1210 (853-1760)	2686
Total population	15-16	19.3 (15.9-23.4)	16.3 (13.8-19.7)	66.5 (44.1-98.8)	338 (253-460)	930 (626-1270)	2651
Age 3-5 years	15-16	16.9 (9.57-29.9)	13.4 (5.80-28.2)	54.7 (20.9-133)	205 (62.6-387)	387 (130-6010)	141
Age 6-11 years	11-12	18.7 (12.3-28.2)	13.2 (8.20-20.8)	55.4 (28.0-108)	336 (134-653)	657 (236-1270)	396
Age 6-11 years	13-14	26.0 (16.5-40.9)	19.2 (14.4-30.0)	77.6 (39.0-206)	363 (171-720)	824 (271-1840)	409
Age 6-11 years	15-16	20.0 (13.7-29.2)	16.3 (11.8-23.0)	53.2 (34.4-94.9)	166 (96.0-332)	640 (160-3060)	415
Age 12-19 years	11-12	27.8 (15.4-50.2)	21.6 (10.8-42.1)	109 (34.0-255)	433 (159-1160)	1120 (261-1990)	388
Age 12-19 years	13-14	29.2 (23.3-36.4)	26.2 (19.7-36.4)	87.2 (57.8-137)	261 (167-504)	537 (269-1340)	462
Age 12-19 years	15-16	16.3 (10.9-24.3)	14.3 (8.90-22.9)	42.3 (25.7-84.3)	132 (77.2-278)	291 (118-755)	405
Age 20+ years	11-12	23.1 (17.8-30.0)	19.2 (14.4-27.0)	83.8 (52.8-137)	482 (305-805)	1250 (975-1640)	1705
Age 20+ years	13-14	24.6 (19.7-30.6)	20.1 (16.0-24.7)	90.6 (73.4-102)	482 (294-801)	1360 (875-2740)	1815
Age 20+ years	15-16	19.7 (16.4-23.8)	16.7 (14.5-20.3)	70.7 (48.9-108)	450 (303-521)	1080 (641-1480)	1690
Males	11-12	17.2 (12.1-24.5)	16.0 (9.40-23.6)	50.2 (40.1-78.7)	295 (141-448)	594 (301-1360)	1259
Males	13-14	19.0 (15.8-22.9)	16.8 (14.4-19.8)	55.0 (46.4-63.1)	231 (176-259)	576 (340-864)	1285
Males	15-16	13.7 (11.3-16.6)	13.1 (10.1-15.5)	40.3 (28.8-62.7)	144 (111-192)	395 (244-627)	1307
Females	11-12	31.0 (22.7-42.2)	22.2 (16.0-34.1)	137 (79.9-243)	781 (467-1220)	1720 (1260-2290)	1230
Females	13-14	32.9 (24.9-43.5)	26.2 (19.4-37.2)	120 (94.9-195)	733 (447-1230)	1950 (1200-3460)	1401
Females	15-16	26.9 (20.8-34.7)	21.2 (18.6-27.0)	106 (67.0-157)	559 (453-800)	1300 (934-1610)	1344
Mexican Americans	11-12	16.8 (10.5-26.8)	13.4 (7.20-25.2)	46.1 (25.2-115)	305 (111-644)	885 (305-1740)	316
Mexican Americans	13-14	25.9 (20.5-32.7)	19.0 (15.0-24.2)	69.3 (44.1-86.6)	256 (204-538)	893 (518-1230)	438
Mexican Americans	15-16	12.6 (10.2-15.5)	11.0 (8.50-12.9)	32.9 (27.0-41.4)	112 (73.4-167)	318 (150-597)	513
Non-Hispanic blacks	11-12	14.5 (11.4-18.5)	10.9 (8.00-14.1)	41.4 (28.8-59.5)	316 (192-433)	895 (475-1270)	665
Non-Hispanic blacks	13-14	10.9 (7.48-15.8)	9.60 (6.60-13.1)	26.9 (19.6-39.9)	104 (60.3-205)	448 (118-1070)	609
Non-Hispanic blacks	15-16	10.1 (8.06-12.7)	7.90 (6.20-9.50)	24.8 (20.8-32.9)	144 (93.6-243)	423 (261-611)	610
Non-Hispanic whites	11-12	26.8 (17.8-40.5)	22.2 (14.8-36.5)	101 (52.8-216)	512 (255-1130)	1230 (805-1830)	813
Non-Hispanic whites	13-14	29.7 (22.7-38.8)	24.9 (19.5-32.9)	108 (94.0-131)	523 (340-853)	1470 (1150-2860)	988
Non-Hispanic whites	15-16	24.2 (19.1-30.5)	20.3 (17.0-25.6)	87.7 (61.2-134)	483 (278-627)	1080 (755-1610)	781
All Hispanics	11-12	21.2 (15.2-29.4)	16.3 (10.6-22.7)	57.9 (38.2-126)	408 (261-684)	1020 (527-1610)	571
All Hispanics	13-14	28.2 (23.8-33.4)	20.1 (16.5-23.9)	81.5 (64.7-98.3)	415 (219-824)	1120 (738-1780)	690
All Hispanics	15-16	15.4 (12.5-19.0)	12.8 (10.3-16.1)	41.3 (32.3-53.2)	152 (98.8-258)	420 (264-867)	859
Asians	11-12	16.7 (10.5-26.5)	11.9 (7.30-21.1)	66.4 (37.6-122)	486 (157-1350)	1640 (770-2780)	352
Asians	13-14	18.6 (12.4-28.0)	17.0 (8.30-26.8)	64.2 (36.1-107)	254 (114-532)	532 (283-1770)	289
Asians	15-16	15.9 (10.2-24.9)	12.3 (7.10-21.4)	49.4 (27.0-112)	343 (119-622)	685 (319-2790)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.400, 0.400, and 0.400 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Benzophenone-3_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Benzophenone-3_FactSheet.html

Urinary Benzophenone-3 (creatinine corrected) (2011 - 2016)†

CAS Number 131-57-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	26.4 (19.3-36.2)	18.8 (13.3-27.3)	102 (57.8-162)	613 (330-1020)	1680 (1010-2500)	2487
Total population	13-14	25.2 (20.5-31.0)	19.8 (15.7-24.7)	79.8 (66.2-103)	467 (299-603)	1190 (847-1810)	2684
Total population	15-16	19.6 (16.3-23.5)	15.5 (13.0-19.0)	58.8 (44.7-87.8)	372 (246-440)	858 (746-1170)	2650
Age 3-5 years	15-16	39.7 (21.2-74.2)	29.6 (13.4-68.6)	114 (37.9-447)	455 (130-1040)	1040 (447-16700)	140
Age 6-11 years	11-12	26.9 (17.9-40.2)	18.8 (13.0-28.6)	67.8 (37.8-135)	552 (138-1010)	1010 (297-1670)	395
Age 6-11 years	13-14	32.8 (21.5-50.1)	28.8 (16.7-45.7)	90.0 (46.9-189)	401 (152-868)	868 (432-1700)	409
Age 6-11 years	15-16	25.8 (17.7-37.4)	19.8 (12.3-31.9)	61.9 (38.1-97.8)	199 (117-503)	848 (198-3740)	415
Age 12-19 years	11-12	27.1 (14.2-51.8)	16.7 (8.69-44.3)	102 (29.9-331)	631 (117-3050)	1720 (331-3900)	388
Age 12-19 years	13-14	23.7 (17.8-31.4)	21.6 (15.8-28.7)	63.0 (49.1-86.2)	221 (116-440)	506 (221-647)	462
Age 12-19 years	15-16	12.7 (8.95-18.0)	10.8 (7.99-14.7)	30.9 (19.0-43.7)	91.3 (42.9-186)	204 (100-631)	405
Age 20+ years	11-12	26.3 (19.8-34.8)	19.8 (13.9-26.6)	107 (68.1-156)	640 (371-957)	1890 (1080-2500)	1704
Age 20+ years	13-14	24.7 (20.3-30.0)	18.8 (15.2-23.1)	82.3 (69.5-102)	529 (317-790)	1420 (915-2660)	1813
Age 20+ years	15-16	20.1 (16.6-24.3)	16.0 (13.3-20.2)	68.7 (50.3-98.8)	416 (289-639)	1050 (772-1420)	1690
Males	11-12	16.1 (11.3-22.8)	11.9 (8.77-18.1)	48.8 (31.6-84.5)	237 (120-442)	716 (267-1030)	1258
Males	13-14	15.9 (13.2-19.3)	13.8 (10.9-17.5)	44.0 (33.1-58.5)	181 (146-229)	432 (299-532)	1284
Males	15-16	11.9 (9.89-14.4)	10.4 (7.88-13.6)	34.1 (24.3-50.2)	118 (92.6-145)	380 (204-436)	1307
Females	11-12	42.7 (30.6-59.5)	30.1 (19.7-49.4)	186 (107-374)	1150 (771-1910)	2720 (1660-4230)	1229
Females	13-14	38.9 (29.2-51.8)	29.7 (21.3-39.9)	153 (83.6-242)	905 (603-1250)	2550 (1440-3500)	1400
Females	15-16	31.6 (24.5-40.8)	23.3 (17.1-32.1)	113 (69.2-199)	746 (391-965)	1450 (979-1810)	1343
Mexican Americans	11-12	18.9 (12.4-29.0)	13.8 (8.75-22.0)	45.3 (23.5-132)	369 (132-820)	1030 (371-2330)	316
Mexican Americans	13-14	26.4 (20.2-34.4)	18.2 (15.6-23.2)	59.1 (40.6-82.7)	296 (122-1090)	1180 (473-2130)	438
Mexican Americans	15-16	13.2 (10.8-16.2)	11.4 (9.12-13.8)	30.5 (24.2-37.0)	111 (77.4-144)	287 (166-659)	513
Non-Hispanic blacks	11-12	11.3 (8.82-14.5)	7.48 (6.04-9.49)	27.6 (18.0-42.1)	269 (159-376)	747 (376-1010)	665
Non-Hispanic blacks	13-14	8.02 (5.57-11.5)	6.43 (4.68-8.60)	16.9 (11.6-24.7)	93.5 (51.1-204)	332 (144-818)	609
Non-Hispanic blacks	15-16	7.84 (6.47-9.49)	5.82 (4.52-7.00)	18.0 (13.5-24.7)	99.4 (58.9-178)	393 (183-758)	609
Non-Hispanic whites	11-12	32.6 (21.1-50.4)	25.5 (15.3-41.1)	128 (70.8-248)	793 (334-1320)	1970 (1030-3500)	811
Non-Hispanic whites	13-14	31.2 (24.5-39.6)	25.3 (20.1-31.5)	115 (77.3-159)	569 (432-765)	1270 (871-2550)	987
Non-Hispanic whites	15-16	25.6 (20.3-32.4)	19.3 (15.5-29.4)	92.6 (53.8-131)	440 (289-746)	1070 (767-1540)	781
All Hispanics	11-12	23.7 (17.6-32.0)	15.9 (11.4-21.7)	65.0 (38.6-132)	425 (265-916)	1850 (784-2330)	571
All Hispanics	13-14	28 (23.2-33.7)	18.8 (16.3-22.5)	66.8 (50.9-84.5)	338 (190-1020)	1380 (974-2740)	690
All Hispanics	15-16	15.7 (12.9-19.3)	13.1 (11.0-15.4)	36.9 (30.5-46.4)	139 (103-215)	426 (250-808)	859
Asians	11-12	22.3 (14.3-34.9)	14.2 (8.24-27.8)	73.1 (41.6-153)	624 (282-1640)	1860 (641-4410)	352
Asians	13-14	23.1 (16.3-32.8)	20.2 (12.9-34.4)	67.5 (48.4-102)	253 (131-537)	657 (287-1900)	288
Asians	15-16	19.4 (13.7-27.5)	15.9 (10.9-22.1)	57.9 (41.8-101)	400 (175-636)	652 (332-2670)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Benzophenone-3_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Benzophenone-3_FactSheet.html

Urinary Bisphenol A (2011 - 2016)†

CAS Number 80-05-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.51 (1.41-1.62)	1.40 (1.30-1.60)	3.00 (2.70-3.30)	5.60 (4.90-6.50)	9.40 (7.70-11.2)	2489
Total population	13-14	1.28 (1.20-1.36)	1.30 (1.20-1.40)	2.50 (2.40-2.70)	4.90 (4.10-5.60)	7.70 (6.80-8.30)	2686
Total population	15-16	1.10 (1.00-1.20)	1.10 (1.00-1.20)	2.10 (1.80-2.40)	4.20 (3.60-5.00)	6.80 (5.50-8.20)	2651
Age 3-5 years	15-16	1.21 (.986-1.49)	1.30 (1.00-1.50)	2.10 (1.70-2.80)	3.50 (2.60-9.40)	7.40 (3.10-45.5)	141
Age 6-11 years	11-12	1.58 (1.41-1.78)	1.50 (1.30-1.70)	3.10 (2.60-3.50)	6.70 (5.10-8.00)	8.70 (6.20-21.4)	396
Age 6-11 years	13-14	1.43 (1.30-1.59)	1.40 (1.30-1.60)	2.90 (2.30-3.40)	4.40 (4.10-5.20)	8.00 (5.20-10.2)	409
Age 6-11 years	15-16	1.14 (.987-1.32)	1.20 (.900-1.30)	2.10 (1.70-2.40)	4.00 (2.80-5.80)	6.20 (4.80-8.50)	415
Age 12-19 years	11-12	1.69 (1.42-2.00)	1.70 (1.30-2.10)	3.30 (2.80-4.00)	6.90 (4.80-7.90)	10.0 (7.10-13.0)	388
Age 12-19 years	13-14	1.28 (1.16-1.41)	1.20 (1.10-1.40)	2.40 (1.90-2.70)	4.60 (3.30-5.20)	6.80 (5.20-8.10)	462
Age 12-19 years	15-16	1.21 (1.03-1.42)	1.30 (.900-1.40)	2.30 (1.70-2.80)	4.30 (3.50-6.20)	7.10 (4.80-9.20)	405
Age 20+ years	11-12	1.48 (1.35-1.61)	1.40 (1.20-1.60)	2.90 (2.50-3.30)	5.40 (4.70-6.30)	9.30 (7.30-12.2)	1705
Age 20+ years	13-14	1.26 (1.18-1.35)	1.30 (1.20-1.40)	2.50 (2.40-2.80)	4.90 (4.10-6.00)	7.80 (6.80-8.60)	1815
Age 20+ years	15-16	1.08 (.976-1.19)	1.10 (.900-1.10)	2.00 (1.80-2.50)	4.10 (3.50-5.30)	6.80 (5.00-8.90)	1690
Males	11-12	1.64 (1.49-1.81)	1.50 (1.40-1.70)	3.20 (2.70-3.70)	6.00 (5.00-7.70)	9.50 (7.80-11.2)	1259
Males	13-14	1.43 (1.30-1.58)	1.40 (1.30-1.60)	2.80 (2.40-3.20)	5.30 (4.30-6.60)	8.30 (6.80-10.3)	1285
Males	15-16	1.19 (1.06-1.34)	1.10 (1.00-1.30)	2.40 (1.90-2.90)	4.90 (3.90-6.20)	7.80 (5.40-11.2)	1307
Females	11-12	1.39 (1.25-1.55)	1.30 (1.20-1.50)	2.80 (2.40-3.20)	5.20 (4.30-6.30)	8.50 (6.50-13.4)	1230
Females	13-14	1.15 (1.05-1.26)	1.20 (1.10-1.30)	2.30 (2.00-2.60)	4.20 (3.80-5.20)	7.20 (5.60-8.10)	1401
Females	15-16	1.02 (.914-1.13)	1.00 (.900-1.10)	1.80 (1.60-2.20)	3.70 (3.40-4.10)	5.80 (4.80-6.50)	1344
Mexican Americans	11-12	1.45 (1.30-1.63)	1.40 (1.20-1.60)	2.80 (2.30-3.10)	5.00 (4.20-6.50)	7.70 (5.90-9.70)	316
Mexican Americans	13-14	1.28 (1.06-1.53)	1.30 (1.00-1.70)	2.50 (2.10-2.80)	4.10 (3.50-4.90)	5.60 (4.60-7.30)	438
Mexican Americans	15-16	1.09 (.957-1.25)	1.10 (1.00-1.30)	2.10 (1.80-2.40)	4.00 (3.30-4.60)	6.00 (4.30-9.50)	513
Non-Hispanic blacks	11-12	2.12 (1.88-2.38)	2.00 (1.80-2.40)	4.10 (3.40-4.60)	7.10 (5.70-8.10)	11.4 (8.10-14.3)	665
Non-Hispanic blacks	13-14	1.83 (1.62-2.07)	1.90 (1.50-2.20)	3.60 (3.20-4.10)	6.80 (5.70-7.80)	9.80 (7.70-12.9)	609
Non-Hispanic blacks	15-16	1.45 (1.31-1.61)	1.40 (1.30-1.60)	2.70 (2.40-3.00)	5.00 (4.10-6.00)	7.60 (6.00-10.9)	610
Non-Hispanic whites	11-12	1.46 (1.34-1.58)	1.30 (1.20-1.50)	2.90 (2.50-3.20)	5.40 (4.60-6.60)	8.90 (6.90-13.4)	813
Non-Hispanic whites	13-14	1.22 (1.13-1.31)	1.30 (1.10-1.40)	2.40 (2.20-2.70)	4.40 (3.90-5.90)	7.40 (6.40-8.30)	988
Non-Hispanic whites	15-16	1.05 (.935-1.19)	1.00 (.900-1.10)	1.90 (1.70-2.50)	4.10 (3.10-5.00)	6.60 (4.80-8.80)	781
All Hispanics	11-12	1.48 (1.25-1.74)	1.40 (1.20-1.70)	2.80 (2.20-3.40)	5.70 (4.20-7.30)	9.10 (6.50-14.1)	571
All Hispanics	13-14	1.31 (1.18-1.46)	1.30 (1.10-1.50)	2.60 (2.20-2.80)	4.10 (3.70-4.70)	6.10 (4.90-7.50)	690
All Hispanics	15-16	1.11 (.990-1.23)	1.10 (1.00-1.30)	2.20 (1.90-2.50)	4.00 (3.50-5.00)	6.60 (5.00-8.10)	859
Asians	11-12	1.03 (.863-1.23)	.900 (.800-1.10)	1.80 (1.50-2.20)	4.00 (2.40-6.40)	7.30 (3.90-11.9)	352
Asians	13-14	.782 (.646-.948)	.800 (.700-.900)	1.40 (1.00-1.80)	2.40 (1.80-3.30)	3.60 (2.40-12.1)	289
Asians	15-16	.702 (.629-.784)	.700 (.600-.800)	1.30 (1.10-1.60)	2.30 (1.80-2.70)	3.10 (2.40-4.40)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.400, 0.200, and 0.200 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/BisphenolA_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/BisphenolA_FactSheet.html

Urinary Bisphenol A (creatinine corrected) (2011 - 2016)†

CAS Number 80-05-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.72 (1.61-1.84)	1.58 (1.46-1.71)	2.86 (2.62-3.01)	4.62 (4.12-5.65)	8.24 (6.47-11.0)	2487
Total population	13-14	1.28 (1.18-1.39)	1.21 (1.11-1.32)	2.12 (1.92-2.33)	3.88 (3.46-4.24)	5.09 (4.65-5.96)	2684
Total population	15-16	1.12 (1.04-1.20)	1.03 (.952-1.11)	1.85 (1.70-2.00)	3.44 (3.00-4.14)	5.30 (4.69-6.77)	2650
Age 3-5 years	15-16	2.86 (2.27-3.60)	2.73 (2.00-3.18)	4.55 (3.33-6.62)	7.50 (5.51-11.1)	12.5 (7.50-36.7)	140
Age 6-11 years	11-12	2.27 (1.97-2.62)	2.00 (1.78-2.16)	3.33 (2.93-3.75)	7.94 (4.71-12.4)	14.0 (6.45-47.5)	395
Age 6-11 years	13-14	1.81 (1.68-1.96)	1.80 (1.52-2.03)	3.10 (2.63-3.46)	4.48 (4.00-4.96)	7.03 (5.00-9.92)	409
Age 6-11 years	15-16	1.47 (1.28-1.69)	1.35 (1.09-1.67)	2.38 (2.05-2.84)	4.46 (3.44-5.37)	6.20 (4.74-8.57)	415
Age 12-19 years	11-12	1.64 (1.44-1.87)	1.48 (1.13-1.98)	2.88 (2.21-3.23)	4.50 (3.37-8.16)	8.74 (3.57-18.4)	388
Age 12-19 years	13-14	1.04 (.887-1.21)	.932 (.809-1.19)	1.71 (1.33-2.03)	2.69 (2.28-3.33)	3.99 (3.29-4.67)	462
Age 12-19 years	15-16	0.94 (.843-1.05)	.872 (.802-.954)	1.44 (1.25-1.71)	2.81 (2.06-3.72)	4.62 (3.21-6.67)	405
Age 20+ years	11-12	1.68 (1.57-1.80)	1.55 (1.43-1.68)	2.75 (2.54-3.00)	4.55 (4.00-5.39)	7.73 (5.73-10.0)	1704
Age 20+ years	13-14	1.27 (1.16-1.39)	1.21 (1.11-1.30)	2.09 (1.90-2.31)	3.88 (3.33-4.37)	5.09 (4.58-5.97)	1813
Age 20+ years	15-16	1.1 (1.01-1.19)	1.02 (.933-1.11)	1.80 (1.63-1.98)	3.39 (2.92-4.22)	5.24 (4.52-7.09)	1690
Males	11-12	1.54 (1.40-1.69)	1.37 (1.20-1.59)	2.55 (2.21-2.94)	4.38 (3.75-6.00)	8.24 (6.01-11.0)	1258
Males	13-14	1.2 (1.11-1.31)	1.12 (.988-1.25)	1.95 (1.78-2.24)	3.75 (3.25-4.29)	4.91 (4.42-7.02)	1284
Males	15-16	1.04 (.936-1.15)	.943 (.846-1.09)	1.73 (1.45-2.06)	3.43 (2.77-4.52)	5.00 (4.10-7.14)	1307
Females	11-12	1.91 (1.76-2.08)	1.75 (1.57-1.97)	2.93 (2.73-3.24)	4.94 (4.27-6.24)	8.13 (6.00-11.1)	1229
Females	13-14	1.36 (1.23-1.51)	1.28 (1.17-1.43)	2.25 (2.03-2.48)	3.94 (3.27-4.48)	5.18 (4.50-6.07)	1400
Females	15-16	1.19 (1.11-1.29)	1.10 (.978-1.21)	1.94 (1.79-2.14)	3.45 (2.94-4.58)	5.56 (4.75-6.79)	1343
Mexican Americans	11-12	1.64 (1.49-1.80)	1.46 (1.32-1.64)	2.70 (2.34-3.01)	4.50 (3.45-7.00)	7.37 (4.76-11.4)	316
Mexican Americans	13-14	1.3 (1.16-1.45)	1.27 (1.05-1.57)	2.25 (1.97-2.50)	3.57 (3.04-3.98)	4.25 (3.93-4.83)	438
Mexican Americans	15-16	1.15 (1.04-1.26)	1.07 (.946-1.20)	1.89 (1.67-2.27)	3.79 (2.84-5.47)	5.94 (4.03-9.09)	513
Non-Hispanic blacks	11-12	1.65 (1.48-1.84)	1.50 (1.30-1.71)	2.63 (2.11-3.17)	4.82 (3.82-6.24)	7.23 (5.98-10.7)	665
Non-Hispanic blacks	13-14	1.35 (1.25-1.46)	1.32 (1.13-1.46)	2.17 (1.96-2.35)	3.89 (3.24-4.27)	5.00 (4.40-6.01)	609
Non-Hispanic blacks	15-16	1.12 (.995-1.27)	.987 (.893-1.12)	1.90 (1.54-2.16)	3.53 (2.51-5.00)	5.63 (3.91-7.75)	609
Non-Hispanic whites	11-12	1.77 (1.64-1.92)	1.64 (1.49-1.78)	2.90 (2.65-3.08)	4.60 (4.05-6.00)	9.00 (6.11-12.3)	811
Non-Hispanic whites	13-14	1.28 (1.14-1.44)	1.21 (1.06-1.38)	2.13 (1.85-2.42)	3.94 (3.33-4.56)	5.60 (4.65-6.53)	987
Non-Hispanic whites	15-16	1.12 (1.01-1.24)	1.04 (.930-1.16)	1.82 (1.59-2.04)	3.47 (2.96-4.44)	5.26 (4.44-7.14)	781
All Hispanics	11-12	1.66 (1.44-1.90)	1.47 (1.28-1.70)	2.80 (2.39-3.14)	4.82 (3.67-7.00)	7.69 (5.76-9.62)	571
All Hispanics	13-14	1.3 (1.19-1.43)	1.25 (1.09-1.42)	2.20 (1.92-2.47)	3.61 (3.13-3.98)	4.54 (4.03-4.89)	690
All Hispanics	15-16	1.13 (1.04-1.23)	1.03 (.888-1.20)	1.92 (1.67-2.18)	3.60 (2.91-4.46)	5.93 (4.29-7.75)	859
Asians	11-12	1.38 (1.25-1.52)	1.32 (1.16-1.40)	2.11 (1.84-2.50)	4.04 (2.80-6.25)	7.42 (4.38-12.1)	352
Asians	13-14	0.99 (.847-1.16)	.918 (.778-1.05)	1.62 (1.39-1.97)	2.71 (2.09-4.00)	4.44 (2.71-10.0)	288
Asians	15-16	0.855 (.758-.965)	.800 (.683-.900)	1.47 (1.17-1.71)	2.62 (2.09-3.27)	3.43 (2.62-5.71)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/BisphenolA_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/BisphenolA_FactSheet.html

Urinary Bisphenol F (2013 - 2016)†

CAS Number 80-05-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.532 (.460-.616)	.400 (.300-.500)	1.10 (.900-1.40)	4.00 (2.80-5.30)	9.80 (6.50-16.1)	2682
Total population	15-16	*	<LOD	.800 (.600-.900)	2.90 (2.20-4.30)	8.20 (6.10-13.3)	2651
Age 3-5 years	15-16	*	<LOD	.300 (<LOD-.700)	.900 (.500-1.10)	1.10 (.700-52.9)	141
Age 6-11 years	13-14	.421 (.343-.516)	.300 (.200-.400)	.900 (.600-1.30)	2.30 (1.50-3.30)	3.90 (3.00-6.10)	409
Age 6-11 years	15-16	*	<LOD	.500 (.300-.700)	1.50 (.800-2.50)	2.80 (1.50-9.60)	415
Age 12-19 years	13-14	.567 (.458-.701)	.400 (.300-.600)	1.20 (1.00-1.50)	5.30 (2.50-8.40)	8.80 (6.50-18.7)	461
Age 12-19 years	15-16	*	.200 (<LOD-.400)	1.00 (.500-2.50)	6.10 (2.40-16.5)	17.2 (6.10-34.7)	405
Age 20+ years	13-14	.541 (.457-.641)	.400 (.300-.500)	1.20 (.900-1.50)	4.20 (2.60-6.30)	12.2 (6.00-21.4)	1812
Age 20+ years	15-16	*	<LOD	.800 (.600-1.00)	2.90 (2.00-5.10)	7.80 (5.90-14.4)	1690
Males	13-14	.582 (.505-.671)	.400 (.400-.500)	1.20 (1.10-1.40)	5.10 (3.00-6.50)	12.4 (7.00-17.7)	1284
Males	15-16	*	<LOD	.900 (.600-1.20)	3.70 (2.40-7.40)	14.4 (6.40-19.5)	1307
Females	13-14	.489 (.401-.596)	.300 (.300-.500)	1.00 (.700-1.50)	3.30 (2.40-4.60)	8.90 (4.50-21.4)	1398
Females	15-16	*	<LOD	.600 (.500-.800)	2.60 (1.50-4.20)	6.40 (5.10-7.70)	1344
Mexican Americans	13-14	*	.300 (<LOD-.400)	.600 (.400-1.10)	1.90 (1.00-5.10)	5.30 (1.90-14.9)	438
Mexican Americans	15-16	*	<LOD	.300 (.300-.400)	1.30 (.800-2.60)	4.30 (1.70-7.90)	513
Non-Hispanic blacks	13-14	.607 (.540-.683)	.400 (.400-.500)	1.30 (1.10-1.70)	5.40 (3.50-8.90)	14.6 (8.10-26.4)	608
Non-Hispanic blacks	15-16	*	.300 (<LOD-.400)	1.10 (.700-1.90)	5.90 (2.30-10.8)	12.1 (7.60-22.7)	610
Non-Hispanic whites	13-14	.581 (.473-.713)	.400 (.300-.600)	1.30 (1.00-1.60)	4.30 (2.70-6.50)	12.4 (5.70-24.1)	987
Non-Hispanic whites	15-16	*	<LOD	.800 (.600-1.00)	3.20 (2.20-5.50)	10.3 (5.50-18.5)	781
All Hispanics	13-14	*	.300 (.200-.400)	.700 (.500-1.10)	2.50 (1.40-5.90)	8.20 (4.10-18.0)	690
All Hispanics	15-16	*	<LOD	.400 (.300-.500)	1.30 (1.00-1.80)	3.80 (2.00-6.60)	859
Asians	13-14	*	<LOD	.400 (.300-.700)	1.10 (.600-2.00)	2.10 (1.10-7.00)	287
Asians	15-16	*	<LOD	.200 (<LOD-.400)	1.10 (.700-1.30)	1.70 (.900-3.30)	275

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.200 and 0.200 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Bisphenol F (creatinine corrected) (2013 - 2016)†

CAS Number 80-05-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	0.534 (.471-.606)	.444 (.385-.515)	1.07 (.899-1.21)	3.33 (2.39-4.76)	8.39 (5.90-12.0)	2680
Total population	15-16	*	<LOD	.737 (.645-.857)	2.57 (1.91-3.52)	7.78 (5.97-9.70)	2650
Age 3-5 years	15-16	*	<LOD	.933 (<LOD-1.41)	1.88 (1.13-2.81)	2.78 (1.75-55.1)	140
Age 6-11 years	13-14	0.532 (.431-.656)	.452 (.360-.636)	1.19 (.798-1.74)	2.44 (1.91-3.49)	4.76 (3.48-10.0)	409
Age 6-11 years	15-16	*	<LOD	.652 (.538-.769)	1.68 (1.09-3.54)	5.88 (1.63-20.7)	415
Age 12-19 years	13-14	0.46 (.365-.580)	.388 (.287-.474)	1.06 (.680-1.46)	3.23 (1.85-5.17)	8.80 (3.31-14.4)	461
Age 12-19 years	15-16	*	.260 (<LOD-.385)	.706 (.410-1.86)	4.29 (1.56-7.91)	7.91 (4.10-21.9)	405
Age 20+ years	13-14	0.546 (.479-.622)	.464 (.395-.526)	1.06 (.875-1.21)	3.40 (2.29-5.03)	8.75 (5.70-13.8)	1810
Age 20+ years	15-16	*	<LOD	.746 (.636-.889)	2.33 (1.71-3.56)	7.78 (5.45-10.7)	1690
Males	13-14	0.489 (.426-.563)	.398 (.311-.492)	.994 (.783-1.16)	3.98 (2.63-5.17)	9.47 (6.81-13.8)	1283
Males	15-16	*	<LOD	.725 (.583-1.04)	3.00 (1.82-5.83)	11.3 (6.66-14.5)	1307
Females	13-14	0.581 (.497-.678)	.494 (.421-.583)	1.11 (.896-1.40)	3.09 (2.11-4.10)	6.97 (3.89-14.1)	1397
Females	15-16	*	<LOD	.738 (.606-.923)	2.21 (1.57-3.06)	5.46 (4.26-7.78)	1343
Mexican Americans	13-14	*	.308 (<LOD-.400)	.667 (.497-.875)	1.75 (.995-3.61)	4.22 (2.02-6.73)	438
Mexican Americans	15-16	*	<LOD	.483 (.376-.612)	1.37 (.943-2.17)	4.20 (1.95-6.92)	513
Non-Hispanic blacks	13-14	0.449 (.392-.515)	.350 (.304-.389)	.980 (.758-1.27)	3.24 (2.37-4.67)	8.28 (4.67-12.1)	608
Non-Hispanic blacks	15-16	*	.292 (<LOD-.343)	.781 (.566-1.23)	3.89 (2.24-6.02)	9.27 (4.73-14.6)	609
Non-Hispanic whites	13-14	0.611 (.515-.726)	.517 (.424-.612)	1.14 (.994-1.43)	3.89 (2.63-6.50)	10.8 (5.90-15.3)	986
Non-Hispanic whites	15-16	*	<LOD	.792 (.645-1.13)	2.90 (1.82-5.00)	8.22 (5.45-13.8)	781
All Hispanics	13-14	*	.308 (.255-.395)	.698 (.526-.933)	2.02 (1.41-4.05)	5.56 (3.00-16.0)	690
All Hispanics	15-16	*	<LOD	.500 (.424-.588)	1.32 (1.08-1.54)	3.14 (1.95-5.32)	859
Asians	13-14	*	<LOD	.672 (.492-.843)	1.31 (.843-2.90)	2.00 (1.17-7.78)	286
Asians	15-16	*	<LOD	.500 (<LOD-.583)	.857 (.700-1.55)	1.74 (.857-5.88)	275

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Bisphenol S (2013 - 2016)†

CAS Number 80-05-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.427 (.375-.487)	.400 (.300-.500)	.900 (.700-1.10)	2.10 (1.70-2.40)	3.60 (2.50-4.70)	2682
Total population	15-16	.467 (.405-.537)	.400 (.400-.500)	1.00 (.900-1.30)	2.40 (1.90-3.10)	4.10 (3.10-5.90)	2651
Age 3-5 years	15-16	.401 (.314-.513)	.300 (.200-.600)	.900 (.700-1.30)	2.10 (1.30-2.90)	2.90 (1.40-4.90)	141
Age 6-11 years	13-14	.351 (.306-.404)	.300 (.300-.400)	.700 (.500-.800)	1.40 (1.00-1.60)	2.10 (1.50-4.90)	409
Age 6-11 years	15-16	.368 (.313-.431)	.300 (.300-.400)	.700 (.600-.800)	1.60 (1.20-2.30)	3.00 (2.30-5.10)	415
Age 12-19 years	13-14	.400 (.332-.482)	.400 (.300-.500)	.800 (.600-1.10)	1.80 (1.20-2.40)	3.20 (1.80-8.30)	461
Age 12-19 years	15-16	.371 (.305-.452)	.400 (.300-.400)	.800 (.600-.900)	1.80 (1.00-2.70)	2.70 (1.80-3.90)	405
Age 20+ years	13-14	.441 (.381-.510)	.400 (.400-.500)	.900 (.800-1.10)	2.10 (1.80-2.50)	3.80 (2.60-4.60)	1812
Age 20+ years	15-16	.496 (.427-.575)	.500 (.400-.600)	1.10 (1.00-1.40)	2.60 (2.00-3.40)	4.40 (3.30-6.60)	1690
Males	13-14	.455 (.393-.527)	.400 (.400-.500)	.900 (.700-1.10)	2.30 (1.60-2.60)	3.90 (2.40-6.40)	1284
Males	15-16	.501 (.420-.597)	.500 (.400-.600)	1.10 (.900-1.50)	2.50 (2.00-3.50)	4.40 (3.00-7.20)	1307
Females	13-14	.403 (.343-.473)	.400 (.300-.500)	.900 (.700-1.10)	2.00 (1.50-2.30)	3.40 (2.40-4.60)	1398
Females	15-16	.436 (.378-.502)	.400 (.300-.500)	1.00 (.900-1.20)	2.20 (1.80-2.90)	3.90 (2.90-5.20)	1344
Mexican Americans	13-14	.498 (.381-.650)	.500 (.400-.600)	1.00 (.800-1.40)	2.10 (1.60-4.30)	4.90 (2.20-10.8)	438
Mexican Americans	15-16	.650 (.525-.805)	.600 (.500-.800)	1.30 (1.00-2.20)	3.20 (2.40-4.30)	5.00 (3.30-8.60)	513
Non-Hispanic blacks	13-14	.636 (.537-.754)	.600 (.500-.700)	1.40 (1.20-1.70)	3.20 (2.10-4.80)	6.00 (3.50-9.50)	608
Non-Hispanic blacks	15-16	.712 (.616-.824)	.700 (.500-.800)	1.50 (1.40-1.90)	4.10 (3.00-5.20)	6.60 (5.10-8.60)	610
Non-Hispanic whites	13-14	.383 (.334-.440)	.400 (.300-.400)	.800 (.600-.900)	1.90 (1.40-2.40)	3.00 (2.40-4.00)	987
Non-Hispanic whites	15-16	.389 (.343-.440)	.300 (.300-.400)	.900 (.800-1.10)	2.10 (1.70-2.40)	3.00 (2.20-4.30)	781
All Hispanics	13-14	.507 (.424-.606)	.500 (.400-.600)	1.00 (.800-1.30)	2.10 (1.70-3.30)	4.10 (2.60-6.40)	690
All Hispanics	15-16	.663 (.548-.804)	.600 (.500-.700)	1.40 (1.10-1.80)	3.60 (2.80-4.50)	6.50 (4.50-8.10)	859
Asians	13-14	.327 (.270-.397)	.300 (.300-.300)	.600 (.500-.900)	1.40 (1.00-2.70)	2.80 (1.60-6.50)	287
Asians	15-16	.455 (.361-.575)	.400 (.300-.500)	1.00 (.700-1.40)	2.40 (1.80-2.90)	3.60 (2.60-5.40)	275

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Bisphenol S (creatinine corrected) (2013 - 2016)†

CAS Number 80-05-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	0.428 (.387-.474)	.380 (.352-.411)	.797 (.690-.903)	1.80 (1.49-2.10)	3.33 (2.60-4.68)	2680
Total population	15-16	0.474 (.417-.539)	.455 (.400-.514)	.917 (.791-1.09)	2.00 (1.67-2.45)	3.64 (2.75-4.56)	2650
Age 3-5 years	15-16	0.94 (.752-1.18)	.725 (.588-1.17)	2.00 (1.41-2.57)	3.75 (3.18-5.71)	5.71 (3.18-7.56)	140
Age 6-11 years	13-14	0.444 (.390-.505)	.405 (.345-.457)	.778 (.652-.938)	1.59 (1.14-2.27)	2.63 (2.05-4.93)	409
Age 6-11 years	15-16	0.473 (.417-.538)	.450 (.375-.515)	.762 (.652-.968)	1.85 (1.39-2.38)	3.73 (2.33-5.12)	415
Age 12-19 years	13-14	0.325 (.287-.368)	.294 (.256-.331)	.588 (.500-.674)	1.31 (.886-1.88)	2.27 (1.33-4.58)	461
Age 12-19 years	15-16	0.288 (.246-.338)	.252 (.216-.303)	.552 (.465-.766)	1.17 (.976-1.61)	1.77 (1.40-2.38)	405
Age 20+ years	13-14	0.444 (.396-.498)	.389 (.357-.426)	.839 (.714-.960)	1.88 (1.56-2.22)	3.49 (2.71-4.91)	1810
Age 20+ years	15-16	0.505 (.438-.583)	.476 (.412-.556)	.989 (.823-1.15)	2.20 (1.73-2.76)	3.89 (2.86-4.84)	1690
Males	13-14	0.383 (.335-.437)	.333 (.299-.370)	.741 (.630-.851)	1.56 (1.33-1.93)	2.81 (1.88-4.76)	1283
Males	15-16	0.437 (.375-.509)	.407 (.357-.488)	.870 (.738-1.05)	2.00 (1.55-2.44)	3.52 (2.56-4.55)	1307
Females	13-14	0.477 (.431-.529)	.417 (.385-.455)	.848 (.729-.986)	2.03 (1.67-2.60)	3.64 (2.97-5.20)	1397
Females	15-16	0.513 (.453-.580)	.481 (.431-.548)	1.01 (.833-1.14)	2.04 (1.70-2.76)	3.70 (2.72-5.00)	1343
Mexican Americans	13-14	0.507 (.410-.627)	.458 (.370-.549)	.962 (.722-1.25)	2.22 (1.30-5.42)	5.57 (2.26-14.9)	438
Mexican Americans	15-16	0.682 (.556-.836)	.638 (.504-.778)	1.27 (.947-1.59)	2.87 (1.82-3.89)	4.17 (3.64-6.16)	513
Non-Hispanic blacks	13-14	0.471 (.398-.557)	.414 (.336-.519)	.943 (.792-1.11)	2.10 (1.50-3.67)	4.11 (2.58-6.69)	608
Non-Hispanic blacks	15-16	0.551 (.503-.604)	.476 (.427-.556)	1.12 (.968-1.36)	2.86 (2.38-3.64)	4.84 (3.57-6.58)	609
Non-Hispanic whites	13-14	0.402 (.354-.457)	.357 (.316-.390)	.714 (.596-.864)	1.68 (1.38-1.95)	3.02 (2.20-4.58)	986
Non-Hispanic whites	15-16	0.412 (.363-.468)	.408 (.333-.476)	.800 (.656-1.00)	1.61 (1.41-1.91)	2.53 (2.00-3.66)	781
All Hispanics	13-14	0.503 (.435-.581)	.487 (.411-.538)	.909 (.756-1.09)	2.03 (1.53-2.78)	3.90 (2.80-5.75)	690
All Hispanics	15-16	0.677 (.551-.831)	.635 (.476-.779)	1.29 (1.02-1.68)	3.33 (2.35-3.79)	4.96 (3.84-6.33)	859
Asians	13-14	0.42 (.359-.492)	.389 (.357-.459)	.720 (.546-.938)	1.68 (.964-2.76)	2.76 (1.75-8.04)	286
Asians	15-16	0.555 (.471-.653)	.467 (.398-.647)	1.08 (.800-1.38)	2.56 (1.52-4.69)	4.83 (2.56-7.92)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Triclocarban (2013 - 2016)†

CAS Number 101-20-2

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.200 (.200-.200)	2.20 (1.20-4.10)	13.4 (8.00-24.5)	2686
Total population	15-16	*	<LOD	.200 (.100-.200)	1.70 (.600-3.60)	11.5 (6.30-22.5)	2651
Age 3-5 years	15-16	*	<LOD	<LOD	.400 (.200-1.20)	1.20 (.200-14.9)	141
Age 6-11 years	13-14	*	<LOD	<LOD	.300 (.200-.500)	.900 (.400-5.50)	409
Age 6-11 years	15-16	*	<LOD	.100 (<LOD-.200)	.500 (.200-1.40)	1.40 (.500-3.60)	415
Age 12-19 years	13-14	*	<LOD	.200 (.100-.200)	.900 (.400-1.90)	2.60 (1.40-9.40)	462
Age 12-19 years	15-16	*	<LOD	.100 (<LOD-.200)	.700 (.200-2.30)	2.30 (.900-6.10)	405
Age 20+ years	13-14	*	<LOD	.200 (.200-.300)	3.40 (1.80-7.00)	17.9 (10.0-30.8)	1815
Age 20+ years	15-16	*	<LOD	.200 (.100-.200)	2.50 (.900-6.30)	19.6 (7.10-30.5)	1690
Males	13-14	*	<LOD	.200 (.200-.400)	3.50 (1.60-9.90)	31.9 (13.9-47.6)	1285
Males	15-16	*	<LOD	.200 (.100-.300)	1.70 (.600-9.80)	16.9 (4.80-37.5)	1307
Females	13-14	*	<LOD	.200 (.100-.200)	1.70 (.600-3.50)	7.50 (3.50-12.9)	1401
Females	15-16	*	<LOD	.100 (<LOD-.200)	1.40 (.500-2.60)	6.60 (2.60-22.5)	1344
Mexican Americans	13-14	*	<LOD	.100 (<LOD-.200)	.600 (.200-3.30)	3.30 (.400-16.3)	438
Mexican Americans	15-16	*	<LOD	.100 (<LOD-.200)	.400 (.200-1.70)	2.40 (.700-8.60)	513
Non-Hispanic blacks	13-14	.397 (.295-.536)	.200 (.100-.300)	1.10 (.700-2.00)	11.3 (6.00-17.9)	27.0 (11.7-67.9)	609
Non-Hispanic blacks	15-16	*	<LOD	.600 (.300-1.30)	6.60 (1.60-23.3)	30.1 (9.70-56.9)	610
Non-Hispanic whites	13-14	*	<LOD	.200 (.100-.200)	2.00 (.800-4.50)	14.8 (7.10-32.5)	988
Non-Hispanic whites	15-16	*	<LOD	.100 (<LOD-.200)	1.30 (.400-3.10)	11.5 (4.40-24.4)	781
All Hispanics	13-14	*	<LOD	.100 (<LOD-.200)	.600 (.300-2.10)	4.40 (1.10-9.40)	690
All Hispanics	15-16	*	<LOD	.200 (<LOD-.200)	1.10 (.300-3.20)	5.70 (2.40-14.7)	859
Asians	13-14	*	<LOD	.100 (<LOD-.100)	.500 (.200-1.40)	2.20 (.800-7.80)	289
Asians	15-16	*	<LOD	<LOD	.300 (.200-1.30)	2.50 (.300-15.4)	275

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Triclocarban (creatinine corrected) (2013 - 2016)†

CAS Number 101-20-2

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.275 (.248-.306)	1.96 (1.00-4.17)	14.6 (8.93-21.3)	2684
Total population	15-16	*	<LOD	.235 (.189-.294)	1.53 (.778-3.36)	11.3 (5.64-20.1)	2650
Age 3-5 years	15-16	*	<LOD	<LOD	1.15 (.538-2.18)	2.18 (.778-18.0)	140
Age 6-11 years	13-14	*	<LOD	<LOD	.413 (.323-.725)	.778 (.389-7.77)	409
Age 6-11 years	15-16	*	<LOD	.260 (<LOD-.361)	.820 (.368-1.76)	1.76 (.882-10.3)	415
Age 12-19 years	13-14	*	<LOD	.200 (.146-.248)	.559 (.380-.888)	1.97 (.769-8.70)	462
Age 12-19 years	15-16	*	<LOD	.160 (<LOD-.190)	.399 (.236-1.94)	2.26 (.426-5.11)	405
Age 20+ years	13-14	*	<LOD	.292 (.261-.333)	3.20 (1.67-7.07)	17.6 (10.7-22.9)	1813
Age 20+ years	15-16	*	<LOD	.241 (.189-.330)	2.45 (1.00-5.68)	18.0 (7.73-24.1)	1690
Males	13-14	*	<LOD	.250 (.185-.306)	3.00 (1.07-9.86)	21.3 (13.7-28.3)	1284
Males	15-16	*	<LOD	.226 (.153-.292)	1.71 (.659-5.74)	13.0 (2.67-28.5)	1307
Females	13-14	*	<LOD	.292 (.250-.357)	1.65 (.700-4.17)	9.33 (4.17-14.9)	1400
Females	15-16	*	<LOD	.241 (<LOD-.316)	1.25 (.732-3.36)	10.1 (3.36-19.9)	1343
Mexican Americans	13-14	*	<LOD	.200 (<LOD-.292)	.559 (.292-1.35)	1.35 (.444-21.5)	438
Mexican Americans	15-16	*	<LOD	.194 (<LOD-.265)	.571 (.316-1.39)	1.84 (.850-5.96)	513
Non-Hispanic blacks	13-14	0.293 (.220-.391)	.172 (.127-.235)	.741 (.513-1.11)	7.90 (2.41-19.3)	23.9 (10.8-28.9)	609
Non-Hispanic blacks	15-16	*	<LOD	.403 (.259-.714)	4.69 (1.15-18.2)	21.8 (8.51-44.8)	609
Non-Hispanic whites	13-14	*	<LOD	.278 (.233-.333)	2.06 (.800-7.12)	15.4 (9.87-22.6)	987
Non-Hispanic whites	15-16	*	<LOD	.212 (<LOD-.275)	1.39 (.667-3.56)	11.3 (3.36-20.8)	781
All Hispanics	13-14	*	<LOD	.192 (<LOD-.233)	.617 (.351-1.35)	4.48 (1.24-10.6)	690
All Hispanics	15-16	*	<LOD	.233 (<LOD-.304)	1.05 (.500-2.67)	5.96 (1.84-14.8)	859
Asians	13-14	*	<LOD	.217 (<LOD-.250)	.625 (.379-1.67)	3.06 (.769-12.1)	288
Asians	15-16	*	<LOD	<LOD	.392 (.280-1.80)	2.82 (.375-23.8)	275

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Triclosan (2011 - 2016)†

CAS Number 3380-34-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	11.8 (10.6-13.1)	7.10 (6.10-7.90)	41.6 (30.2-59.5)	267 (207-332)	553 (429-722)	2489
Total population	13-14	9.78 (9.01-10.6)	6.30 (5.70-7.20)	33.9 (29.1-39.1)	172 (138-208)	379 (324-431)	2686
Total population	15-16	5.79 (4.96-6.76)	3.00 (2.50-3.80)	12.8 (9.50-17.8)	135 (79.2-187)	348 (250-451)	2651
Age 3-5 years	15-16	*	2.20 (<LOD-2.90)	5.30 (3.40-7.40)	14.5 (7.70-28.8)	41.5 (14.5-73.0)	141
Age 6-11 years	11-12	7.18 (5.73-9.01)	5.00 (3.40-7.30)	17.2 (10.4-21.8)	77.6 (28.9-184)	184 (78.7-393)	396
Age 6-11 years	13-14	8.24 (6.70-10.1)	6.10 (4.80-8.00)	22.9 (15.3-33.5)	73.8 (52.7-96.0)	124 (91.2-204)	409
Age 6-11 years	15-16	4.45 (3.35-5.91)	2.70 (2.10-3.20)	7.70 (4.30-18.6)	54.1 (22.2-95.3)	135 (54.8-300)	415
Age 12-19 years	11-12	10.1 (7.70-13.3)	5.80 (4.70-7.50)	25.5 (15.1-38.9)	156 (73.5-286)	489 (171-1550)	388
Age 12-19 years	13-14	7.96 (6.81-9.31)	6.00 (4.80-7.40)	19.7 (15.4-25.3)	85.7 (37.2-183)	224 (122-325)	462
Age 12-19 years	15-16	5.16 (3.92-6.79)	2.90 (2.20-3.80)	8.80 (7.00-13.8)	136 (32.2-292)	357 (164-575)	405
Age 20+ years	11-12	12.7 (11.2-14.4)	7.60 (6.40-8.50)	57.4 (37.0-75.8)	298 (243-388)	594 (437-845)	1705
Age 20+ years	13-14	10.3 (9.32-11.3)	6.40 (5.60-7.50)	39.3 (32.4-48.5)	203 (147-270)	420 (350-529)	1815
Age 20+ years	15-16	6.10 (5.11-7.29)	3.10 (2.60-4.00)	15.1 (10.0-20.9)	143 (83.9-234)	369 (244-486)	1690
Males	11-12	11.6 (10.1-13.1)	6.40 (5.30-7.50)	41.6 (28.1-58.7)	320 (211-388)	566 (392-722)	1259
Males	13-14	9.95 (8.75-11.3)	6.40 (5.20-8.50)	34.7 (29.3-40.6)	172 (126-215)	372 (297-479)	1285
Males	15-16	5.68 (4.67-6.91)	2.90 (2.30-3.80)	12.6 (8.20-19.6)	132 (65.0-216)	348 (170-528)	1307
Females	11-12	12.0 (10.2-14.0)	7.60 (6.20-8.60)	42.2 (25.7-75.8)	242 (188-286)	545 (380-855)	1230
Females	13-14	9.63 (8.41-11.0)	6.20 (5.60-7.10)	31.7 (24.9-42.5)	173 (112-240)	384 (302-528)	1401
Females	15-16	5.90 (4.75-7.31)	3.20 (2.60-4.00)	12.8 (9.00-20.8)	136 (64.3-234)	369 (172-586)	1344
Mexican Americans	11-12	12.6 (8.98-17.8)	7.20 (4.70-11.7)	47.6 (21.9-82.7)	411 (151-628)	628 (393-1250)	316
Mexican Americans	13-14	8.65 (5.55-13.5)	5.20 (2.60-12.2)	31.9 (15.4-68.0)	191 (79.5-346)	488 (180-822)	438
Mexican Americans	15-16	5.76 (4.54-7.30)	3.00 (2.20-4.10)	13.4 (7.20-22.0)	152 (65.2-332)	453 (252-592)	513
Non-Hispanic blacks	11-12	10.5 (9.08-12.2)	6.70 (5.70-8.40)	29.9 (22.4-40.0)	169 (106-278)	475 (278-718)	665
Non-Hispanic blacks	13-14	8.34 (7.54-9.23)	5.50 (4.40-6.60)	24.9 (18.9-32.6)	145 (68.6-209)	304 (204-509)	609
Non-Hispanic blacks	15-16	5.66 (4.36-7.34)	3.10 (2.50-4.10)	12.9 (7.50-22.6)	115 (63.2-189)	329 (204-445)	610
Non-Hispanic whites	11-12	11.7 (10.0-13.7)	7.00 (5.60-8.00)	44.6 (24.4-75.8)	248 (184-392)	552 (365-759)	813
Non-Hispanic whites	13-14	10.0 (8.95-11.3)	6.40 (5.60-8.00)	34.7 (29.2-43.1)	148 (122-210)	350 (253-438)	988
Non-Hispanic whites	15-16	5.58 (4.47-6.97)	2.90 (2.40-3.70)	12.2 (8.00-19.6)	133 (49.2-214)	341 (164-486)	781
All Hispanics	11-12	13.4 (11.6-15.5)	7.50 (6.40-9.30)	48.3 (33.2-75.5)	411 (264-518)	861 (536-1040)	571
All Hispanics	13-14	9.14 (6.95-12.0)	6.00 (3.70-9.50)	29.6 (17.9-44.3)	208 (131-325)	583 (325-737)	690
All Hispanics	15-16	6.49 (5.32-7.91)	3.20 (2.50-4.20)	15.6 (12.0-22.2)	179 (102-346)	486 (346-645)	859
Asians	11-12	11.7 (7.75-17.8)	7.30 (3.80-15.1)	42.9 (18.6-125)	274 (117-433)	453 (235-636)	352
Asians	13-14	11.5 (9.24-14.3)	6.20 (4.30-9.10)	71.5 (25.2-121)	294 (212-428)	594 (384-740)	289
Asians	15-16	7.78 (4.90-12.3)	3.20 (2.00-7.40)	39.2 (9.00-127)	242 (127-350)	441 (248-820)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.30, 1.70, and 1.70 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Triclosan_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Triclosan_FactSheet.html

Urinary Triclosan (creatinine corrected) (2011 - 2016)†

CAS Number 3380-34-5

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	13.4 (11.8-15.1)	8.39 (6.79-10.0)	49.3 (37.4-57.5)	309 (229-404)	642 (508-788)	2487
Total population	13-14	9.83 (9.00-10.7)	6.90 (6.27-7.65)	29.9 (25.1-34.4)	173 (138-207)	358 (292-425)	2684
Total population	15-16	5.88 (5.12-6.76)	3.53 (3.17-3.92)	12.4 (9.25-18.6)	123 (67.5-210)	299 (232-392)	2650
Age 3-5 years	15-16	*	6.00 (<LOD-7.88)	11.3 (8.24-15.7)	27.8 (15.7-36.0)	53.2 (27.8-131)	140
Age 6-11 years	11-12	10.3 (8.18-12.9)	6.70 (5.62-9.06)	22.4 (16.3-31.7)	103 (54.5-153)	235 (113-333)	395
Age 6-11 years	13-14	10.4 (8.61-12.6)	8.97 (6.62-11.5)	23.4 (18.4-36.1)	78.1 (57.0-125)	184 (81.2-268)	409
Age 6-11 years	15-16	5.73 (4.35-7.54)	3.67 (3.08-4.80)	11.3 (6.23-20.7)	52.0 (32.7-122)	168 (69.1-259)	415
Age 12-19 years	11-12	9.84 (7.85-12.4)	5.83 (4.95-7.23)	26.3 (19.0-37.8)	182 (65.0-399)	421 (182-647)	388
Age 12-19 years	13-14	6.46 (5.24-7.96)	5.11 (4.39-5.93)	15.7 (10.0-21.8)	53.6 (33.2-105)	153 (102-289)	462
Age 12-19 years	15-16	4.01 (3.26-4.93)	2.39 (2.07-2.67)	7.31 (5.06-13.1)	82.5 (24.7-205)	218 (93.9-296)	405
Age 20+ years	11-12	14.4 (12.4-16.7)	9.06 (7.41-11.2)	54.3 (43.9-75.0)	364 (246-514)	660 (536-817)	1704
Age 20+ years	13-14	10.4 (9.44-11.4)	7.17 (6.32-8.26)	34.4 (29.3-41.6)	202 (162-234)	408 (296-531)	1813
Age 20+ years	15-16	6.22 (5.27-7.35)	3.65 (3.24-4.21)	13.1 (9.77-22.2)	149 (67.5-263)	311 (254-441)	1690
Males	11-12	10.8 (9.49-12.2)	6.40 (5.24-8.53)	37.4 (26.8-49.4)	226 (153-309)	536 (311-656)	1258
Males	13-14	8.36 (7.44-9.41)	5.74 (4.80-6.67)	26.7 (22.6-31.8)	143 (111-195)	296 (216-426)	1284
Males	15-16	4.95 (4.20-5.84)	3.08 (2.67-3.54)	9.45 (7.59-12.5)	110 (43.3-190)	263 (158-303)	1307
Females	11-12	16.5 (13.8-19.6)	10.8 (8.44-12.7)	53.3 (44.2-75.0)	381 (273-539)	746 (614-900)	1229
Females	13-14	11.5 (10.0-13.1)	8.08 (6.70-9.23)	34.4 (25.1-42.2)	205 (150-253)	419 (294-573)	1400
Females	15-16	6.94 (5.68-8.48)	4.00 (3.45-5.00)	15.1 (11.3-25.1)	149 (58.9-278)	385 (254-595)	1343
Mexican Americans	11-12	14.2 (10.4-19.5)	8.29 (6.10-12.4)	62.5 (31.8-111)	399 (163-536)	536 (271-900)	316
Mexican Americans	13-14	8.82 (5.50-14.1)	6.08 (3.08-13.4)	25.5 (15.9-61.3)	147 (68.8-340)	425 (142-659)	438
Mexican Americans	15-16	6.04 (4.82-7.56)	3.43 (2.79-4.35)	12.6 (8.64-20.5)	245 (78.2-358)	429 (314-599)	513
Non-Hispanic blacks	11-12	8.18 (7.09-9.44)	5.52 (4.66-6.27)	21.5 (16.7-29.9)	130 (74.3-222)	365 (229-461)	665
Non-Hispanic blacks	13-14	6.16 (5.30-7.15)	4.27 (3.52-4.93)	16.7 (12.7-21.3)	107 (66.1-125)	218 (116-284)	609
Non-Hispanic blacks	15-16	4.38 (3.61-5.32)	2.67 (2.22-3.18)	9.70 (6.00-18.6)	80.3 (46.0-139)	249 (158-297)	609
Non-Hispanic whites	11-12	14.2 (12.1-16.7)	8.95 (6.79-11.7)	51.9 (39.1-69.1)	311 (180-569)	675 (508-817)	811
Non-Hispanic whites	13-14	10.6 (9.78-11.5)	7.78 (6.67-9.09)	33.0 (26.4-40.2)	178 (128-215)	339 (247-420)	987
Non-Hispanic whites	15-16	5.92 (4.83-7.26)	3.54 (3.18-4.14)	11.8 (8.62-20.1)	116 (43.3-221)	264 (144-464)	781
All Hispanics	11-12	15 (13.0-17.3)	8.58 (6.52-11.4)	70.8 (40.8-98.6)	449 (320-514)	647 (506-913)	571
All Hispanics	13-14	9.07 (6.64-12.4)	6.08 (3.75-11.0)	24.7 (17.0-55.6)	197 (114-322)	462 (322-619)	690
All Hispanics	15-16	6.62 (5.42-8.09)	3.69 (3.03-4.57)	15.1 (9.44-27.7)	257 (165-338)	440 (361-537)	859
Asians	11-12	15.7 (10.2-24.2)	10.5 (6.05-17.4)	51.8 (23.6-142)	333 (127-609)	575 (381-719)	352
Asians	13-14	14.6 (11.5-18.6)	8.00 (5.74-13.3)	100 (39.3-151)	406 (247-528)	659 (419-917)	288
Asians	15-16	9.47 (6.43-14.0)	4.83 (3.51-7.20)	37.2 (12.6-158)	299 (210-392)	505 (343-595)	275

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Triclosan_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Triclosan_FactSheet.html

Urinary Butyl paraben (2011 - 2016)†

CAS Number 94-26-8

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.300 (.200-.400)	2.50 (1.60-3.40)	7.70 (4.50-11.4)	2489
Total population	13-14	*	<LOD	.200 (.100-.200)	1.30 (.800-1.70)	4.40 (2.70-6.10)	2686
Total population	15-16	*	<LOD	<LOD	.700 (.400-1.40)	4.00 (1.80-7.80)	2651
Age 3-5 years	15-16	*	<LOD	<LOD	.200 (.100-1.10)	1.10 (.200-54.2)	141
Age 6-11 years	11-12	*	<LOD	<LOD	.700 (.300-1.00)	1.50 (1.00-1.90)	396
Age 6-11 years	13-14	*	<LOD	<LOD	.300 (.200-.500)	.600 (.300-1.30)	409
Age 6-11 years	15-16	*	<LOD	<LOD	.200 (.100-.200)	.300 (.200-.800)	415
Age 12-19 years	11-12	*	<LOD	.300 (<LOD-.400)	.900 (.500-1.60)	1.90 (1.10-7.10)	388
Age 12-19 years	13-14	*	<LOD	.200 (.100-.200)	1.20 (.500-1.90)	5.90 (1.70-26.7)	462
Age 12-19 years	15-16	*	<LOD	<LOD	.400 (.100-1.50)	1.50 (.300-4.00)	405
Age 20+ years	11-12	*	<LOD	.400 (.300-.500)	3.30 (2.20-5.50)	8.90 (5.50-13.9)	1705
Age 20+ years	13-14	*	<LOD	.200 (.100-.300)	1.50 (.900-2.20)	4.90 (2.70-7.40)	1815
Age 20+ years	15-16	*	<LOD	.100 (<LOD-.100)	1.10 (.500-1.90)	5.00 (2.00-12.2)	1690
Males	11-12	*	<LOD	<LOD	.400 (.200-.500)	1.30 (.500-2.40)	1259
Males	13-14	*	<LOD	<LOD	.200 (.100-.200)	.400 (.300-.700)	1285
Males	15-16	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.400)	1307
Females	11-12	*	<LOD	.900 (.600-1.40)	5.90 (3.40-10.4)	13.4 (9.30-24.5)	1230
Females	13-14	*	<LOD	.500 (.400-.800)	2.90 (1.90-4.90)	8.40 (4.90-15.3)	1401
Females	15-16	*	<LOD	.300 (.100-.500)	2.30 (1.50-5.30)	14.8 (5.00-20.1)	1344
Mexican Americans	11-12	*	<LOD	.300 (<LOD-.400)	1.80 (1.40-5.90)	10.0 (3.20-13.7)	316
Mexican Americans	13-14	*	<LOD	.200 (.100-.300)	1.60 (.500-4.40)	7.10 (2.10-21.2)	438
Mexican Americans	15-16	*	<LOD	.100 (<LOD-.100)	.300 (.200-.700)	2.30 (.700-6.80)	513
Non-Hispanic blacks	11-12	*	<LOD	.200 (<LOD-.300)	1.60 (1.00-2.50)	4.70 (2.50-8.10)	665
Non-Hispanic blacks	13-14	*	<LOD	.100 (<LOD-.200)	.800 (.500-1.70)	3.20 (1.70-5.50)	609
Non-Hispanic blacks	15-16	*	<LOD	.100 (<LOD-.200)	.500 (.200-1.00)	2.00 (.900-3.70)	610
Non-Hispanic whites	11-12	*	<LOD	.300 (.200-.500)	2.60 (1.50-4.60)	8.00 (4.10-13.0)	813
Non-Hispanic whites	13-14	*	<LOD	.200 (.100-.200)	1.20 (.700-1.70)	3.20 (1.80-5.60)	988
Non-Hispanic whites	15-16	*	<LOD	<LOD	1.10 (.500-1.90)	4.80 (1.50-17.7)	781
All Hispanics	11-12	*	<LOD	.300 (<LOD-.400)	2.60 (1.30-7.00)	10.2 (3.40-21.5)	571
All Hispanics	13-14	*	<LOD	.200 (.100-.300)	1.90 (.700-4.30)	9.00 (3.20-20.7)	690
All Hispanics	15-16	*	<LOD	.100 (<LOD-.100)	.500 (.300-1.00)	4.00 (1.20-6.20)	859
Asians	11-12	*	<LOD	.400 (<LOD-1.10)	3.10 (1.40-7.70)	12.0 (4.80-20.5)	352
Asians	13-14	*	<LOD	.200 (<LOD-.500)	2.90 (1.10-10.0)	18.4 (5.60-26.1)	289
Asians	15-16	*	<LOD	.100 (<LOD-.300)	1.30 (.500-2.30)	5.60 (1.80-15.7)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.100, and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary Butyl paraben (creatinine corrected) (2011 - 2016)†

CAS Number 94-26-8

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.560 (.476-.667)	3.50 (2.00-4.55)	10.0 (6.26-13.5)	2487
Total population	13-14	*	<LOD	.250 (.202-.318)	1.54 (.952-2.22)	4.39 (3.25-6.96)	2684
Total population	15-16	*	<LOD	<LOD	.786 (.438-1.80)	4.57 (2.23-8.48)	2650
Age 3-5 years	15-16	*	<LOD	<LOD	.778 (.467-1.17)	1.38 (.652-164)	140
Age 6-11 years	11-12	*	<LOD	<LOD	.825 (.737-1.12)	1.56 (.825-2.44)	395
Age 6-11 years	13-14	*	<LOD	<LOD	.411 (.326-.538)	.714 (.467-.984)	409
Age 6-11 years	15-16	*	<LOD	<LOD	.318 (.280-.392)	.538 (.389-.769)	415
Age 12-19 years	11-12	*	<LOD	.378 (<LOD-.588)	1.35 (.588-2.21)	2.21 (1.50-7.45)	388
Age 12-19 years	13-14	*	<LOD	.194 (.159-.233)	1.02 (.484-1.88)	4.00 (1.74-12.1)	462
Age 12-19 years	15-16	*	<LOD	<LOD	.316 (.185-.517)	.800 (.333-2.15)	405
Age 20+ years	11-12	*	<LOD	.609 (.500-.789)	4.02 (2.58-6.28)	12.2 (7.04-17.9)	1704
Age 20+ years	13-14	*	<LOD	.269 (.208-.382)	1.74 (1.15-2.63)	5.42 (3.42-8.95)	1813
Age 20+ years	15-16	*	<LOD	.211 (<LOD-.241)	1.33 (.538-2.59)	6.63 (3.18-15.8)	1690
Males	11-12	*	<LOD	<LOD	.583 (.424-.824)	1.35 (.778-2.25)	1258
Males	13-14	*	<LOD	<LOD	.225 (.179-.280)	.417 (.304-.583)	1284
Males	15-16	*	<LOD	<LOD	.233 (<LOD-.256)	.318 (.259-.412)	1307
Females	11-12	*	<LOD	1.56 (1.08-2.00)	8.19 (5.33-12.1)	17.6 (11.8-30.8)	1229
Females	13-14	*	<LOD	.690 (.411-1.11)	3.42 (2.41-4.87)	10.2 (6.22-13.4)	1400
Females	15-16	*	<LOD	.339 (.238-.606)	3.72 (2.03-6.63)	16.6 (6.63-27.2)	1343
Mexican Americans	11-12	*	<LOD	.533 (<LOD-.660)	3.48 (1.30-4.33)	7.45 (3.50-19.2)	316
Mexican Americans	13-14	*	<LOD	.247 (.189-.350)	1.71 (.811-5.00)	10.6 (1.87-25.4)	438
Mexican Americans	15-16	*	<LOD	.179 (<LOD-.217)	.500 (.333-.786)	2.15 (.814-7.22)	513
Non-Hispanic blacks	11-12	*	<LOD	.298 (<LOD-.378)	1.43 (.875-1.93)	3.47 (1.93-6.72)	665
Non-Hispanic blacks	13-14	*	<LOD	.146 (<LOD-.189)	.583 (.368-1.16)	2.86 (1.19-3.25)	609
Non-Hispanic blacks	15-16	*	<LOD	.132 (<LOD-.167)	.503 (.276-1.16)	1.80 (.778-3.80)	609
Non-Hispanic whites	11-12	*	<LOD	.606 (.500-.778)	3.78 (2.08-5.63)	11.5 (5.39-15.7)	811
Non-Hispanic whites	13-14	*	<LOD	.259 (.200-.368)	1.54 (.778-2.33)	4.03 (2.50-6.09)	987
Non-Hispanic whites	15-16	*	<LOD	<LOD	1.20 (.438-3.18)	6.23 (2.59-22.4)	781
All Hispanics	11-12	*	<LOD	.526 (<LOD-.700)	3.50 (1.53-6.88)	13.7 (6.54-19.2)	571
All Hispanics	13-14	*	<LOD	.250 (.219-.309)	1.73 (.896-3.92)	10.3 (3.56-14.3)	690
All Hispanics	15-16	*	<LOD	.175 (<LOD-.212)	.577 (.389-1.13)	3.40 (1.37-8.70)	859
Asians	11-12	*	<LOD	.824 (<LOD-1.30)	6.28 (2.03-12.3)	14.9 (7.89-18.8)	352
Asians	13-14	*	<LOD	.440 (<LOD-.606)	3.46 (1.43-13.0)	23.6 (5.45-38.4)	288
Asians	15-16	*	<LOD	.292 (<LOD-.370)	1.07 (.595-3.40)	4.24 (1.36-15.4)	275

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary Ethyl paraben (2011 - 2016)†

CAS Number 120-47-8

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	5.10 (4.00-7.10)	33.6 (24.6-42.9)	68.8 (52.1-106)	2489
Total population	13-14	*	<LOD	5.30 (4.50-6.50)	33.5 (25.5-46.4)	77.0 (66.4-97.9)	2686
Total population	15-16	*	<LOD	4.20 (3.00-6.20)	28.3 (21.0-42.4)	91.5 (59.7-123)	2651
Age 3-5 years	15-16	*	<LOD	1.40 (<LOD-2.30)	5.50 (2.30-35.6)	35.6 (4.20-74.9)	141
Age 6-11 years	11-12	*	<LOD	<LOD	3.40 (1.70-6.90)	6.90 (3.40-17.4)	396
Age 6-11 years	13-14	*	<LOD	1.30 (1.00-1.70)	5.60 (2.90-8.40)	10.7 (6.60-17.3)	409
Age 6-11 years	15-16	*	<LOD	1.30 (<LOD-1.60)	3.90 (2.00-9.20)	15.2 (5.10-38.1)	415
Age 12-19 years	11-12	*	<LOD	2.00 (1.10-3.10)	9.60 (5.50-14.0)	21.5 (9.60-69.2)	388
Age 12-19 years	13-14	*	<LOD	2.40 (1.60-3.40)	15.6 (6.60-29.3)	48.7 (19.4-83.4)	462
Age 12-19 years	15-16	*	<LOD	1.70 (1.10-2.80)	7.20 (2.20-28.2)	28.2 (6.30-62.9)	405
Age 20+ years	11-12	*	<LOD	7.20 (5.50-10.0)	41.1 (33.4-51.0)	86.5 (58.0-140)	1705
Age 20+ years	13-14	*	1.10 (<LOD-1.30)	6.90 (5.50-8.60)	43.3 (32.2-53.4)	84.8 (70.5-114)	1815
Age 20+ years	15-16	*	<LOD	6.30 (5.10-7.30)	35.5 (24.7-58.0)	117 (75.7-146)	1690
Males	11-12	*	<LOD	2.20 (1.60-2.90)	10.0 (6.10-18.9)	31.2 (18.9-39.8)	1259
Males	13-14	*	<LOD	2.40 (1.80-3.10)	8.50 (6.00-14.4)	34.0 (15.6-62.8)	1285
Males	15-16	*	<LOD	1.80 (1.40-2.20)	7.80 (6.20-13.5)	28.2 (16.8-39.3)	1307
Females	11-12	*	1.60 (1.10-2.60)	12.9 (9.40-17.5)	58.2 (45.4-68.8)	145 (86.5-153)	1230
Females	13-14	*	1.60 (1.20-2.30)	12.5 (8.60-17.8)	58.7 (46.4-72.9)	110 (81.5-149)	1401
Females	15-16	*	1.30 (<LOD-2.00)	11.1 (7.80-14.8)	63.0 (36.8-117)	169 (119-248)	1344
Mexican Americans	11-12	*	<LOD	4.40 (2.40-6.40)	22.0 (12.9-35.5)	45.4 (22.4-171)	316
Mexican Americans	13-14	*	<LOD	4.20 (2.60-7.70)	32.6 (16.7-53.4)	70.6 (52.5-123)	438
Mexican Americans	15-16	*	<LOD	1.80 (1.40-2.80)	15.2 (9.30-24.9)	53.4 (18.5-128)	513
Non-Hispanic blacks	11-12	*	1.50 (1.10-2.00)	8.00 (5.80-12.8)	55.4 (33.4-79.7)	106 (82.8-139)	665
Non-Hispanic blacks	13-14	*	1.40 (1.10-1.90)	6.80 (4.90-9.20)	48.8 (29.9-77.0)	115 (77.0-230)	609
Non-Hispanic blacks	15-16	3.14 (2.56-3.84)	1.90 (1.40-2.60)	8.40 (5.90-11.9)	41.1 (29.6-60.8)	119 (64.7-139)	610
Non-Hispanic whites	11-12	*	<LOD	4.60 (3.50-9.10)	33.6 (21.6-45.4)	62.6 (42.9-132)	813
Non-Hispanic whites	13-14	*	<LOD	5.20 (3.90-6.50)	29.2 (17.8-46.4)	68.5 (48.7-86.6)	988
Non-Hispanic whites	15-16	*	<LOD	4.40 (2.90-6.90)	28.4 (18.8-57.9)	110 (58.0-145)	781
All Hispanics	11-12	*	<LOD	4.50 (3.00-5.80)	24.4 (15.2-34.6)	55.9 (27.1-115)	571
All Hispanics	13-14	*	<LOD	5.50 (3.70-8.70)	35.5 (23.9-53.4)	90.4 (62.5-123)	690
All Hispanics	15-16	*	<LOD	2.30 (1.70-3.40)	17.7 (13.6-24.9)	61.1 (26.4-108)	859
Asians	11-12	*	<LOD	4.90 (3.40-8.30)	39.4 (16.0-59.1)	92.4 (43.4-186)	352
Asians	13-14	*	<LOD	6.00 (2.70-11.3)	52.1 (27.4-75.0)	99.9 (65.5-174)	289
Asians	15-16	*	<LOD	2.50 (1.90-5.60)	34.4 (16.5-57.3)	77.8 (43.7-99.7)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.00, 1.00, and 1.00 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary Ethyl paraben (creatinine corrected) (2011 - 2016)†

CAS Number 120-47-8

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	6.57 (5.32-8.80)	39.5 (28.4-50.6)	87.7 (63.6-121)	2487
Total population	13-14	*	<LOD	5.41 (4.31-6.33)	36.6 (26.5-47.5)	99.3 (69.5-129)	2684
Total population	15-16	*	<LOD	5.04 (3.55-6.78)	30.8 (23.1-40.7)	90.8 (56.2-124)	2650
Age 3-5 years	15-16	*	<LOD	5.00 (<LOD-7.89)	11.8 (6.46-94.7)	83.0 (8.49-129)	140
Age 6-11 years	11-12	*	<LOD	<LOD	5.92 (3.74-7.50)	7.95 (6.51-17.8)	395
Age 6-11 years	13-14	*	<LOD	2.45 (2.03-2.96)	6.30 (3.94-9.44)	12.4 (7.02-26.6)	409
Age 6-11 years	15-16	*	<LOD	2.54 (<LOD-2.84)	5.26 (3.94-9.28)	16.0 (6.46-26.9)	415
Age 12-19 years	11-12	*	<LOD	2.53 (1.81-3.83)	11.1 (6.70-14.5)	20.5 (11.9-44.1)	388
Age 12-19 years	13-14	*	<LOD	2.24 (1.83-2.81)	11.8 (4.44-15.7)	36.1 (13.2-73.2)	462
Age 12-19 years	15-16	*	<LOD	1.64 (1.29-2.05)	4.47 (2.70-12.0)	12.7 (3.95-41.6)	405
Age 20+ years	11-12	*	<LOD	9.17 (6.69-12.5)	46.4 (34.7-64.8)	110 (71.5-146)	1704
Age 20+ years	13-14	*	1.57 (<LOD-1.84)	6.97 (5.76-8.73)	47.0 (35.1-63.1)	113 (76.0-169)	1813
Age 20+ years	15-16	*	<LOD	6.82 (5.13-8.60)	40.7 (27.4-55.9)	107 (74.3-167)	1690
Males	11-12	*	<LOD	2.45 (2.07-2.94)	8.76 (5.32-14.2)	23.2 (13.2-33.1)	1258
Males	13-14	*	<LOD	2.17 (1.78-2.63)	7.89 (5.23-12.5)	26.6 (13.8-41.0)	1284
Males	15-16	*	<LOD	2.26 (1.87-2.45)	8.49 (5.07-11.3)	18.0 (12.4-23.8)	1307
Females	11-12	*	2.96 (2.37-4.08)	18.9 (12.5-27.6)	81.9 (55.6-121)	146 (115-181)	1229
Females	13-14	*	2.54 (2.09-3.05)	14.5 (10.3-20.8)	73.2 (51.8-104)	167 (104-221)	1400
Females	15-16	*	2.10 (<LOD-2.73)	11.2 (9.24-14.5)	63.4 (48.9-99.6)	189 (137-253)	1343
Mexican Americans	11-12	*	<LOD	4.73 (3.29-8.92)	25.4 (14.2-33.9)	45.4 (32.6-121)	316
Mexican Americans	13-14	*	<LOD	4.85 (3.13-8.28)	33.9 (16.4-60.9)	75.8 (30.0-319)	438
Mexican Americans	15-16	*	<LOD	2.73 (2.29-3.55)	14.0 (7.16-25.9)	43.1 (20.8-120)	513
Non-Hispanic blacks	11-12	*	1.39 (1.06-1.75)	6.98 (4.74-8.92)	40.2 (24.8-55.3)	79.3 (61.1-135)	665
Non-Hispanic blacks	13-14	*	1.20 (1.05-1.39)	5.13 (3.53-7.24)	30.6 (18.4-38.8)	77.2 (38.8-129)	609
Non-Hispanic blacks	15-16	2.42 (2.04-2.88)	1.60 (1.29-2.09)	6.46 (4.87-8.63)	33.2 (18.5-49.0)	73.5 (47.9-135)	609
Non-Hispanic whites	11-12	*	<LOD	7.20 (4.88-10.4)	40.1 (26.4-63.5)	93.8 (58.4-131)	811
Non-Hispanic whites	13-14	*	<LOD	5.25 (3.95-6.33)	36.6 (22.0-51.9)	87.1 (51.9-162)	987
Non-Hispanic whites	15-16	*	<LOD	5.90 (3.61-9.05)	35.8 (18.6-48.9)	99.6 (55.9-165)	781
All Hispanics	11-12	*	<LOD	5.03 (3.74-7.13)	31.6 (13.2-54.0)	60.2 (43.6-121)	571
All Hispanics	13-14	*	<LOD	6.55 (3.94-8.72)	35.1 (26.6-56.1)	103 (56.1-135)	690
All Hispanics	15-16	*	<LOD	3.03 (2.54-3.74)	18.1 (12.8-25.9)	70.4 (33.6-120)	859
Asians	11-12	*	<LOD	7.21 (4.46-13.6)	48.9 (26.3-78.9)	100 (50.4-149)	352
Asians	13-14	*	<LOD	7.52 (3.33-14.6)	65.9 (36.9-105)	116 (80.6-191)	288
Asians	15-16	*	<LOD	3.55 (2.75-4.64)	46.0 (11.0-73.5)	100 (46.0-257)	275

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary Methyl paraben (2011 - 2016)†

CAS Number 99-76-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	40.3 (35.4-46.0)	39.0 (32.4-47.8)	172 (149-198)	471 (401-593)	841 (692-975)	2489
Total population	13-14	48.1 (43.0-53.8)	41.7 (34.5-50.4)	167 (151-186)	445 (404-509)	819 (663-918)	2686
Total population	15-16	31.8 (27.0-37.5)	28.2 (22.1-34.8)	127 (97.6-154)	422 (334-528)	722 (619-807)	2651
Age 3-5 years	15-16	23.1 (16.2-33.0)	13.3 (9.30-24.4)	92.8 (53.3-200)	439 (123-1090)	1090 (332-1570)	141
Age 6-11 years	11-12	18.5 (15.7-21.9)	13.8 (11.2-17.7)	58.6 (43.8-78.2)	217 (155-363)	549 (329-983)	396
Age 6-11 years	13-14	28.6 (21.4-38.1)	22.7 (17.8-30.3)	62.1 (43.5-100)	260 (150-408)	542 (290-878)	409
Age 6-11 years	15-16	17.2 (13.4-22.2)	10.7 (8.40-15.1)	52.5 (29.8-92.1)	229 (144-332)	512 (256-909)	415
Age 12-19 years	11-12	26.3 (19.0-36.5)	17.0 (9.80-31.2)	121 (62.4-219)	538 (376-667)	772 (609-996)	388
Age 12-19 years	13-14	40.5 (32.7-50.1)	32.0 (25.2-41.7)	147 (89.6-193)	452 (309-725)	942 (612-1220)	462
Age 12-19 years	15-16	24.2 (16.2-36.2)	16.3 (10.4-30.9)	111 (52.6-184)	383 (184-670)	670 (287-1300)	405
Age 20+ years	11-12	46.8 (41.3-53.1)	48.9 (37.8-61.0)	188 (158-231)	477 (409-611)	870 (676-1070)	1705
Age 20+ years	13-14	52.2 (46.0-59.3)	46.8 (37.8-57.3)	179 (163-201)	457 (417-525)	823 (663-918)	1815
Age 20+ years	15-16	35.5 (30.4-41.4)	31.7 (27.1-41.6)	140 (108-166)	445 (357-531)	727 (647-807)	1690
Males	11-12	23.2 (19.2-28.1)	17.3 (12.5-23.4)	81.9 (65.7-119)	312 (224-396)	575 (401-822)	1259
Males	13-14	31.1 (26.8-36.2)	24.4 (20.1-29.8)	77.2 (67.2-94.6)	273 (230-328)	561 (408-740)	1285
Males	15-16	18.2 (15.7-21.2)	13.9 (11.2-17.5)	57.9 (43.8-70.6)	229 (167-291)	480 (348-633)	1307
Females	11-12	68.6 (59.0-79.9)	76.9 (67.5-89.2)	248 (201-309)	637 (493-819)	972 (772-1190)	1230
Females	13-14	72.8 (63.6-83.4)	73.9 (61.0-94.1)	248 (217-276)	583 (490-680)	904 (801-1070)	1401
Females	15-16	54.4 (44.6-66.4)	59.2 (40.8-86.5)	200 (163-267)	561 (479-670)	874 (707-1180)	1344
Mexican Americans	11-12	43.9 (31.5-61.2)	44.9 (26.2-68.1)	192 (111-302)	529 (328-912)	1080 (471-1740)	316
Mexican Americans	13-14	62.1 (49.2-78.4)	57.4 (45.1-84.0)	230 (154-341)	518 (361-725)	915 (535-1530)	438
Mexican Americans	15-16	33.8 (26.9-42.5)	30.9 (21.2-43.8)	120 (85.2-174)	420 (255-587)	741 (607-870)	513
Non-Hispanic blacks	11-12	123 (100-152)	155 (115-199)	450 (341-579)	934 (819-1110)	1390 (1020-1990)	665
Non-Hispanic blacks	13-14	111 (96.1-129)	110 (86.4-143)	375 (313-482)	927 (709-1180)	1430 (1020-2040)	609
Non-Hispanic blacks	15-16	92.8 (76.4-113)	88.1 (67.9-109)	378 (298-471)	871 (655-1380)	1660 (1220-2470)	610
Non-Hispanic whites	11-12	31.0 (26.9-35.8)	30.0 (23.4-36.4)	130 (96.8-160)	372 (269-453)	603 (453-772)	813
Non-Hispanic whites	13-14	37.9 (32.8-43.7)	32.5 (28.3-39.0)	123 (94.3-153)	328 (267-391)	573 (422-711)	988
Non-Hispanic whites	15-16	25.9 (21.9-30.7)	22.1 (17.5-27.6)	103 (77.5-137)	344 (267-444)	619 (479-705)	781
All Hispanics	11-12	50.1 (40.5-62.1)	46.0 (39.5-59.4)	203 (130-301)	666 (406-1080)	1170 (766-2100)	571
All Hispanics	13-14	61.9 (52.2-73.3)	60.0 (49.0-73.5)	221 (161-291)	539 (417-702)	842 (639-1070)	690
All Hispanics	15-16	34.2 (28.6-40.9)	31.7 (22.7-40.5)	119 (95.0-155)	353 (281-545)	707 (574-782)	859
Asians	11-12	36.1 (29.2-44.5)	37.1 (24.6-57.4)	140 (97.9-175)	395 (259-509)	692 (461-1030)	352
Asians	13-14	45.0 (37.9-53.5)	38.9 (30.5-53.0)	168 (118-197)	384 (271-475)	663 (393-914)	289
Asians	15-16	27.0 (16.9-43.1)	25.9 (12.1-38.5)	102 (57.1-207)	410 (157-917)	623 (366-1830)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.00, 1.00, and 1.00 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary Methyl paraben (creatinine corrected) (2011 - 2016)†

CAS Number 99-76-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	46 (41.3-51.3)	47.9 (36.9-61.7)	203 (179-228)	494 (399-571)	797 (632-993)	2487
Total population	13-14	48.2 (43.1-53.9)	41.8 (35.5-49.1)	180 (145-205)	410 (379-460)	653 (585-697)	2684
Total population	15-16	32.3 (28.1-37.2)	28.8 (23.8-36.2)	133 (113-157)	406 (333-436)	640 (545-780)	2650
Age 3-5 years	15-16	53.5 (38.6-74.1)	36.8 (22.7-60.8)	198 (90.7-344)	914 (223-2520)	2210 (535-4060)	140
Age 6-11 years	11-12	26.4 (22.8-30.7)	19.4 (14.6-23.8)	69.9 (53.0-113)	282 (182-458)	644 (354-1220)	395
Age 6-11 years	13-14	36.1 (28.0-46.5)	28.2 (20.9-36.5)	72.7 (50.9-122)	263 (160-564)	588 (341-881)	409
Age 6-11 years	15-16	22.2 (18.1-27.3)	13.6 (11.1-18.1)	60.2 (46.2-88.6)	287 (189-466)	684 (372-1060)	415
Age 12-19 years	11-12	25.7 (19.3-34.2)	17.1 (11.8-33.4)	100 (53.2-175)	335 (213-545)	609 (450-773)	388
Age 12-19 years	13-14	32.9 (27.7-39.0)	24.3 (18.1-33.8)	99.5 (75.3-145)	339 (234-412)	495 (377-655)	462
Age 12-19 years	15-16	18.8 (13.3-26.6)	13.5 (8.78-18.6)	65.4 (35.0-155)	311 (148-436)	467 (311-715)	405
Age 20+ years	11-12	53.4 (47.7-59.8)	64.9 (53.2-75.2)	228 (199-250)	523 (429-623)	815 (669-1110)	1704
Age 20+ years	13-14	52.6 (46.6-59.4)	47.5 (38.7-58.5)	199 (170-229)	429 (390-476)	666 (591-781)	1813
Age 20+ years	15-16	36.2 (31.5-41.6)	36.5 (27.9-45.2)	140 (125-182)	418 (353-449)	663 (541-794)	1690
Males	11-12	21.8 (18.3-26.0)	16.2 (12.5-21.1)	74.1 (57.1-93.3)	250 (181-321)	450 (327-560)	1258
Males	13-14	26.1 (22.9-29.8)	18.4 (16.6-22.2)	61.3 (52.1-74.0)	215 (172-284)	411 (323-479)	1284
Males	15-16	15.9 (13.7-18.4)	11.0 (9.65-13.9)	44.8 (38.0-57.8)	196 (148-228)	398 (285-438)	1307
Females	11-12	94.5 (83.1-108)	119 (101-136)	309 (259-356)	682 (571-805)	1090 (797-1300)	1229
Females	13-14	86.5 (74.1-101)	90.5 (72.2-125)	266 (237-307)	564 (506-614)	828 (665-998)	1400
Females	15-16	64 (54.4-75.4)	77.3 (58.2-98.0)	238 (174-303)	518 (447-613)	849 (715-1040)	1343
Mexican Americans	11-12	49.5 (37.0-66.2)	50.5 (32.5-79.7)	200 (133-298)	496 (316-982)	1090 (484-2160)	316
Mexican Americans	13-14	63.3 (46.8-85.5)	67.9 (45.6-96.0)	229 (146-317)	570 (360-764)	883 (578-1130)	438
Mexican Americans	15-16	35.4 (28.9-43.4)	35.0 (23.2-50.2)	123 (93.5-161)	432 (272-474)	609 (470-701)	513
Non-Hispanic blacks	11-12	96.1 (79.4-116)	117 (88.0-157)	341 (274-382)	696 (626-842)	1090 (879-1190)	665
Non-Hispanic blacks	13-14	82 (75.2-89.5)	84.6 (65.8-100)	251 (211-289)	584 (521-672)	924 (655-1120)	609
Non-Hispanic blacks	15-16	71.8 (62.3-82.6)	76.5 (59.4-89.4)	287 (226-361)	622 (535-772)	1160 (772-1490)	609
Non-Hispanic whites	11-12	37.8 (33.1-43.2)	33.4 (25.7-47.6)	177 (141-208)	425 (321-556)	719 (544-833)	811
Non-Hispanic whites	13-14	39.9 (34.5-46.2)	31.8 (26.4-38.7)	139 (104-182)	357 (294-404)	560 (444-640)	987
Non-Hispanic whites	15-16	27.5 (23.6-32.0)	23.2 (17.6-31.1)	119 (102-137)	329 (292-416)	556 (434-844)	781
All Hispanics	11-12	56.1 (46.3-68.0)	57.1 (47.2-75.2)	217 (160-332)	577 (456-813)	1090 (662-1490)	571
All Hispanics	13-14	61.4 (49.8-75.7)	60.8 (51.7-74.6)	227 (179-270)	542 (390-637)	774 (570-1070)	690
All Hispanics	15-16	34.9 (29.8-40.9)	34.5 (25.1-47.0)	126 (105-159)	398 (274-470)	577 (474-675)	859
Asians	11-12	48.3 (39.5-59.2)	54.9 (31.6-79.8)	198 (167-238)	473 (344-600)	840 (528-1170)	352
Asians	13-14	56.9 (45.2-71.6)	59.1 (35.7-82.0)	202 (160-275)	469 (365-608)	761 (475-911)	288
Asians	15-16	32.9 (22.6-47.7)	23.3 (15.1-43.2)	135 (85.5-247)	479 (325-725)	826 (548-1040)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary n-Propyl paraben (2011 - 2016)†

CAS Number 94-13-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	5.39 (4.69-6.19)	4.70 (3.80-5.90)	28.5 (24.5-34.1)	126 (94.0-142)	200 (163-278)	2489
Total population	13-14	5.74 (5.06-6.50)	4.80 (3.90-5.70)	33.7 (27.1-41.1)	120 (106-130)	224 (193-284)	2686
Total population	15-16	4.20 (3.43-5.13)	3.20 (2.40-4.50)	22.8 (17.3-29.5)	86.8 (77.5-100)	176 (148-208)	2651
Age 3-5 years	15-16	3.24 (2.28-4.60)	2.20 (1.40-2.60)	7.30 (4.10-23.3)	79.3 (30.6-226)	226 (30.6-458)	141
Age 6-11 years	11-12	2.20 (1.81-2.68)	1.40 (1.20-1.80)	6.40 (4.80-11.8)	28.1 (17.9-53.4)	77.7 (41.3-185)	396
Age 6-11 years	13-14	2.96 (2.20-3.99)	2.40 (1.80-2.80)	7.60 (5.90-15.4)	44.7 (28.5-75.6)	113 (45.3-213)	409
Age 6-11 years	15-16	2.10 (1.62-2.72)	1.50 (1.20-1.80)	4.90 (3.30-7.80)	31.5 (10.1-60.8)	69.7 (43.9-86.8)	415
Age 12-19 years	11-12	3.69 (2.77-4.92)	2.80 (1.80-4.20)	14.7 (9.50-23.4)	81.8 (51.5-151)	208 (122-357)	388
Age 12-19 years	13-14	5.15 (3.89-6.83)	3.10 (2.40-4.90)	24.5 (12.5-54.0)	119 (90.5-147)	217 (139-299)	462
Age 12-19 years	15-16	3.09 (1.99-4.81)	1.90 (1.10-3.90)	15.0 (4.50-30.6)	53.6 (30.6-166)	221 (48.8-424)	405
Age 20+ years	11-12	6.29 (5.45-7.25)	6.20 (4.80-8.50)	35.4 (29.2-43.2)	135 (98.1-151)	213 (163-323)	1705
Age 20+ years	13-14	6.27 (5.51-7.12)	5.70 (4.40-7.20)	39.2 (31.3-43.2)	126 (112-161)	235 (202-304)	1815
Age 20+ years	15-16	4.74 (3.93-5.72)	4.00 (2.90-5.30)	27.1 (18.9-35.8)	99.8 (85.2-111)	182 (157-227)	1690
Males	11-12	2.44 (1.99-2.98)	1.70 (1.40-2.10)	8.90 (6.70-12.0)	46.5 (28.0-80.6)	137 (65.8-258)	1259
Males	13-14	2.61 (2.20-3.09)	1.70 (1.30-2.20)	9.20 (6.20-13.3)	49.8 (37.1-65.8)	128 (94.0-175)	1285
Males	15-16	1.95 (1.66-2.28)	1.30 (1.10-1.60)	5.40 (4.30-8.50)	35.8 (27.7-42.3)	79.2 (55.0-102)	1307
Females	11-12	11.6 (10.0-13.4)	13.8 (12.4-16.3)	54.7 (48.6-67.2)	151 (141-175)	252 (183-323)	1230
Females	13-14	12.2 (10.6-14.1)	13.5 (10.3-18.2)	57.0 (50.1-67.6)	179 (143-203)	329 (230-376)	1401
Females	15-16	8.77 (6.55-11.8)	8.90 (5.60-14.1)	44.6 (34.0-58.3)	128 (107-176)	266 (190-413)	1344
Mexican Americans	11-12	6.15 (3.98-9.52)	6.50 (2.60-11.1)	30.0 (22.7-57.5)	181 (70.4-312)	312 (146-1060)	316
Mexican Americans	13-14	7.76 (5.55-10.8)	6.00 (3.60-14.0)	45.0 (29.7-57.4)	124 (80.7-184)	195 (137-342)	438
Mexican Americans	15-16	4.46 (3.40-5.85)	3.10 (2.30-4.60)	21.2 (13.4-31.8)	87.3 (58.4-158)	200 (126-298)	513
Non-Hispanic blacks	11-12	16.4 (14.1-19.1)	18.0 (13.4-23.1)	61.1 (49.9-82.9)	183 (147-225)	340 (221-477)	665
Non-Hispanic blacks	13-14	15.4 (13.1-18.0)	15.7 (10.8-20.3)	71.8 (58.2-86.4)	249 (187-305)	396 (344-430)	609
Non-Hispanic blacks	15-16	13.3 (10.9-16.3)	14.1 (11.7-17.8)	53.9 (44.6-72.0)	175 (140-213)	265 (203-376)	610
Non-Hispanic whites	11-12	4.14 (3.57-4.79)	3.30 (2.50-4.20)	21.0 (15.3-30.8)	94.6 (70.3-135)	163 (137-202)	813
Non-Hispanic whites	13-14	4.46 (3.78-5.27)	3.40 (2.70-4.20)	23.8 (17.4-32.2)	98.3 (78.6-120)	202 (130-241)	988
Non-Hispanic whites	15-16	3.42 (2.78-4.22)	2.60 (1.90-3.30)	17.8 (9.30-29.0)	70.4 (54.5-100)	132 (105-198)	781
All Hispanics	11-12	6.87 (5.42-8.71)	6.70 (3.80-9.30)	33.6 (26.1-50.4)	181 (95.3-273)	333 (236-556)	571
All Hispanics	13-14	7.73 (6.26-9.56)	6.20 (4.40-10.4)	45.0 (35.7-54.1)	127 (112-157)	207 (165-324)	690
All Hispanics	15-16	4.61 (3.81-5.57)	3.60 (2.70-4.80)	22.3 (16.2-27.1)	86.2 (66.3-120)	190 (125-255)	859
Asians	11-12	5.07 (4.06-6.34)	5.50 (3.40-7.70)	27.0 (22.3-37.2)	95.8 (63.6-143)	169 (123-292)	352
Asians	13-14	4.42 (3.71-5.27)	3.90 (2.20-8.10)	28.8 (19.3-41.1)	77.8 (60.6-120)	158 (95.5-209)	289
Asians	15-16	2.93 (1.66-5.19)	2.00 (1.10-4.80)	15.7 (7.00-37.3)	72.4 (36.7-96.9)	120 (65.0-367)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.100, and 0.100 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary n-Propyl paraben (creatinine corrected) (2011 - 2016)†

CAS Number 94-13-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.16 (5.42-6.99)	5.35 (3.97-7.07)	36.7 (31.1-42.2)	129 (105-162)	215 (183-321)	2487
Total population	13-14	5.74 (5.10-6.46)	4.75 (3.81-5.91)	36.7 (30.3-41.9)	124 (99.0-148)	222 (186-253)	2684
Total population	15-16	4.26 (3.59-5.07)	3.17 (2.32-4.60)	22.9 (19.1-29.0)	83.0 (69.9-96.3)	158 (129-196)	2650
Age 3-5 years	15-16	7.5 (5.48-10.3)	4.06 (3.03-5.91)	16.3 (8.46-43.4)	120 (43.7-592)	724 (43.4-1510)	140
Age 6-11 years	11-12	3.18 (2.62-3.87)	2.09 (1.58-3.16)	9.11 (5.71-12.2)	37.0 (19.8-53.1)	116 (43.6-202)	395
Age 6-11 years	13-14	3.74 (2.84-4.94)	2.73 (1.75-4.00)	10.9 (7.00-18.3)	40.5 (24.4-98.6)	153 (52.1-271)	409
Age 6-11 years	15-16	2.7 (2.19-3.33)	2.08 (1.44-2.60)	6.21 (4.26-9.84)	34.2 (15.1-66.6)	69.5 (45.7-127)	415
Age 12-19 years	11-12	3.6 (2.75-4.70)	2.46 (1.93-3.52)	14.9 (9.36-24.9)	69.8 (32.3-130)	133 (75.6-202)	388
Age 12-19 years	13-14	4.18 (3.24-5.39)	2.82 (2.03-4.46)	20.7 (9.86-39.0)	76.0 (56.4-102)	118 (94.2-197)	462
Age 12-19 years	15-16	2.4 (1.62-3.57)	1.43 (.811-2.96)	10.1 (4.52-16.4)	60.4 (20.1-86.6)	103 (60.4-263)	405
Age 20+ years	11-12	7.17 (6.22-8.27)	7.28 (5.23-9.77)	45.7 (38.1-51.6)	152 (117-183)	258 (190-365)	1704
Age 20+ years	13-14	6.3 (5.61-7.08)	5.71 (4.40-7.22)	41.8 (35.9-47.8)	138 (112-166)	231 (199-259)	1813
Age 20+ years	15-16	4.83 (4.08-5.72)	4.22 (2.82-5.89)	29.0 (22.8-34.3)	91.5 (73.1-113)	184 (135-224)	1690
Males	11-12	2.29 (1.90-2.75)	1.38 (1.21-1.67)	7.39 (6.02-9.39)	46.2 (28.5-72.7)	94.5 (57.3-190)	1258
Males	13-14	2.19 (1.87-2.56)	1.35 (1.17-1.59)	7.42 (5.24-8.93)	42.2 (32.3-52.2)	110 (78.9-141)	1284
Males	15-16	1.7 (1.47-1.96)	1.15 (.966-1.35)	5.36 (3.28-9.13)	30.5 (20.5-41.4)	64.1 (52.7-84.6)	1307
Females	11-12	16 (13.9-18.4)	20.9 (16.7-25.7)	74.7 (62.3-88.7)	185 (164-213)	345 (239-426)	1229
Females	13-14	14.4 (12.1-17.2)	17.5 (13.2-22.3)	65.9 (56.9-82.9)	198 (152-226)	281 (237-338)	1400
Females	15-16	10.3 (7.96-13.4)	11.1 (7.50-17.2)	47.8 (40.1-60.4)	130 (107-160)	235 (196-331)	1343
Mexican Americans	11-12	6.93 (4.57-10.5)	7.19 (3.71-10.9)	40.5 (24.4-75.9)	159 (90.0-236)	315 (159-536)	316
Mexican Americans	13-14	7.9 (5.27-11.9)	6.75 (3.60-16.0)	52.7 (30.9-67.2)	134 (89.0-205)	231 (158-284)	438
Mexican Americans	15-16	4.68 (3.68-5.95)	3.44 (2.25-6.05)	22.1 (13.8-32.8)	97.2 (60.6-132)	196 (130-238)	513
Non-Hispanic blacks	11-12	12.8 (11.3-14.4)	13.9 (11.3-18.0)	54.5 (43.4-65.7)	140 (105-185)	207 (166-333)	665
Non-Hispanic blacks	13-14	11.4 (10.0-12.9)	10.8 (7.87-13.9)	56.0 (44.6-67.6)	137 (108-186)	233 (191-274)	609
Non-Hispanic blacks	15-16	10.3 (8.81-12.0)	9.94 (7.53-13.4)	46.3 (38.8-56.2)	130 (107-157)	229 (157-369)	609
Non-Hispanic whites	11-12	5.06 (4.35-5.88)	3.20 (2.50-5.06)	31.1 (27.3-37.1)	120 (88.2-164)	213 (164-345)	811
Non-Hispanic whites	13-14	4.69 (4.01-5.48)	3.58 (2.66-4.63)	29.2 (22.9-36.2)	112 (81.6-158)	212 (165-259)	987
Non-Hispanic whites	15-16	3.63 (3.02-4.36)	2.38 (1.87-3.61)	22.1 (15.3-28.5)	73.1 (52.1-91.5)	134 (96.7-200)	781
All Hispanics	11-12	7.7 (5.99-9.90)	7.47 (5.00-10.1)	51.5 (35.2-72.9)	162 (119-196)	318 (185-473)	571
All Hispanics	13-14	7.67 (5.91-9.97)	6.40 (4.71-10.3)	46.5 (35.4-61.9)	139 (109-205)	240 (173-285)	690
All Hispanics	15-16	4.7 (3.97-5.56)	3.64 (2.68-5.59)	22.6 (17.6-31.3)	95.1 (63.5-118)	177 (121-233)	859
Asians	11-12	6.8 (5.47-8.45)	6.90 (3.41-13.7)	46.5 (35.6-59.5)	136 (94.4-188)	222 (168-304)	352
Asians	13-14	5.54 (4.23-7.26)	5.22 (2.70-8.39)	43.9 (31.4-57.0)	104 (87.0-137)	153 (113-250)	288
Asians	15-16	3.57 (2.25-5.67)	2.25 (1.27-5.39)	21.2 (8.80-43.4)	102 (52.1-153)	182 (125-276)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Parabens_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Parabens_FactSheet.html

Urinary 2,4-Dichlorophenol (2011 - 2016)†

CAS Number 120-83-2

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.695 (.619-.781)	.600 (.600-.700)	1.30 (1.10-1.60)	3.50 (2.80-4.40)	9.00 (5.60-13.0)	2489
Total population	13-14	.669 (.603-.743)	.600 (.500-.700)	1.30 (1.20-1.40)	3.00 (2.70-3.50)	6.40 (4.80-11.5)	2686
Total population	15-16	.596 (.509-.698)	.500 (.500-.600)	1.30 (1.10-1.70)	3.80 (2.90-4.70)	7.70 (5.20-11.7)	2651
Age 3-5 years	15-16	.493 (.381-.636)	.400 (.300-.500)	.800 (.600-1.30)	2.50 (1.30-7.10)	7.80 (2.50-16.9)	141
Age 6-11 years	11-12	.672 (.558-.810)	.600 (.400-.700)	1.10 (1.00-1.40)	3.60 (1.90-5.50)	11.3 (4.10-23.2)	396
Age 6-11 years	13-14	.773 (.646-.925)	.700 (.600-.900)	1.20 (1.10-1.60)	2.90 (2.10-4.80)	8.90 (3.30-21.8)	409
Age 6-11 years	15-16	.681 (.510-.909)	.600 (.400-.800)	1.30 (1.00-2.00)	4.60 (2.20-7.10)	8.50 (4.80-15.0)	415
Age 12-19 years	11-12	.711 (.591-.857)	.600 (.500-.800)	1.30 (1.00-1.50)	3.30 (2.10-5.80)	9.00 (4.10-13.0)	388
Age 12-19 years	13-14	.668 (.576-.775)	.600 (.500-.700)	1.10 (.900-1.40)	2.40 (1.70-4.40)	7.30 (3.10-13.8)	462
Age 12-19 years	15-16	.819 (.631-1.06)	.700 (.500-1.00)	1.90 (1.50-2.60)	5.80 (4.50-8.40)	10.8 (6.30-22.4)	405
Age 20+ years	11-12	.695 (.613-.789)	.600 (.500-.700)	1.30 (1.10-1.60)	3.50 (2.80-4.60)	9.00 (5.20-13.1)	1705
Age 20+ years	13-14	.659 (.593-.732)	.600 (.500-.700)	1.30 (1.20-1.40)	3.10 (2.70-3.50)	6.20 (4.90-10.8)	1815
Age 20+ years	15-16	.562 (.481-.657)	.500 (.500-.600)	1.30 (1.00-1.60)	3.40 (2.60-4.30)	7.40 (4.50-11.7)	1690
Males	11-12	.717 (.641-.802)	.600 (.600-.700)	1.30 (1.10-1.60)	3.20 (2.20-4.40)	7.10 (4.60-10.6)	1259
Males	13-14	.708 (.637-.786)	.600 (.600-.700)	1.30 (1.10-1.60)	2.90 (2.60-3.30)	6.20 (4.10-11.3)	1285
Males	15-16	.613 (.532-.705)	.500 (.500-.600)	1.30 (1.00-1.70)	3.60 (2.60-4.30)	7.70 (4.40-12.3)	1307
Females	11-12	.675 (.581-.784)	.600 (.500-.700)	1.20 (1.00-1.60)	3.80 (2.80-6.00)	11.1 (4.90-24.3)	1230
Females	13-14	.635 (.553-.729)	.600 (.500-.700)	1.20 (1.10-1.40)	3.10 (2.50-4.10)	7.60 (4.40-12.3)	1401
Females	15-16	.580 (.466-.721)	.500 (.400-.600)	1.40 (1.00-1.80)	4.20 (2.90-5.80)	8.10 (5.70-14.5)	1344
Mexican Americans	11-12	.895 (.720-1.11)	.800 (.600-1.00)	1.80 (1.30-2.60)	6.60 (3.50-10.5)	14.5 (7.40-27.0)	316
Mexican Americans	13-14	.807 (.609-1.07)	.600 (.400-1.00)	1.70 (1.10-2.90)	4.00 (3.00-12.2)	14.6 (3.90-49.9)	438
Mexican Americans	15-16	.970 (.706-1.33)	.800 (.500-1.10)	2.40 (1.40-4.80)	9.20 (6.30-14.5)	17.1 (11.3-23.4)	513
Non-Hispanic blacks	11-12	1.23 (.965-1.57)	.900 (.800-1.20)	2.20 (1.60-3.30)	6.90 (4.20-14.8)	25.0 (8.40-53.6)	665
Non-Hispanic blacks	13-14	1.11 (.791-1.54)	.800 (.700-1.10)	2.00 (1.40-3.30)	8.20 (3.00-28.2)	23.5 (6.50-81.9)	609
Non-Hispanic blacks	15-16	1.42 (.986-2.04)	1.10 (.800-1.50)	3.00 (2.10-5.00)	16.0 (6.10-50.6)	55.5 (20.7-153)	610
Non-Hispanic whites	11-12	.577 (.514-.647)	.500 (.500-.600)	1.00 (.900-1.20)	2.50 (1.70-3.70)	4.90 (3.30-9.40)	813
Non-Hispanic whites	13-14	.588 (.525-.659)	.500 (.500-.600)	1.10 (1.00-1.30)	2.60 (2.30-2.90)	4.60 (3.10-5.50)	988
Non-Hispanic whites	15-16	.458 (.397-.528)	.400 (.400-.500)	1.00 (.800-1.30)	2.40 (1.90-3.10)	4.20 (3.20-5.10)	781
All Hispanics	11-12	.981 (.760-1.27)	.800 (.600-1.00)	2.10 (1.30-3.10)	6.10 (3.90-13.0)	15.9 (7.00-42.0)	571
All Hispanics	13-14	.786 (.641-.965)	.600 (.500-.800)	1.60 (1.20-2.10)	3.50 (3.10-7.80)	12.4 (4.20-26.1)	690
All Hispanics	15-16	.982 (.757-1.27)	.800 (.600-1.10)	2.40 (1.60-3.60)	9.00 (5.40-15.0)	17.7 (10.5-30.1)	859
Asians	11-12	.621 (.478-.807)	.500 (.400-.700)	1.10 (.800-1.60)	3.60 (1.70-7.10)	11.1 (3.50-17.7)	352
Asians	13-14	.567 (.435-.738)	.500 (.300-.700)	1.20 (.800-1.60)	2.70 (1.70-5.80)	7.30 (2.50-58.9)	289
Asians	15-16	.466 (.364-.596)	.400 (.300-.600)	1.00 (.800-1.30)	2.30 (1.80-5.40)	6.50 (2.20-10.8)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.100, and 0.100 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/24D_BiomonitoringSummary.html

Urinary 2,4-Dichlorophenol (creatinine corrected) (2011 - 2016)†

CAS Number 120-83-2

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	0.791 (.706-.886)	.614 (.560-.690)	1.29 (1.08-1.48)	3.33 (2.67-4.57)	8.10 (5.65-11.2)	2487
Total population	13-14	0.668 (.611-.730)	.556 (.510-.595)	1.13 (1.03-1.29)	2.73 (2.26-3.33)	5.96 (4.41-8.38)	2684
Total population	15-16	0.605 (.524-.699)	.467 (.421-.537)	1.14 (.900-1.48)	3.02 (2.22-3.99)	6.08 (4.18-9.53)	2650
Age 3-5 years	15-16	1.16 (.921-1.46)	.833 (.682-1.21)	1.92 (1.36-2.55)	4.44 (2.81-14.9)	17.2 (4.28-50.0)	140
Age 6-11 years	11-12	0.964 (.807-1.15)	.741 (.620-.851)	1.38 (1.07-1.61)	3.51 (2.22-7.36)	12.4 (5.13-34.9)	395
Age 6-11 years	13-14	0.977 (.833-1.14)	.800 (.698-.909)	1.52 (1.20-1.94)	3.41 (2.22-6.60)	9.68 (4.48-23.7)	409
Age 6-11 years	15-16	0.877 (.683-1.13)	.727 (.541-.851)	1.60 (1.05-2.31)	4.25 (2.40-9.84)	10.0 (4.14-17.4)	415
Age 12-19 years	11-12	0.693 (.582-.825)	.545 (.465-.678)	1.15 (.875-1.50)	2.73 (1.96-4.00)	4.82 (3.06-9.75)	388
Age 12-19 years	13-14	0.542 (.472-.623)	.439 (.385-.519)	.833 (.678-1.13)	1.72 (1.31-3.08)	4.10 (2.45-5.27)	462
Age 12-19 years	15-16	0.636 (.523-.774)	.457 (.382-.550)	1.29 (.875-1.75)	3.66 (2.86-5.43)	7.03 (4.00-21.3)	405
Age 20+ years	11-12	0.79 (.694-.898)	.610 (.556-.675)	1.30 (1.07-1.54)	3.33 (2.55-4.77)	8.33 (5.75-11.3)	1704
Age 20+ years	13-14	0.661 (.600-.728)	.538 (.495-.588)	1.14 (.991-1.31)	2.77 (2.22-3.47)	5.96 (4.39-8.53)	1813
Age 20+ years	15-16	0.573 (.498-.659)	.446 (.404-.513)	1.08 (.854-1.42)	2.71 (2.03-3.88)	5.80 (3.85-8.51)	1690
Males	11-12	0.67 (.594-.756)	.538 (.462-.609)	1.08 (.903-1.27)	2.89 (2.10-3.46)	5.65 (4.26-7.63)	1258
Males	13-14	0.595 (.550-.642)	.496 (.455-.538)	1.03 (.906-1.12)	2.41 (2.11-2.77)	4.39 (3.06-7.65)	1284
Males	15-16	0.534 (.471-.607)	.424 (.380-.476)	.957 (.811-1.18)	2.67 (1.75-3.53)	4.95 (3.60-8.44)	1307
Females	11-12	0.928 (.816-1.06)	.714 (.634-.833)	1.45 (1.27-1.76)	4.02 (3.06-6.37)	11.2 (6.37-18.1)	1229
Females	13-14	0.747 (.667-.836)	.616 (.560-.676)	1.29 (1.11-1.43)	3.29 (2.37-4.15)	7.69 (4.69-12.6)	1400
Females	15-16	0.682 (.568-.820)	.526 (.450-.625)	1.32 (.915-1.82)	3.66 (2.40-5.65)	6.48 (4.55-13.0)	1343
Mexican Americans	11-12	1.01 (.856-1.19)	.788 (.620-1.04)	1.67 (1.50-2.14)	5.94 (3.50-9.36)	14.7 (6.16-33.3)	316
Mexican Americans	13-14	0.823 (.614-1.10)	.632 (.452-.864)	1.43 (.938-2.29)	6.25 (2.45-12.0)	13.5 (6.32-37.3)	438
Mexican Americans	15-16	1.02 (.740-1.40)	.727 (.500-1.13)	2.31 (1.50-3.93)	7.73 (5.65-12.5)	19.7 (10.0-35.1)	513
Non-Hispanic blacks	11-12	0.959 (.766-1.20)	.737 (.588-.851)	1.56 (1.18-2.34)	5.26 (3.00-15.0)	19.9 (6.61-40.7)	665
Non-Hispanic blacks	13-14	0.815 (.617-1.08)	.576 (.500-.704)	1.40 (.952-2.30)	5.32 (2.37-14.7)	15.4 (4.69-51.3)	609
Non-Hispanic blacks	15-16	1.1 (.798-1.51)	.760 (.538-1.15)	2.17 (1.59-2.99)	11.2 (4.00-38.0)	59.8 (11.8-133)	609
Non-Hispanic whites	11-12	0.7 (.609-.805)	.563 (.519-.619)	1.08 (.885-1.33)	2.89 (1.79-3.78)	5.75 (3.27-9.67)	811
Non-Hispanic whites	13-14	0.615 (.557-.679)	.521 (.476-.570)	1.05 (.906-1.24)	2.22 (1.88-2.78)	3.64 (3.01-5.71)	987
Non-Hispanic whites	15-16	0.485 (.435-.541)	.408 (.380-.444)	.870 (.758-1.00)	1.82 (1.49-2.63)	3.60 (2.61-4.72)	781
All Hispanics	11-12	1.1 (.919-1.31)	.870 (.700-1.12)	2.00 (1.54-2.72)	5.70 (3.96-9.26)	14.7 (6.37-43.5)	571
All Hispanics	13-14	0.78 (.628-.970)	.629 (.508-.774)	1.30 (.980-1.98)	4.48 (3.03-6.81)	11.1 (6.16-23.8)	690
All Hispanics	15-16	1 (.755-1.33)	.772 (.543-1.08)	2.14 (1.58-3.44)	7.20 (5.30-12.5)	17.4 (9.16-37.2)	859
Asians	11-12	0.832 (.629-1.10)	.667 (.513-.952)	1.42 (1.01-2.12)	3.50 (2.31-7.82)	8.00 (3.50-17.0)	352
Asians	13-14	0.72 (.540-.961)	.588 (.469-.813)	1.38 (1.06-1.71)	3.51 (1.95-6.78)	7.65 (2.54-54.1)	288
Asians	15-16	0.567 (.473-.680)	.455 (.385-.533)	1.05 (.845-1.67)	3.43 (2.19-4.66)	5.44 (4.17-7.65)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/24D_BiomonitoringSummary.html

Urinary 2,5-Dichlorophenol (2011 - 2016)†

CAS Number 583-78-8

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.21 (3.15-5.62)	3.10 (2.30-3.90)	13.4 (9.40-18.9)	69.9 (40.9-117)	213 (121-404)	2489
Total population	13-14	2.78 (2.15-3.59)	1.80 (1.40-2.50)	7.50 (5.30-11.4)	37.7 (23.8-58.0)	148 (78.4-266)	2686
Total population	15-16	2.97 (2.19-4.02)	2.10 (1.60-2.80)	9.30 (5.70-16.3)	51.0 (29.3-103)	175 (95.9-358)	2651
Age 3-5 years	15-16	2.53 (1.45-4.43)	1.60 (.800-3.10)	8.00 (2.80-18.2)	35.6 (15.0-76.8)	262 (35.6-573)	141
Age 6-11 years	11-12	3.45 (2.11-5.64)	2.30 (1.60-3.30)	9.20 (4.40-21.2)	69.1 (27.8-168)	369 (99.9-986)	396
Age 6-11 years	13-14	2.90 (1.98-4.24)	2.00 (1.30-3.00)	8.20 (4.30-14.9)	29.6 (19.7-73.8)	123 (38.0-438)	409
Age 6-11 years	15-16	3.82 (2.21-6.58)	2.70 (1.40-5.30)	14.4 (5.60-36.5)	73.4 (35.8-189)	196 (83.4-343)	415
Age 12-19 years	11-12	4.15 (2.43-7.10)	3.20 (1.60-8.00)	14.0 (7.30-28.8)	55.7 (28.6-209)	236 (71.2-468)	388
Age 12-19 years	13-14	2.72 (1.75-4.24)	2.10 (1.30-3.30)	6.00 (3.80-14.0)	21.7 (10.6-77.7)	77.7 (21.7-315)	462
Age 12-19 years	15-16	5.12 (3.40-7.71)	3.30 (2.30-6.80)	17.6 (10.3-36.1)	125 (66.7-210)	373 (207-711)	405
Age 20+ years	11-12	4.31 (3.21-5.78)	3.20 (2.30-4.10)	14.2 (9.40-19.2)	71.4 (39.5-118)	198 (118-408)	1705
Age 20+ years	13-14	2.78 (2.20-3.51)	1.80 (1.40-2.40)	7.80 (5.50-11.5)	42.7 (25.2-61.2)	169 (87.2-308)	1815
Age 20+ years	15-16	2.68 (1.97-3.64)	1.90 (1.50-2.50)	7.90 (5.00-13.4)	40.9 (21.7-99.0)	164 (73.5-352)	1690
Males	11-12	4.42 (3.38-5.78)	3.30 (2.40-4.50)	13.2 (9.40-20.8)	55.5 (37.1-106)	194 (99.8-341)	1259
Males	13-14	2.96 (2.31-3.80)	2.00 (1.50-2.60)	7.20 (5.20-11.5)	36.1 (23.1-52.6)	175 (77.6-250)	1285
Males	15-16	3.25 (2.41-4.38)	2.40 (1.70-3.10)	9.90 (6.30-16.6)	44.9 (24.0-99.0)	159 (80.8-358)	1307
Females	11-12	4.01 (2.86-5.61)	2.80 (2.00-3.70)	13.9 (9.20-17.7)	83.3 (42.4-124)	352 (117-614)	1230
Females	13-14	2.61 (1.96-3.48)	1.70 (1.30-2.50)	7.80 (5.20-11.9)	38.3 (21.6-63.8)	136 (63.2-376)	1401
Females	15-16	2.72 (1.90-3.90)	1.80 (1.40-2.50)	8.40 (4.80-17.6)	51.9 (31.6-140)	199 (89.4-373)	1344
Mexican Americans	11-12	5.92 (3.36-10.4)	4.00 (2.20-8.40)	21.2 (14.2-42.7)	178 (58.4-341)	362 (119-1130)	316
Mexican Americans	13-14	4.60 (2.78-7.61)	2.70 (1.40-6.30)	14.5 (6.70-29.2)	90.5 (32.9-486)	584 (85.3-1840)	438
Mexican Americans	15-16	9.27 (4.65-18.5)	7.20 (3.00-18.6)	33.6 (13.8-124)	310 (118-462)	633 (428-930)	513
Non-Hispanic blacks	11-12	16.6 (10.4-26.2)	13.4 (8.80-19.4)	47.9 (24.9-100)	227 (108-569)	759 (341-2480)	665
Non-Hispanic blacks	13-14	9.58 (5.03-18.2)	7.20 (3.90-14.2)	27.6 (15.6-70.7)	175 (51.4-874)	843 (150-3710)	609
Non-Hispanic blacks	15-16	18.1 (10.4-31.4)	12.7 (7.20-25.9)	69.9 (38.4-150)	503 (175-1940)	2210 (768-6510)	610
Non-Hispanic whites	11-12	2.78 (2.13-3.63)	2.00 (1.60-2.50)	7.40 (5.40-9.70)	34.4 (18.1-67.6)	112 (52.1-178)	813
Non-Hispanic whites	13-14	1.95 (1.54-2.46)	1.40 (1.10-1.90)	4.70 (3.30-6.50)	19.0 (12.8-25.9)	53.7 (25.2-131)	988
Non-Hispanic whites	15-16	1.60 (1.33-1.93)	1.30 (1.10-1.60)	4.00 (2.90-5.00)	18.7 (10.4-24.3)	38.0 (28.7-51.9)	781
All Hispanics	11-12	7.96 (4.50-14.1)	6.30 (3.20-14.9)	29.1 (16.0-66.7)	196 (84.1-399)	536 (194-1630)	571
All Hispanics	13-14	4.26 (2.84-6.40)	2.80 (1.50-5.00)	11.8 (7.20-22.4)	77.7 (42.7-236)	420 (112-807)	690
All Hispanics	15-16	8.79 (4.94-15.6)	6.40 (3.30-14.8)	35.3 (18.7-80.8)	284 (116-503)	633 (415-930)	859
Asians	11-12	3.77 (2.17-6.53)	2.40 (1.40-5.40)	13.0 (5.40-43.4)	86.8 (38.6-160)	378 (86.8-810)	352
Asians	13-14	2.66 (1.64-4.32)	1.70 (1.20-2.90)	6.20 (3.30-18.5)	50.3 (13.0-154)	154 (38.7-2450)	289
Asians	15-16	2.54 (1.79-3.61)	2.00 (1.40-3.20)	7.60 (4.80-12.5)	30.1 (15.6-55.8)	158 (31.2-318)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.100, and 0.100 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/25D_BiomonitoringSummary.html

Urinary 2,5-Dichlorophenol (creatinine corrected) (2011 - 2016)†

CAS Number 583-78-8

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.8 (3.65-6.32)	3.19 (2.38-4.43)	11.4 (7.97-17.9)	66.4 (39.9-125)	215 (145-342)	2487
Total population	13-14	2.77 (2.12-3.62)	1.82 (1.43-2.40)	6.80 (4.62-9.72)	32.2 (21.9-45.5)	108 (58.4-270)	2684
Total population	15-16	3.02 (2.25-4.04)	2.03 (1.54-2.74)	8.45 (4.88-14.1)	44.0 (26.2-80.1)	133 (66.8-249)	2650
Age 3-5 years	15-16	5.95 (3.51-10.1)	3.51 (1.95-6.90)	17.7 (5.17-45.4)	59.4 (36.4-213)	440 (59.4-1610)	140
Age 6-11 years	11-12	5.01 (3.10-8.09)	3.02 (2.00-5.00)	10.6 (5.53-21.7)	98.1 (32.9-166)	377 (125-1180)	395
Age 6-11 years	13-14	3.66 (2.50-5.36)	2.41 (1.62-3.54)	9.73 (5.25-15.6)	37.6 (16.9-110)	172 (70.4-615)	409
Age 6-11 years	15-16	4.92 (2.92-8.27)	3.07 (1.95-6.19)	15.6 (6.95-38.4)	83.5 (41.2-160)	224 (109-460)	415
Age 12-19 years	11-12	4.04 (2.51-6.52)	2.41 (1.54-5.34)	12.1 (5.67-27.6)	47.9 (26.3-99.5)	157 (55.1-324)	388
Age 12-19 years	13-14	2.21 (1.44-3.40)	1.53 (.915-2.52)	5.16 (2.63-12.0)	22.7 (12.2-38.9)	54.2 (21.7-236)	462
Age 12-19 years	15-16	3.98 (2.62-6.03)	2.61 (1.30-5.15)	13.8 (6.35-26.5)	92.2 (42.0-131)	235 (113-781)	405
Age 20+ years	11-12	4.9 (3.67-6.56)	3.33 (2.50-4.51)	11.5 (8.04-18.0)	70.3 (38.8-136)	226 (145-342)	1704
Age 20+ years	13-14	2.78 (2.15-3.59)	1.81 (1.44-2.29)	6.67 (4.62-9.47)	32.6 (21.1-51.0)	126 (58.4-325)	1813
Age 20+ years	15-16	2.73 (2.04-3.64)	1.89 (1.43-2.55)	6.97 (4.38-11.7)	35.7 (19.3-69.1)	89.9 (50.8-270)	1690
Males	11-12	4.15 (3.14-5.49)	2.87 (2.14-4.13)	9.73 (6.88-16.1)	52.8 (31.4-106)	157 (125-233)	1258
Males	13-14	2.49 (1.93-3.22)	1.69 (1.23-2.22)	5.49 (4.18-8.11)	27.4 (19.6-45.8)	88.7 (58.4-160)	1284
Males	15-16	2.83 (2.12-3.79)	2.01 (1.44-2.73)	7.01 (4.81-13.2)	37.0 (22.0-57.8)	121 (55.3-223)	1307
Females	11-12	5.53 (4.14-7.37)	3.39 (2.57-5.00)	13.1 (8.84-19.5)	90.1 (45.2-147)	331 (145-557)	1229
Females	13-14	3.07 (2.30-4.09)	1.96 (1.52-2.54)	8.22 (5.07-11.9)	33.8 (21.7-56.2)	140 (50.4-374)	1400
Females	15-16	3.2 (2.31-4.44)	2.04 (1.59-2.99)	9.57 (4.74-17.1)	52.8 (27.3-90.7)	149 (71.7-334)	1343
Mexican Americans	11-12	6.67 (4.04-11.0)	4.85 (2.25-8.69)	22.4 (12.6-37.6)	189 (49.2-249)	383 (213-981)	316
Mexican Americans	13-14	4.68 (2.72-8.06)	2.47 (1.36-5.71)	14.5 (7.24-25.0)	91.8 (26.9-559)	559 (89.0-1330)	438
Mexican Americans	15-16	9.72 (4.86-19.5)	6.71 (3.08-19.3)	33.1 (13.7-131)	204 (93.1-466)	689 (289-1240)	513
Non-Hispanic blacks	11-12	12.9 (8.32-19.9)	9.41 (6.35-15.1)	34.5 (18.1-75.0)	174 (83.7-567)	744 (236-1790)	665
Non-Hispanic blacks	13-14	7.07 (3.87-12.9)	5.62 (2.55-10.4)	21.2 (10.0-54.1)	128 (32.7-527)	415 (103-2580)	609
Non-Hispanic blacks	15-16	14 (8.41-23.3)	9.92 (5.05-18.5)	52.8 (31.5-76.2)	369 (121-1430)	2020 (544-4830)	609
Non-Hispanic whites	11-12	3.4 (2.57-4.49)	2.36 (1.76-3.19)	6.96 (4.70-9.67)	34.5 (16.4-80.1)	126 (55.3-232)	811
Non-Hispanic whites	13-14	2.03 (1.53-2.69)	1.48 (1.13-1.91)	4.15 (2.96-6.34)	18.2 (10.6-32.5)	45.8 (26.0-86.3)	987
Non-Hispanic whites	15-16	1.7 (1.45-1.99)	1.33 (1.19-1.60)	3.78 (2.91-4.81)	13.5 (8.89-23.8)	34.4 (23.4-46.3)	781
All Hispanics	11-12	8.92 (5.45-14.6)	6.55 (3.50-13.8)	28.8 (16.6-53.6)	184 (97.2-266)	383 (213-1240)	571
All Hispanics	13-14	4.23 (2.77-6.47)	2.50 (1.41-5.07)	11.5 (6.84-18.7)	84.6 (32.2-226)	401 (135-993)	690
All Hispanics	15-16	8.96 (4.93-16.3)	6.09 (2.96-16.3)	36.4 (18.9-71.7)	213 (131-354)	597 (271-1670)	859
Asians	11-12	5.05 (2.93-8.69)	2.99 (1.74-7.04)	15.3 (6.51-45.6)	106 (58.7-177)	236 (97.5-632)	352
Asians	13-14	3.4 (2.10-5.52)	2.06 (1.33-3.26)	8.99 (3.21-20.8)	45.2 (17.3-158)	207 (32.6-3020)	288
Asians	15-16	3.1 (2.24-4.29)	2.43 (1.56-3.87)	8.75 (5.59-13.7)	31.2 (16.7-111)	127 (39.9-211)	275

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/25D_BiomonitoringSummary.html

Flame Retardant Metabolites

Urinary Bis(1-chloro-2-propyl) phosphate (BCPP) (2011 - 2014)

CAS Number 789440-10-4

Metabolite of Tris(1-chloro-2-propyl) phosphate (TCPP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.118 (<LOD-.149)	.266 (.227-.297)	.523 (.443-.658)	.960 (.753-1.13)	2410
Total population	13-14	.188 (.174-.202)	.160 (.140-.180)	.380 (.330-.410)	.790 (.690-.880)	1.25 (1.07-1.48)	2665
Age 6-11 years	11-12	.179 (.154-.209)	.154 (.115-.192)	.303 (.265-.442)	.706 (.544-.838)	.999 (.772-1.26)	394
Age 6-11 years	13-14	.267 (.227-.314)	.250 (.200-.300)	.490 (.400-.590)	1.08 (.630-1.98)	2.12 (1.28-4.21)	421
Age 12-19 years	11-12	.162 (.141-.186)	.147 (.101-.194)	.263 (.218-.366)	.523 (.424-.636)	.754 (.572-1.46)	385
Age 12-19 years	13-14	.190 (.164-.220)	.160 (.130-.220)	.410 (.290-.520)	.670 (.600-.790)	1.04 (.700-1.31)	427
Age 20+ years	11-12	*	.113 (<LOD-.141)	.258 (.219-.296)	.520 (.395-.745)	.960 (.658-1.26)	1631
Age 20+ years	13-14	*	.150 (.130-.170)	.350 (.310-.390)	.760 (.690-.860)	1.25 (1.05-1.55)	1817
Males	11-12	*	.123 (<LOD-.154)	.269 (.219-.301)	.494 (.416-.628)	.958 (.576-1.40)	1220
Males	13-14	.199 (.183-.217)	.170 (.140-.200)	.420 (.360-.480)	.880 (.760-.980)	1.34 (1.17-1.67)	1344
Females	11-12	*	.115 (<LOD-.152)	.260 (.226-.312)	.572 (.482-.735)	.998 (.753-1.15)	1190
Females	13-14	*	.150 (.130-.180)	.340 (.280-.390)	.700 (.560-.830)	1.11 (.870-1.52)	1321
Mexican Americans	11-12	.159 (.134-.189)	.133 (<LOD-.171)	.238 (.185-.373)	.539 (.419-.756)	.898 (.726-1.70)	288
Mexican Americans	13-14	*	.130 (<LOD-.160)	.320 (.290-.380)	.660 (.510-.910)	1.11 (.780-1.50)	428
Non-Hispanic blacks	11-12	.177 (.160-.195)	.153 (.125-.174)	.296 (.264-.329)	.636 (.520-.851)	1.10 (.864-1.43)	667
Non-Hispanic blacks	13-14	.190 (.171-.212)	.170 (.150-.200)	.340 (.310-.390)	.690 (.580-.820)	1.01 (.820-1.23)	587
Non-Hispanic whites	11-12	*	.111 (<LOD-.154)	.266 (.218-.306)	.503 (.371-.777)	.960 (.652-1.38)	777
Non-Hispanic whites	13-14	.189 (.172-.208)	.150 (.130-.180)	.380 (.330-.450)	.820 (.700-.990)	1.31 (1.07-1.73)	1014
All Hispanics	11-12	.161 (.144-.179)	.137 (.109-.176)	.261 (.220-.310)	.518 (.431-.664)	.896 (.664-1.25)	552
All Hispanics	13-14	*	.150 (.110-.180)	.320 (.310-.360)	.660 (.550-.780)	1.11 (.860-1.50)	671
Asians	11-12	*	.113 (<LOD-.157)	.294 (.232-.390)	.635 (.469-.797)	1.03 (.652-1.98)	327
Asians	13-14	*	.170 (.120-.210)	.400 (.310-.540)	.770 (.660-1.08)	1.30 (.850-2.26)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Bis(1-chloro-2-propyl) phosphate (BCPP) (creatinine corrected) (2011 - 2014)

CAS Number 789440-10-4

Metabolite of Tris(1-chloro-2-propyl) phosphate (TCPP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.148 (<LOD-.169)	.284 (.248-.320)	.553 (.459-.673)	.888 (.776-1.12)	2410
Total population	13-14	0.2 (.184-.218)	.187 (.173-.201)	.347 (.313-.375)	.701 (.619-.787)	1.21 (1.03-1.49)	2663
Age 6-11 years	11-12	0.25 (.216-.289)	.237 (.203-.273)	.444 (.362-.628)	.837 (.755-1.20)	1.47 (.917-3.26)	394
Age 6-11 years	13-14	0.344 (.296-.399)	.349 (.292-.381)	.568 (.500-.701)	1.37 (.953-2.13)	2.41 (1.26-3.30)	421
Age 12-19 years	11-12	0.146 (.127-.168)	.141 (.118-.173)	.263 (.214-.307)	.483 (.334-.689)	.709 (.483-.872)	385
Age 12-19 years	13-14	0.162 (.135-.194)	.159 (.130-.191)	.314 (.226-.384)	.500 (.416-.667)	.753 (.500-1.26)	427
Age 20+ years	11-12	*	.143 (<LOD-.163)	.262 (.230-.317)	.507 (.418-.674)	.873 (.699-1.14)	1631
Age 20+ years	13-14	*	.184 (.168-.196)	.320 (.284-.365)	.665 (.571-.769)	1.17 (.936-1.50)	1815
Males	11-12	*	.134 (<LOD-.149)	.233 (.205-.261)	.473 (.374-.614)	.855 (.553-1.21)	1220
Males	13-14	0.182 (.165-.201)	.167 (.152-.179)	.333 (.284-.382)	.722 (.610-.842)	1.21 (1.00-1.56)	1343
Females	11-12	*	.173 (<LOD-.200)	.323 (.291-.362)	.620 (.495-.752)	1.02 (.776-1.53)	1190
Females	13-14	*	.210 (.187-.233)	.352 (.316-.390)	.688 (.560-.847)	1.26 (.921-1.53)	1320
Mexican Americans	11-12	0.159 (.133-.189)	.139 (<LOD-.175)	.263 (.222-.303)	.556 (.369-.674)	.968 (.556-1.61)	288
Mexican Americans	13-14	*	.153 (<LOD-.189)	.318 (.259-.350)	.517 (.412-.739)	.918 (.556-1.27)	426
Non-Hispanic blacks	11-12	0.13 (.118-.144)	.111 (.102-.126)	.229 (.199-.271)	.499 (.381-.673)	.853 (.614-1.13)	667
Non-Hispanic blacks	13-14	0.146 (.124-.172)	.144 (.116-.163)	.250 (.229-.292)	.459 (.391-.550)	.727 (.574-.890)	587
Non-Hispanic whites	11-12	*	.158 (<LOD-.181)	.296 (.248-.332)	.553 (.427-.750)	.873 (.714-1.31)	777
Non-Hispanic whites	13-14	0.214 (.195-.235)	.198 (.179-.219)	.358 (.318-.389)	.777 (.644-.965)	1.49 (1.04-1.80)	1014
All Hispanics	11-12	0.162 (.143-.183)	.148 (.128-.165)	.263 (.235-.306)	.543 (.472-.651)	.831 (.645-1.47)	552
All Hispanics	13-14	*	.171 (.153-.189)	.333 (.305-.350)	.556 (.470-.735)	.977 (.638-1.23)	669
Asians	11-12	*	.196 (<LOD-.232)	.379 (.323-.444)	.688 (.559-.996)	1.20 (.676-3.05)	327
Asians	13-14	*	.241 (.212-.266)	.447 (.359-.547)	.750 (.621-.944)	1.26 (.820-1.66)	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Bis(2-chloroethyl) phosphate (BCEtP) (2011 - 2014)

CAS Number 3040-56-0

Metabolite of Tris(2-chloroethyl) phosphate (TCEtP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.467 (.411-.531)	.456 (.387-.539)	1.04 (.904-1.22)	2.36 (2.04-2.77)	4.01 (3.34-4.75)	2409
Total population	13-14	.419 (.376-.466)	.390 (.350-.420)	.950 (.840-1.12)	2.31 (1.90-2.82)	3.94 (3.08-5.17)	2651
Age 6-11 years	11-12	.690 (.597-.798)	.630 (.555-.750)	1.53 (1.16-1.86)	2.97 (2.43-3.97)	5.32 (3.34-13.4)	394
Age 6-11 years	13-14	.662 (.545-.804)	.660 (.500-.850)	1.50 (1.05-1.77)	2.91 (1.77-5.63)	5.63 (2.99-7.34)	418
Age 12-19 years	11-12	.635 (.490-.823)	.619 (.487-.807)	1.32 (1.07-1.93)	3.10 (2.38-4.13)	6.61 (3.25-11.4)	386
Age 12-19 years	13-14	.602 (.508-.713)	.570 (.450-.730)	1.47 (.950-2.21)	3.18 (2.57-3.80)	4.24 (3.76-6.40)	423
Age 20+ years	11-12	.427 (.364-.501)	.404 (.327-.522)	.964 (.818-1.14)	2.18 (1.77-2.70)	3.81 (2.94-4.52)	1629
Age 20+ years	13-14	.378 (.339-.421)	.350 (.310-.390)	.850 (.740-.960)	2.06 (1.69-2.64)	3.55 (2.76-5.17)	1810
Males	11-12	.490 (.439-.547)	.504 (.415-.547)	1.09 (.911-1.35)	2.43 (2.13-3.10)	4.47 (3.81-5.27)	1217
Males	13-14	.458 (.401-.523)	.420 (.390-.470)	1.03 (.890-1.28)	2.46 (1.85-3.07)	4.00 (3.00-6.92)	1337
Females	11-12	.446 (.368-.541)	.423 (.329-.560)	.997 (.855-1.22)	2.24 (1.95-2.70)	3.57 (2.92-4.75)	1192
Females	13-14	.384 (.335-.439)	.350 (.310-.390)	.850 (.740-1.03)	2.28 (1.90-2.75)	3.90 (2.98-4.64)	1314
Mexican Americans	11-12	.483 (.361-.648)	.438 (.330-.596)	1.06 (.709-1.70)	3.16 (1.52-6.17)	5.50 (2.38-6.77)	286
Mexican Americans	13-14	.502 (.397-.636)	.500 (.370-.660)	1.14 (.710-1.88)	2.70 (1.69-4.00)	4.47 (3.30-7.73)	428
Non-Hispanic blacks	11-12	.727 (.663-.796)	.764 (.668-.857)	1.50 (1.34-1.82)	2.98 (2.53-3.45)	5.78 (3.86-7.82)	666
Non-Hispanic blacks	13-14	.483 (.431-.541)	.400 (.380-.480)	1.03 (.820-1.26)	2.41 (1.95-2.88)	4.26 (2.84-5.60)	578
Non-Hispanic whites	11-12	.416 (.358-.484)	.393 (.310-.509)	.939 (.812-1.11)	2.10 (1.77-2.44)	3.53 (2.66-4.46)	776
Non-Hispanic whites	13-14	.394 (.352-.441)	.360 (.310-.400)	.910 (.820-1.09)	2.28 (1.85-2.75)	3.73 (2.82-5.41)	1012
All Hispanics	11-12	.523 (.434-.631)	.503 (.399-.600)	1.16 (.917-1.57)	2.95 (1.99-4.36)	5.14 (3.28-6.47)	552
All Hispanics	13-14	.478 (.398-.575)	.470 (.390-.570)	1.06 (.770-1.52)	2.38 (1.71-3.50)	4.00 (3.01-5.35)	668
Asians	11-12	.451 (.370-.549)	.457 (.327-.510)	.972 (.738-1.34)	2.62 (1.47-4.24)	4.77 (2.76-8.07)	327
Asians	13-14	.375 (.316-.445)	.340 (.270-.400)	.770 (.620-1.14)	2.26 (1.32-3.55)	4.68 (2.79-6.93)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.080 respectively.

Urinary Bis(2-chloroethyl) phosphate (BCEtP) (creatinine corrected) (2011 - 2014)

CAS Number 3040-56-0

Metabolite of Tris(2-chloroethyl) phosphate (TCEtP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	0.491 (.443-.545)	.498 (.441-.558)	.969 (.811-1.11)	2.11 (1.92-2.35)	3.39 (2.96-3.79)	2409
Total population	13-14	0.447 (.396-.505)	.388 (.337-.444)	.856 (.743-.981)	2.03 (1.72-2.38)	3.94 (2.74-5.13)	2649
Age 6-11 years	11-12	0.968 (.806-1.16)	.865 (.724-1.13)	1.88 (1.51-2.14)	4.22 (2.93-5.44)	6.77 (4.22-15.6)	394
Age 6-11 years	13-14	0.855 (.720-1.02)	.833 (.676-.981)	1.60 (1.18-2.12)	4.25 (3.39-5.43)	6.83 (4.97-8.99)	418
Age 12-19 years	11-12	0.574 (.433-.760)	.537 (.404-.690)	1.23 (.788-1.90)	3.11 (1.90-5.15)	5.15 (2.74-9.05)	386
Age 12-19 years	13-14	0.516 (.429-.620)	.442 (.350-.568)	1.06 (.768-1.38)	2.33 (1.70-3.03)	4.48 (2.42-6.77)	423
Age 20+ years	11-12	0.445 (.396-.501)	.457 (.398-.524)	.855 (.748-1.01)	1.87 (1.60-2.09)	2.89 (2.29-3.49)	1629
Age 20+ years	13-14	0.408 (.362-.460)	.349 (.313-.393)	.742 (.632-.875)	1.87 (1.42-2.31)	3.12 (2.38-4.69)	1808
Males	11-12	0.449 (.413-.489)	.449 (.400-.506)	.865 (.779-1.02)	2.07 (1.77-2.43)	3.28 (2.89-4.15)	1217
Males	13-14	0.42 (.370-.476)	.373 (.322-.406)	.826 (.725-.954)	2.01 (1.50-2.43)	3.70 (2.44-5.50)	1336
Females	11-12	0.534 (.466-.612)	.534 (.464-.621)	1.04 (.879-1.22)	2.14 (1.92-2.46)	3.41 (2.76-4.48)	1192
Females	13-14	0.476 (.417-.543)	.407 (.350-.467)	.909 (.742-1.04)	2.06 (1.75-2.41)	3.99 (2.61-5.26)	1313
Mexican Americans	11-12	0.482 (.347-.669)	.509 (.381-.666)	1.05 (.673-1.61)	2.18 (1.46-3.12)	3.12 (1.97-6.71)	286
Mexican Americans	13-14	0.515 (.394-.672)	.477 (.343-.637)	1.01 (.665-1.47)	2.35 (1.57-3.03)	3.19 (2.43-6.34)	426
Non-Hispanic blacks	11-12	0.537 (.480-.599)	.517 (.469-.595)	1.10 (.927-1.29)	2.43 (1.97-2.98)	3.79 (3.08-6.23)	666
Non-Hispanic blacks	13-14	0.374 (.321-.435)	.328 (.267-.450)	.732 (.630-.867)	1.56 (1.18-1.80)	2.41 (1.86-3.17)	578
Non-Hispanic whites	11-12	0.466 (.407-.535)	.481 (.399-.563)	.900 (.767-1.09)	1.92 (1.61-2.34)	2.99 (2.41-3.72)	776
Non-Hispanic whites	13-14	0.446 (.393-.506)	.379 (.333-.437)	.857 (.731-1.00)	2.03 (1.64-2.44)	4.68 (2.51-5.58)	1012
All Hispanics	11-12	0.529 (.446-.626)	.523 (.450-.613)	1.09 (.819-1.41)	2.45 (1.97-2.94)	3.43 (2.52-5.21)	552
All Hispanics	13-14	0.495 (.406-.604)	.472 (.371-.585)	.980 (.736-1.36)	2.27 (1.69-2.75)	3.14 (2.53-3.94)	666
Asians	11-12	0.606 (.512-.716)	.587 (.473-.732)	1.29 (1.07-1.58)	2.77 (2.11-3.62)	4.78 (2.77-7.50)	327
Asians	13-14	0.477 (.412-.553)	.442 (.371-.500)	.792 (.606-1.28)	2.33 (1.51-3.46)	4.18 (2.76-9.34)	291

Urinary Bis(1,3-dichloro-2-propyl) phosphate (BDCPP) (2011 - 2014)

CAS Number 72236-72-7

Metabolite of Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.872 (.718-1.04)	2.16 (1.76-2.49)	4.38 (3.61-5.22)	7.08 (5.86-9.25)	2416
Total population	13-14	.856 (.750-.976)	.880 (.790-.970)	2.21 (1.90-2.57)	4.77 (3.88-5.77)	7.23 (6.07-8.60)	2646
Age 6-11 years	11-12	*	2.21 (1.61-2.67)	4.13 (3.25-5.49)	7.98 (6.00-9.60)	11.0 (9.19-14.5)	398
Age 6-11 years	13-14	2.25 (1.82-2.77)	2.31 (1.62-2.86)	5.40 (3.69-7.33)	11.3 (7.39-14.9)	14.9 (10.8-25.4)	421
Age 12-19 years	11-12	*	1.15 (.963-1.43)	2.68 (2.10-3.24)	5.24 (3.72-7.88)	9.19 (5.93-11.2)	386
Age 12-19 years	13-14	1.34 (1.13-1.59)	1.43 (1.23-1.74)	3.08 (2.39-3.99)	5.58 (4.02-8.18)	8.61 (5.58-9.87)	427
Age 20+ years	11-12	*	.742 (.630-.901)	1.82 (1.49-2.19)	3.63 (3.01-4.73)	6.37 (5.01-7.26)	1632
Age 20+ years	13-14	.720 (.633-.818)	.710 (.630-.830)	1.84 (1.62-2.09)	3.96 (3.14-4.75)	6.29 (4.93-7.16)	1798
Males	11-12	*	.936 (.760-1.09)	2.14 (1.65-2.37)	4.28 (3.20-5.28)	6.97 (5.28-8.21)	1221
Males	13-14	.914 (.802-1.04)	.940 (.830-1.06)	2.20 (1.87-2.59)	4.49 (3.47-5.75)	7.15 (5.18-9.41)	1331
Females	11-12	*	.802 (.614-1.04)	2.19 (1.74-2.76)	4.42 (3.59-5.99)	7.58 (5.93-10.6)	1195
Females	13-14	.803 (.679-.949)	.820 (.690-.960)	2.25 (1.81-2.60)	5.09 (3.98-6.30)	7.48 (6.17-8.83)	1315
Mexican Americans	11-12	*	.949 (.746-1.28)	2.11 (1.76-2.67)	4.34 (2.92-5.26)	6.13 (4.66-6.78)	286
Mexican Americans	13-14	1.08 (.904-1.28)	1.16 (.900-1.54)	2.51 (1.87-3.11)	5.09 (3.63-7.48)	8.19 (5.50-11.3)	423
Non-Hispanic blacks	11-12	*	1.27 (1.08-1.38)	2.72 (2.30-3.12)	5.50 (4.37-7.87)	11.0 (6.89-13.6)	669
Non-Hispanic blacks	13-14	.975 (.873-1.09)	.960 (.860-1.12)	2.16 (1.86-2.54)	4.23 (3.43-4.94)	6.18 (5.08-7.02)	585
Non-Hispanic whites	11-12	*	.827 (.647-1.03)	2.16 (1.58-2.67)	4.32 (3.24-5.98)	7.21 (5.78-10.1)	780
Non-Hispanic whites	13-14	.833 (.708-.980)	.850 (.710-.990)	2.26 (1.93-2.66)	4.93 (3.98-6.44)	7.42 (6.76-8.83)	1005
All Hispanics	11-12	*	.894 (.718-1.14)	2.06 (1.66-2.49)	3.96 (3.23-5.00)	5.28 (4.88-6.40)	551
All Hispanics	13-14	.977 (.840-1.14)	1.02 (.850-1.22)	2.20 (1.76-2.61)	4.39 (3.30-5.43)	7.39 (4.83-9.07)	665
Asians	11-12	*	.528 (.398-.665)	1.25 (.862-1.74)	2.77 (1.67-4.08)	4.08 (2.53-11.8)	328
Asians	13-14	.508 (.438-.589)	.480 (.390-.610)	1.19 (.900-1.49)	3.19 (1.93-4.33)	4.62 (3.61-9.06)	289

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.110 respectively.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Bis(1,3-dichloro-2-propyl) phosphate (BDCPP) (creatinine corrected) (2011 - 2014)

CAS Number 72236-72-7

Metabolite of Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.834 (.728-.981)	1.81 (1.53-2.15)	3.55 (3.18-4.34)	6.06 (4.78-7.26)	2416
Total population	13-14	0.913 (.795-1.05)	.874 (.746-1.03)	1.90 (1.58-2.22)	3.72 (2.88-4.97)	6.30 (4.77-7.93)	2644
Age 6-11 years	11-12	*	2.61 (2.08-3.44)	5.53 (4.03-6.72)	7.97 (7.04-10.5)	11.5 (8.24-16.1)	398
Age 6-11 years	13-14	2.89 (2.38-3.51)	2.81 (2.28-3.66)	6.10 (4.42-7.98)	11.0 (8.41-14.3)	14.8 (11.2-21.1)	421
Age 12-19 years	11-12	*	1.09 (.963-1.33)	2.15 (1.78-2.43)	3.77 (2.90-4.92)	7.30 (3.29-12.2)	386
Age 12-19 years	13-14	1.14 (.931-1.40)	1.10 (.887-1.45)	2.20 (1.75-2.57)	4.26 (2.75-6.46)	6.82 (3.43-10.5)	427
Age 20+ years	11-12	*	.732 (.638-.828)	1.49 (1.29-1.72)	2.98 (2.46-3.47)	4.34 (3.42-5.89)	1632
Age 20+ years	13-14	0.777 (.682-.886)	.734 (.627-.875)	1.55 (1.37-1.77)	2.85 (2.38-3.57)	4.29 (3.29-5.29)	1796
Males	11-12	*	.789 (.659-.913)	1.60 (1.35-1.94)	3.04 (2.48-3.82)	5.46 (3.51-7.06)	1221
Males	13-14	0.837 (.723-.968)	.825 (.696-.964)	1.69 (1.41-2.05)	3.07 (2.53-4.30)	4.97 (3.71-6.96)	1330
Females	11-12	*	.904 (.749-1.10)	2.01 (1.63-2.53)	4.20 (3.37-5.16)	6.76 (4.92-9.24)	1195
Females	13-14	0.993 (.853-1.16)	.917 (.750-1.15)	2.07 (1.74-2.48)	4.26 (3.18-5.63)	7.02 (5.23-8.90)	1314
Mexican Americans	11-12	*	.857 (.728-1.08)	1.78 (1.27-2.52)	3.07 (2.62-3.41)	4.40 (3.11-5.46)	286
Mexican Americans	13-14	1.11 (.905-1.36)	1.08 (.865-1.32)	2.15 (1.62-2.86)	4.16 (3.13-5.91)	6.38 (4.69-8.48)	421
Non-Hispanic blacks	11-12	*	.835 (.777-.919)	1.76 (1.43-1.98)	3.82 (2.44-5.04)	6.19 (3.91-9.86)	669
Non-Hispanic blacks	13-14	0.75 (.674-.834)	.731 (.630-.842)	1.44 (1.29-1.60)	2.81 (2.21-3.54)	4.27 (3.38-5.80)	585
Non-Hispanic whites	11-12	*	.897 (.668-1.15)	1.90 (1.50-2.30)	3.93 (3.22-4.78)	6.76 (4.92-8.24)	780
Non-Hispanic whites	13-14	0.943 (.806-1.10)	.896 (.708-1.09)	2.00 (1.68-2.43)	3.94 (3.00-5.11)	6.77 (5.00-9.20)	1005
All Hispanics	11-12	*	.842 (.732-1.03)	1.79 (1.40-2.19)	3.13 (2.77-3.40)	4.15 (3.40-5.46)	551
All Hispanics	13-14	1.01 (.862-1.19)	.977 (.833-1.19)	1.92 (1.62-2.23)	3.97 (2.87-4.69)	5.80 (4.19-7.84)	663
Asians	11-12	*	.618 (.458-.849)	1.53 (.959-2.24)	3.14 (2.24-4.60)	5.64 (3.19-9.67)	328
Asians	13-14	0.648 (.554-.758)	.582 (.515-.727)	1.30 (1.01-1.62)	2.59 (1.88-4.70)	4.99 (2.78-6.91)	289

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Dibenzyl phosphate (DBzP) (2011 - 2014)

CAS Number 1623-08-1

Metabolite of Tribenzyl phosphate (TBzP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2425
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2665
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	398
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	421
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	386
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1641
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1817
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1227
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1344
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1198
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1321
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	288
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	428
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	669
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	587
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	784
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1014
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	671
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	329
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.050 and 0.050 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Dibenzyl phosphate (DBzP) (creatinine corrected) (2011 - 2014)

CAS Number 1623-08-1

Metabolite of Tribenzyl phosphate (TBzP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2425
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2663
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	398
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	421
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	386
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1641
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1815
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1227
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1343
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1198
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1320
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	288
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	426
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	669
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	587
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	784
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1014
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	669
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	329
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Dibutyl phosphate (DBuP) (2011 - 2014)

CAS Number 107-66-4

Metabolite of Tri-n-butyl phosphate (TBuP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.167 (.146-.189)	.328 (.267-.387)	.544 (.408-.663)	2403
Total population	13-14	.188 (.162-.217)	.250 (.220-.280)	.370 (.350-.400)	.520 (.490-.570)	.670 (.610-.750)	2663
Age 6-11 years	11-12	*	<LOD	.214 (.166-.330)	.507 (.326-.973)	1.05 (.509-2.00)	397
Age 6-11 years	13-14	.272 (.203-.365)	.340 (.270-.390)	.490 (.450-.590)	.790 (.660-.980)	1.10 (.740-5.23)	421
Age 12-19 years	11-12	*	<LOD	.155 (<LOD-.228)	.286 (.205-.387)	.387 (.337-.683)	385
Age 12-19 years	13-14	.207 (.175-.244)	.270 (.240-.320)	.390 (.340-.440)	.570 (.450-.750)	.790 (.600-1.19)	427
Age 20+ years	11-12	*	<LOD	.163 (.143-.184)	.315 (.259-.370)	.543 (.383-.656)	1621
Age 20+ years	13-14	.177 (.153-.206)	.230 (.200-.270)	.350 (.330-.380)	.500 (.460-.530)	.600 (.570-.650)	1815
Males	11-12	*	<LOD	.160 (.134-.187)	.339 (.257-.430)	.629 (.387-.802)	1218
Males	13-14	.191 (.166-.221)	.260 (.220-.290)	.380 (.350-.410)	.530 (.500-.570)	.670 (.590-.850)	1342
Females	11-12	*	<LOD	.174 (.143-.205)	.321 (.238-.430)	.535 (.361-.668)	1185
Females	13-14	.184 (.157-.216)	.240 (.210-.270)	.360 (.330-.400)	.510 (.460-.580)	.670 (.590-.790)	1321
Mexican Americans	11-12	*	<LOD	.173 (.134-.224)	.323 (.205-.594)	.489 (.281-1.22)	283
Mexican Americans	13-14	.187 (.145-.239)	.240 (.160-.310)	.370 (.330-.410)	.520 (.470-.590)	.700 (.570-.870)	428
Non-Hispanic blacks	11-12	*	<LOD	.196 (.141-.261)	.323 (.264-.458)	.488 (.333-.768)	666
Non-Hispanic blacks	13-14	.235 (.206-.268)	.300 (.280-.320)	.420 (.370-.460)	.610 (.520-.740)	.810 (.690-.980)	587
Non-Hispanic whites	11-12	*	<LOD	.168 (.149-.188)	.339 (.261-.402)	.597 (.408-.680)	775
Non-Hispanic whites	13-14	.189 (.161-.222)	.250 (.210-.280)	.370 (.340-.400)	.510 (.480-.570)	.640 (.590-.740)	1012
All Hispanics	11-12	*	<LOD	.172 (.109-.230)	.328 (.234-.471)	.528 (.345-1.07)	550
All Hispanics	13-14	.185 (.151-.228)	.230 (.190-.280)	.360 (.330-.420)	.510 (.450-.590)	.700 (.570-.870)	671
Asians	11-12	*	<LOD	<LOD	.236 (.177-.348)	.430 (.292-.559)	326
Asians	13-14	.106 (.091-.124)	.080 (.060-.130)	.260 (.200-.310)	.380 (.340-.470)	.510 (.400-.680)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.050 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Dibutyl phosphate (DBuP) (creatinine corrected) (2011 - 2014)

CAS Number 107-66-4

Metabolite of Tri-n-butyl phosphate (TBuP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.197 (.178-.227)	.345 (.311-.422)	.555 (.473-.693)	2403
Total population	13-14	0.2 (.171-.234)	.215 (.186-.246)	.357 (.321-.393)	.545 (.500-.583)	.719 (.612-.813)	2661
Age 6-11 years	11-12	*	<LOD	.323 (.263-.433)	.693 (.447-1.24)	1.24 (.693-1.93)	397
Age 6-11 years	13-14	0.35 (.266-.461)	.373 (.304-.435)	.543 (.484-.660)	.909 (.682-1.47)	1.47 (.875-4.17)	421
Age 12-19 years	11-12	*	<LOD	.179 (<LOD-.203)	.284 (.197-.466)	.466 (.284-3.41)	385
Age 12-19 years	13-14	0.177 (.152-.205)	.191 (.157-.223)	.286 (.256-.326)	.440 (.373-.548)	.566 (.481-.619)	427
Age 20+ years	11-12	*	<LOD	.192 (.169-.222)	.338 (.296-.402)	.520 (.444-.645)	1621
Age 20+ years	13-14	0.192 (.163-.225)	.209 (.180-.239)	.342 (.311-.376)	.526 (.473-.565)	.651 (.570-.762)	1813
Males	11-12	*	<LOD	.178 (.146-.209)	.309 (.245-.430)	.566 (.355-.944)	1218
Males	13-14	0.175 (.151-.204)	.192 (.159-.227)	.308 (.278-.342)	.479 (.415-.515)	.582 (.543-.619)	1341
Females	11-12	*	<LOD	.229 (.197-.261)	.375 (.330-.462)	.546 (.473-.670)	1185
Females	13-14	0.227 (.191-.271)	.238 (.205-.286)	.407 (.361-.444)	.585 (.542-.704)	.763 (.696-.892)	1320
Mexican Americans	11-12	*	<LOD	.188 (.149-.247)	.363 (.273-.623)	.653 (.355-2.46)	283
Mexican Americans	13-14	0.191 (.152-.239)	.203 (.161-.256)	.324 (.279-.383)	.526 (.436-.581)	.651 (.533-.865)	426
Non-Hispanic blacks	11-12	*	<LOD	.144 (.118-.173)	.241 (.197-.345)	.433 (.297-.546)	666
Non-Hispanic blacks	13-14	0.181 (.157-.208)	.194 (.167-.217)	.323 (.269-.375)	.473 (.424-.519)	.609 (.519-.734)	587
Non-Hispanic whites	11-12	*	<LOD	.215 (.187-.243)	.355 (.309-.471)	.575 (.471-.789)	775
Non-Hispanic whites	13-14	0.214 (.179-.257)	.234 (.196-.265)	.378 (.333-.417)	.561 (.521-.617)	.762 (.617-.893)	1012
All Hispanics	11-12	*	<LOD	.187 (.158-.228)	.363 (.296-.488)	.571 (.398-1.34)	550
All Hispanics	13-14	0.191 (.158-.231)	.200 (.174-.246)	.323 (.281-.370)	.518 (.441-.571)	.651 (.554-.864)	669
Asians	11-12	*	<LOD	<LOD	.374 (.323-.444)	.520 (.394-.794)	326
Asians	13-14	0.135 (.113-.161)	.138 (.116-.162)	.265 (.212-.333)	.487 (.337-.583)	.588 (.508-.674)	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Di-o-cresylphosphate (DoCP) (2013 - 2014)

CAS Number 843-24-3

Metabolite of Tri-o-cresylphosphate (ToCP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2665
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	421
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1817
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1344
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1321
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	428
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	587
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1014
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	671
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.050.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Di-o-cresylphosphate (DoCP) (creatinine corrected) (2013 - 2014)

CAS Number 843-24-3

Metabolite of Tri-o-cresylphosphate (ToCP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2663
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	421
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1815
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1343
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1320
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	426
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	587
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1014
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	669
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Di-p-cresylphosphate (DpCP) (2013 - 2014)

CAS Number 843-24-3

Metabolite of Tri-p-cresylphosphate (TpCP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.070 (.060-.080)	.110 (.090-.160)	2664
Age 6-11 years	13-14	*	<LOD	.060 (<LOD-.080)	.150 (.090-.210)	.240 (.160-.490)	421
Age 12-19 years	13-14	*	<LOD	<LOD	.090 (.060-.130)	.140 (.080-.270)	427
Age 20+ years	13-14	*	<LOD	<LOD	.050 (<LOD-.070)	.090 (.080-.130)	1816
Males	13-14	*	<LOD	<LOD	.070 (.050-.090)	.130 (.100-.200)	1344
Females	13-14	*	<LOD	<LOD	.070 (.050-.080)	.100 (.080-.140)	1320
Mexican Americans	13-14	*	<LOD	<LOD	.060 (<LOD-.090)	.130 (.070-.230)	428
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.060 (<LOD-.080)	.100 (.080-.160)	587
Non-Hispanic whites	13-14	*	<LOD	<LOD	.070 (.060-.090)	.130 (.090-.190)	1014
All Hispanics	13-14	*	<LOD	<LOD	.060 (<LOD-.070)	.100 (.070-.150)	671
Asians	13-14	*	<LOD	<LOD	<LOD	.080 (<LOD-.200)	290

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.050.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Di-p-cresylphosphate (DpCP) (creatinine corrected) (2013 - 2014)

CAS Number 843-24-3

Metabolite of Tri-p-cresylphosphate (TpCP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.133 (.125-.152)	.200 (.182-.219)	2662
Age 6-11 years	13-14	*	<LOD	.125 (<LOD-.174)	.247 (.182-.361)	.361 (.222-.500)	421
Age 12-19 years	13-14	*	<LOD	<LOD	.108 (.085-.174)	.200 (.108-.267)	427
Age 20+ years	13-14	*	<LOD	<LOD	.133 (<LOD-.143)	.182 (.154-.200)	1814
Males	13-14	*	<LOD	<LOD	.121 (.103-.138)	.174 (.135-.222)	1343
Females	13-14	*	<LOD	<LOD	.154 (.133-.182)	.211 (.190-.235)	1319
Mexican Americans	13-14	*	<LOD	<LOD	.143 (<LOD-.174)	.190 (.170-.235)	426
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.082 (<LOD-.101)	.114 (.093-.143)	587
Non-Hispanic whites	13-14	*	<LOD	<LOD	.138 (.125-.167)	.211 (.182-.235)	1014
All Hispanics	13-14	*	<LOD	<LOD	.138 (<LOD-.170)	.190 (.174-.222)	669
Asians	13-14	*	<LOD	<LOD	<LOD	.200 (<LOD-.333)	290

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Dicresyl phosphates (DCP) (2011 - 2012)

Metabolite of Tricresyl phosphate (TCP) mixed isomers

Geometric mean and selected percentiles of urine concentrations of (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2422
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	395
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	387
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1640
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1225
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1197
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	285
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	671
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	783
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	552
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	328

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.500.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Dicresyl phosphates (DCP) (creatinine corrected) (2011 - 2012)

Metabolite of Tricresyl phosphate (TCP) mixed isomers

Geometric mean and selected percentiles of urine concentrations of (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2422
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	395
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	387
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1640
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1225
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1197
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	285
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	671
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	783
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	552
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	328

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Diphenyl phosphate (DPhP) (2011 - 2014)

CAS Number 838-85-7

Metabolite of Triphenyl phosphate (TPhP), Isopropylphenyl diphenyl phosphate (IPPDPP), t-butylphenyl diphenyl phosphate (tBPDPP), and 2-ethylhexyl diphenyl phosphate (EHDPP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.883 (.791-.985)	.908 (.806-.996)	2.04 (1.86-2.32)	4.45 (4.08-5.01)	7.85 (6.52-9.32)	2425
Total population	13-14	.845 (.772-.925)	.820 (.750-.920)	1.77 (1.58-1.91)	3.71 (3.14-4.63)	6.23 (5.16-7.90)	2660
Age 6-11 years	11-12	1.54 (1.25-1.89)	1.58 (1.34-1.92)	3.22 (2.84-4.21)	5.60 (4.78-7.93)	9.66 (5.93-15.2)	398
Age 6-11 years	13-14	1.69 (1.37-2.10)	1.70 (1.24-2.02)	3.47 (2.71-4.35)	8.17 (5.70-10.0)	13.0 (8.17-17.8)	420
Age 12-19 years	11-12	1.56 (1.35-1.79)	1.53 (1.19-1.80)	3.44 (2.73-3.85)	7.17 (5.17-10.5)	14.0 (9.54-18.1)	386
Age 12-19 years	13-14	1.41 (1.19-1.67)	1.44 (1.24-1.79)	2.99 (2.20-3.57)	5.31 (4.42-6.99)	7.96 (6.28-13.0)	426
Age 20+ years	11-12	.763 (.670-.870)	.768 (.694-.853)	1.76 (1.56-2.02)	4.01 (3.41-4.44)	6.90 (5.05-9.18)	1641
Age 20+ years	13-14	.727 (.668-.791)	.720 (.630-.790)	1.44 (1.36-1.57)	3.00 (2.66-3.43)	5.43 (3.98-6.23)	1814
Males	11-12	.762 (.693-.838)	.836 (.741-.929)	1.76 (1.58-1.95)	3.52 (3.20-3.91)	5.60 (4.33-7.19)	1226
Males	13-14	.778 (.695-.871)	.800 (.690-.910)	1.56 (1.38-1.73)	3.00 (2.44-3.71)	4.91 (3.68-6.23)	1341
Females	11-12	1.01 (.864-1.19)	.993 (.846-1.17)	2.46 (2.02-3.06)	5.32 (4.62-7.05)	10.2 (7.72-12.7)	1199
Females	13-14	.915 (.826-1.01)	.890 (.760-1.00)	2.02 (1.81-2.25)	4.81 (3.56-5.81)	8.17 (5.69-11.3)	1319
Mexican Americans	11-12	.931 (.752-1.15)	1.01 (.722-1.17)	2.24 (1.61-3.20)	4.45 (3.79-8.16)	9.06 (5.86-11.9)	288
Mexican Americans	13-14	.898 (.798-1.01)	.850 (.730-1.07)	1.85 (1.50-2.38)	3.98 (2.90-5.32)	5.89 (4.64-8.32)	427
Non-Hispanic blacks	11-12	1.30 (1.14-1.48)	1.31 (1.10-1.45)	2.77 (2.29-3.27)	6.69 (5.60-7.53)	10.7 (7.74-13.7)	671
Non-Hispanic blacks	13-14	1.09 (.944-1.27)	1.05 (.920-1.16)	2.16 (1.81-2.65)	5.06 (3.33-8.22)	8.69 (5.85-13.5)	586
Non-Hispanic whites	11-12	.836 (.712-.982)	.846 (.736-.978)	1.97 (1.66-2.44)	4.26 (3.87-4.84)	7.30 (5.04-9.85)	784
Non-Hispanic whites	13-14	.819 (.726-.923)	.800 (.680-.930)	1.71 (1.49-1.87)	3.54 (2.98-4.91)	6.23 (5.11-8.17)	1011
All Hispanics	11-12	.946 (.783-1.14)	.989 (.783-1.17)	2.13 (1.76-2.61)	4.85 (3.90-6.35)	8.74 (5.56-11.9)	555
All Hispanics	13-14	.880 (.775-1.00)	.830 (.740-1.02)	1.79 (1.48-2.29)	3.71 (2.97-4.51)	5.51 (4.43-6.40)	670
Asians	11-12	.562 (.450-.703)	.491 (.419-.728)	1.44 (1.01-2.09)	3.06 (2.42-5.18)	6.38 (3.74-8.91)	327
Asians	13-14	.564 (.483-.659)	.570 (.410-.760)	1.28 (1.05-1.50)	2.65 (1.72-3.62)	4.11 (3.21-5.69)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.160 respectively.

Urinary Diphenyl phosphate (DPhP) (creatinine corrected) (2011 - 2014)

CAS Number 838-85-7

Metabolite of Triphenyl phosphate (TPhP), Isopropylphenyl diphenyl phosphate (IPPDPP), t-butylphenyl diphenyl phosphate (tBPDPP), and 2-ethylhexyl diphenyl phosphate (EHDPP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	0.925 (.849-1.01)	.856 (.763-.949)	1.75 (1.61-1.88)	3.90 (3.24-4.53)	6.31 (5.68-7.32)	2425
Total population	13-14	0.904 (.846-.966)	.794 (.762-.850)	1.60 (1.40-1.81)	3.34 (2.84-4.10)	5.51 (4.72-6.36)	2658
Age 6-11 years	11-12	2.15 (1.80-2.57)	1.97 (1.55-2.37)	3.48 (2.57-4.47)	7.85 (5.34-8.98)	10.1 (8.13-11.9)	398
Age 6-11 years	13-14	2.18 (1.89-2.51)	1.95 (1.66-2.26)	3.70 (3.05-4.56)	7.17 (5.72-8.69)	9.66 (7.06-17.8)	420
Age 12-19 years	11-12	1.4 (1.27-1.55)	1.22 (1.04-1.38)	2.83 (2.30-3.38)	5.83 (4.85-8.22)	9.64 (6.39-16.6)	386
Age 12-19 years	13-14	1.21 (1.07-1.37)	1.12 (.940-1.32)	2.21 (1.62-2.79)	3.77 (3.00-5.46)	6.59 (4.02-8.47)	426
Age 20+ years	11-12	0.793 (.717-.876)	.752 (.657-.847)	1.54 (1.37-1.64)	2.92 (2.56-3.52)	5.53 (4.56-6.21)	1641
Age 20+ years	13-14	0.786 (.742-.834)	.695 (.643-.762)	1.30 (1.15-1.44)	2.70 (2.31-3.19)	4.82 (3.91-5.51)	1812
Males	11-12	0.696 (.642-.754)	.671 (.587-.751)	1.28 (1.16-1.42)	2.48 (2.13-3.12)	4.28 (3.18-5.32)	1226
Males	13-14	0.715 (.671-.761)	.653 (.605-.715)	1.14 (1.08-1.28)	2.26 (1.96-2.67)	3.91 (2.69-4.90)	1340
Females	11-12	1.21 (1.08-1.36)	1.11 (.959-1.31)	2.25 (1.87-2.62)	5.45 (4.38-6.50)	8.53 (6.59-11.4)	1199
Females	13-14	1.13 (1.05-1.23)	1.00 (.910-1.11)	2.02 (1.80-2.36)	4.65 (3.60-5.46)	6.84 (5.77-8.47)	1318
Mexican Americans	11-12	0.929 (.754-1.14)	.835 (.664-1.21)	1.99 (1.63-2.34)	3.85 (2.80-5.83)	7.79 (4.53-9.64)	288
Mexican Americans	13-14	0.928 (.820-1.05)	.800 (.654-1.02)	1.57 (1.33-1.92)	3.27 (2.70-4.08)	4.99 (3.77-6.44)	425
Non-Hispanic blacks	11-12	0.956 (.857-1.07)	.880 (.786-.950)	1.81 (1.57-2.19)	4.07 (3.49-4.56)	5.57 (4.67-8.13)	671
Non-Hispanic blacks	13-14	0.842 (.701-1.01)	.701 (.627-.789)	1.57 (1.19-2.06)	3.53 (2.37-5.46)	6.26 (4.01-9.66)	586
Non-Hispanic whites	11-12	0.934 (.819-1.06)	.865 (.750-1.01)	1.75 (1.58-1.97)	4.09 (2.92-5.21)	6.31 (5.45-7.64)	784
Non-Hispanic whites	13-14	0.93 (.855-1.01)	.824 (.757-.931)	1.64 (1.43-1.85)	3.55 (2.79-4.54)	5.52 (4.56-6.84)	1011
All Hispanics	11-12	0.956 (.830-1.10)	.841 (.732-.991)	1.89 (1.59-2.22)	3.85 (2.96-5.49)	7.79 (5.36-9.64)	555
All Hispanics	13-14	0.913 (.807-1.03)	.800 (.669-.944)	1.56 (1.32-1.95)	3.24 (2.69-4.04)	5.18 (3.89-6.50)	668
Asians	11-12	0.751 (.636-.887)	.658 (.476-.957)	1.55 (1.25-1.98)	3.74 (2.55-4.94)	6.60 (4.59-8.28)	327
Asians	13-14	0.718 (.646-.799)	.681 (.574-.788)	1.19 (1.00-1.44)	2.19 (1.72-3.62)	4.21 (2.62-5.04)	291

Urinary 2,3,4,5-Tetrabromobenzoic acid (TBBA) (2011 - 2014)

CAS Number 27581-13-1

Metabolite of 2-ethylhexyl-2,3,4,5-tetrabromobenzoate (EH-TBB)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	.056 (<LOD-.083)	2427
Total population	13-14	*	<LOD	<LOD	<LOD	.050 (<LOD-.060)	2665
Age 6-11 years	11-12	*	<LOD	<LOD	.062 (<LOD-.114)	.124 (.071-.208)	398
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.070 (.050-.090)	421
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	387
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	.051 (<LOD-.078)	1642
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1817
Males	11-12	*	<LOD	<LOD	<LOD	.057 (<LOD-.086)	1227
Males	13-14	*	<LOD	<LOD	<LOD	.060 (<LOD-.070)	1344
Females	11-12	*	<LOD	<LOD	<LOD	.056 (<LOD-.093)	1200
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1321
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	288
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	428
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	.070 (<LOD-.124)	671
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.060 (<LOD-.090)	587
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	.059 (<LOD-.091)	784
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	.050 (<LOD-.070)	1014
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	671
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	329
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.050 and 0.050 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2,3,4,5-Tetrabromobenzoic acid (TBBA) (creatinine corrected) (2011 - 2014)

CAS Number 27581-13-1

Metabolite of 2-ethylhexyl-2,3,4,5-tetrabromobenzoate (EH-TBB)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	.167 (<LOD-.184)	2427
Total population	13-14	*	<LOD	<LOD	<LOD	.174 (<LOD-.190)	2663
Age 6-11 years	11-12	*	<LOD	<LOD	.219 (<LOD-.288)	.292 (.219-.350)	398
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.235 (.167-.286)	421
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	387
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	.159 (<LOD-.184)	1642
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1815
Males	11-12	*	<LOD	<LOD	<LOD	.146 (<LOD-.184)	1227
Males	13-14	*	<LOD	<LOD	<LOD	.143 (<LOD-.182)	1343
Females	11-12	*	<LOD	<LOD	<LOD	.175 (<LOD-.219)	1200
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1320
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	288
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	426
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	.109 (<LOD-.139)	671
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.122 (<LOD-.154)	587
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	.167 (<LOD-.198)	784
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	.182 (<LOD-.200)	1014
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	669
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	329
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Herbicides

Urinary 2,4-Dichlorophenoxyacetic acid (2011 - 2014)

CAS Number 94-75-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.326 (.304-.350)	.304 (.278-.323)	.594 (.541-.655)	1.06 (.925-1.27)	1.52 (1.31-1.76)	2365
Total population	13-14	.308 (.280-.339)	.292 (.256-.327)	.514 (.459-.577)	.988 (.797-1.20)	1.44 (1.25-1.68)	2671
Age 6-11 years	11-12	.386 (.347-.429)	.395 (.311-.494)	.665 (.571-.767)	1.25 (.884-1.54)	2.02 (1.49-2.46)	385
Age 6-11 years	13-14	.463 (.368-.583)	.415 (.333-.518)	.849 (.629-1.20)	1.50 (1.02-2.58)	2.16 (1.50-4.13)	421
Age 12-19 years	11-12	.287 (.241-.341)	.262 (.225-.307)	.474 (.321-.751)	1.01 (.643-1.24)	1.20 (1.01-1.42)	380
Age 12-19 years	13-14	.334 (.292-.383)	.324 (.283-.392)	.569 (.507-.673)	.930 (.721-1.28)	1.45 (1.01-1.65)	428
Age 20+ years	11-12	.326 (.298-.357)	.307 (.279-.325)	.596 (.539-.664)	1.11 (.881-1.34)	1.56 (1.34-1.84)	1600
Age 20+ years	13-14	.291 (.265-.318)	.272 (.241-.310)	.478 (.424-.529)	.900 (.740-1.09)	1.32 (1.15-1.54)	1822
Males	11-12	.356 (.317-.399)	.330 (.298-.373)	.637 (.539-.775)	1.24 (.993-1.44)	1.64 (1.40-2.13)	1194
Males	13-14	.343 (.305-.387)	.332 (.295-.372)	.577 (.487-.676)	1.11 (.925-1.31)	1.56 (1.36-1.94)	1345
Females	11-12	.300 (.276-.327)	.271 (.243-.304)	.552 (.482-.635)	.963 (.824-1.16)	1.34 (1.05-1.80)	1171
Females	13-14	.277 (.254-.301)	.257 (.225-.285)	.462 (.412-.522)	.849 (.720-1.04)	1.26 (1.07-1.52)	1326
Mexican Americans	11-12	.311 (.258-.374)	.266 (.216-.348)	.568 (.420-.731)	1.05 (.841-1.43)	1.66 (1.11-2.40)	267
Mexican Americans	13-14	.274 (.241-.311)	.250 (.217-.295)	.427 (.381-.459)	.817 (.564-1.09)	1.16 (.916-1.62)	428
Non-Hispanic blacks	11-12	.325 (.286-.369)	.306 (.255-.359)	.570 (.473-.680)	1.08 (.835-1.46)	1.72 (1.25-2.05)	657
Non-Hispanic blacks	13-14	.305 (.278-.335)	.294 (.267-.315)	.539 (.475-.617)	.863 (.719-1.04)	1.20 (.939-1.56)	590
Non-Hispanic whites	11-12	.344 (.317-.374)	.320 (.296-.358)	.628 (.561-.710)	1.17 (.906-1.34)	1.52 (1.27-1.84)	766
Non-Hispanic whites	13-14	.320 (.284-.361)	.307 (.255-.350)	.526 (.471-.606)	1.04 (.803-1.29)	1.50 (1.28-1.94)	1017
All Hispanics	11-12	.283 (.244-.328)	.245 (.202-.303)	.489 (.405-.624)	.933 (.710-1.16)	1.42 (1.07-1.66)	529
All Hispanics	13-14	.276 (.244-.312)	.250 (.218-.282)	.424 (.373-.469)	.819 (.555-1.20)	1.32 (.972-1.68)	671
Asians	11-12	.254 (.215-.299)	.194 (.169-.254)	.409 (.320-.569)	.950 (.703-1.27)	1.37 (.890-2.56)	326
Asians	13-14	.239 (.207-.277)	.214 (.165-.268)	.379 (.319-.473)	.756 (.592-.967)	1.12 (.802-1.35)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.150 and 0.150 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/24-DichlorophenoxyaceticAcid_BiomonitoringSummary.html

Urinary 2,4-Dichlorophenoxyacetic acid (creatinine corrected) (2011 - 2014)

CAS Number 94-75-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	0.342 (.310-.378)	.320 (.289-.359)	.595 (.528-.676)	1.03 (.882-1.25)	1.62 (1.35-1.91)	2365
Total population	13-14	0.328 (.299-.361)	.306 (.280-.333)	.531 (.472-.611)	.956 (.804-1.15)	1.49 (1.19-1.86)	2669
Age 6-11 years	11-12	0.541 (.467-.627)	.514 (.430-.603)	.858 (.750-1.02)	1.62 (1.20-2.32)	2.92 (1.62-5.02)	385
Age 6-11 years	13-14	0.597 (.448-.794)	.500 (.420-.658)	.953 (.686-1.50)	2.17 (1.23-4.09)	4.00 (1.86-11.2)	421
Age 12-19 years	11-12	0.255 (.218-.300)	.263 (.196-.306)	.415 (.326-.568)	.784 (.653-.869)	.899 (.784-1.35)	380
Age 12-19 years	13-14	0.286 (.255-.320)	.274 (.241-.330)	.443 (.392-.523)	.786 (.579-.954)	1.09 (.784-1.25)	428
Age 20+ years	11-12	0.34 (.301-.385)	.315 (.282-.362)	.580 (.509-.676)	1.02 (.849-1.25)	1.62 (1.25-1.93)	1600
Age 20+ years	13-14	0.314 (.288-.342)	.292 (.264-.320)	.523 (.448-.579)	.877 (.733-1.09)	1.37 (1.15-1.64)	1820
Males	11-12	0.325 (.290-.364)	.306 (.268-.336)	.573 (.454-.668)	1.01 (.836-1.35)	1.62 (1.35-2.19)	1194
Males	13-14	0.314 (.276-.357)	.289 (.248-.333)	.500 (.422-.600)	.980 (.761-1.21)	1.50 (1.11-2.19)	1344
Females	11-12	0.359 (.317-.407)	.333 (.297-.397)	.631 (.539-.739)	1.07 (.879-1.30)	1.62 (1.12-2.03)	1171
Females	13-14	0.342 (.315-.372)	.319 (.304-.345)	.566 (.480-.656)	.953 (.799-1.15)	1.49 (1.21-1.76)	1325
Mexican Americans	11-12	0.31 (.262-.365)	.282 (.235-.334)	.451 (.369-.584)	1.02 (.633-1.55)	1.64 (1.22-2.25)	267
Mexican Americans	13-14	0.283 (.245-.327)	.259 (.221-.319)	.465 (.372-.547)	.781 (.611-1.07)	1.17 (.786-2.26)	426
Non-Hispanic blacks	11-12	0.239 (.210-.272)	.233 (.189-.272)	.406 (.349-.469)	.744 (.610-.822)	1.02 (.783-1.35)	657
Non-Hispanic blacks	13-14	0.234 (.215-.255)	.232 (.211-.248)	.407 (.343-.451)	.650 (.583-.753)	.988 (.725-1.24)	590
Non-Hispanic whites	11-12	0.386 (.350-.427)	.359 (.320-.410)	.662 (.578-.758)	1.11 (.931-1.35)	1.76 (1.35-2.46)	766
Non-Hispanic whites	13-14	0.363 (.327-.402)	.333 (.305-.361)	.579 (.500-.666)	1.08 (.866-1.29)	1.64 (1.28-2.17)	1017
All Hispanics	11-12	0.283 (.245-.328)	.263 (.229-.298)	.440 (.379-.536)	.878 (.688-1.14)	1.44 (1.00-1.83)	529
All Hispanics	13-14	0.287 (.253-.325)	.264 (.229-.305)	.472 (.403-.547)	.845 (.688-1.09)	1.34 (.845-2.84)	669
Asians	11-12	0.336 (.287-.393)	.297 (.251-.344)	.620 (.463-.750)	1.20 (.868-2.11)	2.19 (1.32-3.28)	326
Asians	13-14	0.306 (.274-.342)	.321 (.262-.366)	.528 (.461-.591)	.856 (.740-1.00)	1.14 (.917-1.40)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/24-DichlorophenoxyaceticAcid_BiomonitoringSummary.html

Insect Repellent and Metabolites

Urinary N,N-diethyl-meta-toluamide (DEET) (2011 - 2014)

CAS Number 134-62-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2430
Total population	13-14	*	<LOD	<LOD	<LOD	.103 (<LOD-.269)	2667
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	402
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.205 (<LOD-.792)	421
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	390
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.108 (<LOD-.161)	427
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1638
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	.099 (<LOD-.269)	1819
Males	11-12	*	<LOD	<LOD	<LOD	.085 (<LOD-.162)	1232
Males	13-14	*	<LOD	<LOD	<LOD	.115 (<LOD-.510)	1345
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1198
Females	13-14	*	<LOD	<LOD	<LOD	.091 (<LOD-.155)	1322
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	289
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	670
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	588
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	784
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	.123 (<LOD-.431)	1016
All Hispanics	11-12	*	<LOD	<LOD	<LOD	.094 (<LOD-.294)	557
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	670
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	331
Asians	13-14	*	<LOD	<LOD	<LOD	.132 (<LOD-.518)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.083 and 0.083 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary N,N-diethyl-meta-toluamide (DEET) (creatinine corrected) (2011 - 2014)

CAS Number 134-62-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2430
Total population	13-14	*	<LOD	<LOD	<LOD	.294 (<LOD-.367)	2665
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	402
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.666 (<LOD-1.17)	421
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	390
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.210 (<LOD-.489)	427
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1638
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	.280 (<LOD-.355)	1817
Males	11-12	*	<LOD	<LOD	<LOD	.267 (<LOD-.345)	1232
Males	13-14	*	<LOD	<LOD	<LOD	.267 (<LOD-.618)	1344
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1198
Females	13-14	*	<LOD	<LOD	<LOD	.309 (<LOD-.367)	1321
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	289
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	425
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	670
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	588
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	784
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	.317 (<LOD-.587)	1016
All Hispanics	11-12	*	<LOD	<LOD	<LOD	.255 (<LOD-.367)	557
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	668
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	331
Asians	13-14	*	<LOD	<LOD	<LOD	.489 (<LOD-.534)	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary 3-(Diethylcarbamoyl)benzoic acid (DCBA) (2011 - 2016)†

CAS Number 858981-15-4

Metabolite of DEET

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.49 (1.88-3.29)	1.95 (1.45-2.59)	6.47 (4.52-8.28)	20.8 (12.6-42.0)	61.1 (25.2-181)	2426
Total population	13-14	2.46 (1.84-3.30)	1.77 (1.34-2.30)	6.26 (4.10-9.15)	25.0 (13.2-46.1)	75.9 (31.7-218)	2663
Total population	15-16	3.39 (2.35-4.90)	2.89 (1.94-4.31)	11.2 (7.23-17.1)	54.4 (27.3-92.9)	148 (71.6-310)	2989
Age 3-5 years	15-16	5.03 (3.56-7.11)	4.64 (2.94-6.99)	17.2 (10.6-26.3)	74.5 (37.6-140)	171 (92.0-284)	502
Age 6-11 years	11-12	4.24 (2.76-6.53)	3.84 (2.32-6.11)	11.8 (7.06-17.2)	27.5 (17.7-84.9)	100 (24.6-448)	400
Age 6-11 years	13-14	4.82 (3.20-7.25)	3.64 (2.50-5.02)	11.4 (6.46-19.3)	41.6 (17.1-223)	202 (37.9-649)	420
Age 6-11 years	15-16	5.66 (3.95-8.11)	5.45 (3.36-7.83)	18.0 (11.9-23.1)	64.6 (29.1-134)	193 (69.9-331)	417
Age 12-19 years	11-12	3.91 (3.03-5.04)	3.46 (2.42-4.00)	9.64 (6.42-14.7)	25.0 (16.9-43.0)	60.1 (26.4-161)	390
Age 12-19 years	13-14	4.41 (2.95-6.59)	3.71 (2.58-7.24)	12.2 (7.70-19.1)	37.4 (19.1-79.7)	96.0 (37.7-172)	427
Age 12-19 years	15-16	5.72 (3.50-9.33)	5.86 (3.26-9.35)	15.8 (9.41-28.5)	57.5 (24.5-169)	147 (43.9-650)	400
Age 20+ years	11-12	2.19 (1.66-2.90)	1.63 (1.22-2.21)	5.43 (3.64-7.44)	18.8 (10.4-38.4)	55.4 (23.9-159)	1636
Age 20+ years	13-14	2.10 (1.55-2.86)	1.40 (1.10-1.84)	4.91 (3.21-7.99)	20.4 (10.7-40.1)	60.9 (26.0-221)	1816
Age 20+ years	15-16	2.93 (2.02-4.23)	2.38 (1.63-3.37)	9.46 (5.41-15.7)	53.3 (24.3-91.1)	145 (69.0-323)	1670
Males	11-12	2.87 (2.12-3.90)	2.42 (1.74-3.45)	7.31 (5.05-10.4)	25.2 (12.6-51.1)	57.3 (25.7-198)	1230
Males	13-14	2.94 (2.08-4.17)	2.10 (1.57-2.72)	7.41 (4.62-12.3)	31.5 (15.4-81.2)	103 (39.9-325)	1343
Males	15-16	4.06 (2.72-6.06)	3.32 (2.38-4.75)	12.8 (8.49-23.4)	69.0 (38.5-147)	219 (91.1-447)	1481
Females	11-12	2.17 (1.63-2.90)	1.60 (1.20-2.12)	5.32 (3.54-7.44)	17.7 (9.64-42.7)	63.7 (17.7-242)	1196
Females	13-14	2.07 (1.59-2.71)	1.52 (1.11-1.91)	5.13 (3.67-7.99)	18.9 (9.44-38.6)	43.8 (23.9-138)	1320
Females	15-16	2.85 (2.02-4.02)	2.35 (1.64-3.78)	9.08 (6.11-14.6)	35.3 (22.0-61.7)	98.8 (45.6-219)	1508
Mexican Americans	11-12	2.62 (1.15-5.96)	2.11 (.605-7.86)	8.37 (3.43-22.0)	32.9 (12.9-100)	75.6 (15.9-481)	289
Mexican Americans	13-14	2.27 (1.58-3.26)	1.89 (1.03-2.91)	7.62 (3.80-10.3)	17.2 (11.0-26.0)	35.8 (18.8-106)	427
Mexican Americans	15-16	4.00 (2.11-7.60)	3.52 (1.83-6.52)	13.8 (6.02-35.3)	57.3 (20.6-207)	192 (47.6-319)	596
Non-Hispanic blacks	11-12	3.32 (2.41-4.57)	2.71 (2.08-3.55)	8.08 (4.73-12.2)	22.5 (11.4-55.1)	53.5 (22.5-157)	667
Non-Hispanic blacks	13-14	2.56 (1.94-3.38)	2.18 (1.69-2.89)	5.54 (3.93-7.95)	16.0 (8.88-34.7)	35.7 (17.4-83.5)	585
Non-Hispanic blacks	15-16	4.12 (3.16-5.37)	3.27 (2.35-4.42)	10.1 (8.19-14.2)	38.1 (22.1-71.7)	104 (45.6-277)	703
Non-Hispanic whites	11-12	2.36 (1.71-3.28)	1.83 (1.39-2.50)	5.80 (3.89-8.10)	18.0 (9.01-53.0)	62.3 (16.9-252)	783
Non-Hispanic whites	13-14	2.62 (1.77-3.87)	1.72 (1.15-2.54)	6.96 (3.80-12.8)	31.5 (13.5-93.4)	103 (37.7-373)	1016
Non-Hispanic whites	15-16	3.53 (2.15-5.80)	3.01 (1.63-5.19)	11.9 (6.37-22.5)	60.3 (24.7-112)	148 (67.6-405)	866
All Hispanics	11-12	2.85 (1.59-5.12)	2.11 (.964-4.45)	7.94 (3.77-15.9)	35.9 (14.8-100)	152 (24.6-481)	558
All Hispanics	13-14	2.12 (1.57-2.86)	1.73 (1.12-2.54)	5.68 (3.51-8.32)	15.7 (11.0-22.8)	26.6 (18.8-68.7)	670
All Hispanics	15-16	3.63 (2.20-5.99)	3.18 (1.99-5.36)	12.1 (6.35-22.1)	42.7 (21.1-120)	139 (44.3-319)	972
Asians	11-12	1.40 (.933-2.09)	.959 (.544-1.88)	3.27 (1.80-7.62)	12.7 (6.77-28.8)	28.8 (13.3-50.2)	330
Asians	13-14	1.68 (1.23-2.31)	1.02 (.656-1.54)	3.94 (2.14-6.41)	18.7 (10.8-44.6)	82.7 (26.5-251)	290
Asians	15-16	.906 (.399-2.06)	.610 (<LOD-2.63)	2.91 (1.00-9.23)	11.2 (5.30-24.9)	25.0 (10.9-166)	299

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.475, 0.475, and 0.200 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary 3-(Diethylcarbamoyl)benzoic acid (DCBA) (creatinine corrected) (2011 - 2016)†

CAS Number 858981-15-4

Metabolite of DEET

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.61 (1.96-3.46)	2.07 (1.59-2.63)	5.40 (3.90-7.83)	19.0 (12.7-36.4)	60.1 (22.5-150)	2426
Total population	13-14	2.63 (1.94-3.56)	1.85 (1.47-2.26)	5.24 (3.92-7.72)	23.8 (10.3-55.1)	68.9 (26.9-223)	2661
Total population	15-16	3.51 (2.45-5.02)	2.69 (1.90-4.19)	10.4 (6.73-15.8)	44.3 (24.9-83.5)	140 (68.3-281)	2988
Age 3-5 years	15-16	11.2 (8.01-15.8)	9.96 (7.27-15.8)	35.3 (21.8-61.1)	131 (68.8-271)	304 (170-488)	501
Age 6-11 years	11-12	5.96 (3.63-9.80)	5.22 (3.17-7.29)	15.9 (7.97-21.5)	43.3 (18.5-208)	105 (38.0-1120)	400
Age 6-11 years	13-14	6.21 (4.04-9.55)	4.14 (2.92-5.43)	13.5 (7.13-28.5)	62.2 (23.4-251)	251 (62.2-1060)	420
Age 6-11 years	15-16	7.29 (4.99-10.7)	5.86 (3.92-9.61)	20.9 (12.0-43.4)	81.7 (44.3-174)	312 (81.7-529)	417
Age 12-19 years	11-12	3.49 (2.71-4.49)	3.07 (2.40-3.69)	6.86 (5.21-10.5)	21.3 (13.2-40.3)	44.2 (17.4-203)	390
Age 12-19 years	13-14	3.77 (2.49-5.72)	3.36 (2.02-4.98)	7.08 (5.05-17.1)	34.0 (12.6-86.6)	86.6 (31.1-198)	427
Age 12-19 years	15-16	4.42 (2.68-7.30)	4.21 (2.93-6.72)	11.0 (5.95-22.3)	34.4 (13.6-147)	122 (30.1-457)	400
Age 20+ years	11-12	2.27 (1.72-3.01)	1.79 (1.34-2.42)	4.36 (3.29-6.53)	15.6 (10.5-28.5)	59.3 (21.1-112)	1636
Age 20+ years	13-14	2.27 (1.67-3.08)	1.53 (1.30-1.85)	4.43 (3.23-6.48)	18.1 (8.08-46.6)	53.0 (20.3-212)	1814
Age 20+ years	15-16	2.98 (2.09-4.24)	2.16 (1.57-3.13)	9.15 (4.98-13.3)	40.1 (19.5-76.2)	108 (60.8-277)	1670
Males	11-12	2.62 (1.89-3.63)	2.07 (1.51-2.80)	6.06 (3.88-9.34)	19.3 (13.0-31.0)	55.8 (19.4-176)	1230
Males	13-14	2.69 (1.84-3.93)	1.87 (1.35-2.39)	6.08 (3.85-9.76)	30.8 (12.5-64.2)	86.6 (38.8-347)	1342
Males	15-16	3.61 (2.43-5.36)	2.58 (1.66-4.70)	10.9 (7.09-19.5)	62.9 (31.7-105)	164 (79.3-347)	1481
Females	11-12	2.59 (1.97-3.42)	2.07 (1.60-2.66)	5.18 (3.77-7.04)	17.8 (10.4-45.1)	61.4 (19.3-112)	1196
Females	13-14	2.57 (1.98-3.33)	1.82 (1.53-2.17)	4.96 (3.92-6.40)	19.9 (7.90-45.7)	47.7 (23.2-205)	1319
Females	15-16	3.41 (2.43-4.79)	2.76 (2.01-3.98)	10.1 (5.82-14.7)	34.0 (19.2-62.2)	83.5 (43.7-252)	1507
Mexican Americans	11-12	2.61 (1.12-6.06)	2.23 (.632-8.29)	8.29 (3.05-20.9)	27.9 (8.78-126)	66.3 (11.2-360)	289
Mexican Americans	13-14	2.32 (1.63-3.30)	2.01 (1.32-2.94)	5.87 (3.92-8.12)	16.6 (8.35-34.9)	38.2 (16.6-88.2)	425
Mexican Americans	15-16	4.36 (2.30-8.27)	3.48 (1.98-7.25)	14.2 (6.72-36.6)	55.8 (26.4-108)	109 (56.0-278)	596
Non-Hispanic blacks	11-12	2.45 (1.80-3.33)	2.04 (1.52-2.56)	4.78 (3.20-8.50)	14.2 (8.73-27.3)	28.8 (14.8-94.6)	667
Non-Hispanic blacks	13-14	1.97 (1.46-2.66)	1.50 (1.05-2.57)	4.61 (2.97-5.75)	10.3 (6.48-23.4)	25.4 (10.8-78.8)	585
Non-Hispanic blacks	15-16	3.28 (2.67-4.01)	2.34 (1.70-3.14)	7.25 (5.79-9.17)	32.3 (16.3-48.8)	101 (45.3-310)	702
Non-Hispanic whites	11-12	2.64 (1.89-3.67)	2.08 (1.54-3.01)	5.17 (3.72-7.29)	19.3 (11.5-46.0)	62.3 (17.4-167)	783
Non-Hispanic whites	13-14	2.96 (1.99-4.41)	1.89 (1.42-2.58)	5.87 (3.83-12.2)	33.0 (12.1-103)	118 (36.0-598)	1016
Non-Hispanic whites	15-16	3.79 (2.38-6.03)	3.01 (1.75-5.46)	11.3 (6.47-21.4)	50.3 (23.1-122)	145 (61.4-347)	866
All Hispanics	11-12	2.87 (1.59-5.16)	2.18 (1.10-4.73)	8.13 (3.71-14.4)	27.1 (11.2-104)	104 (19.0-830)	558
All Hispanics	13-14	2.18 (1.63-2.92)	1.78 (1.44-2.32)	4.88 (3.47-6.48)	13.3 (7.83-23.4)	30.2 (16.6-54.6)	668
All Hispanics	15-16	3.83 (2.34-6.26)	3.15 (2.07-5.25)	11.5 (6.55-23.3)	48.2 (23.3-89.3)	93.2 (53.6-207)	972
Asians	11-12	1.85 (1.26-2.73)	1.40 (.933-2.24)	3.95 (2.25-8.68)	13.7 (7.88-33.3)	33.3 (14.8-55.8)	330
Asians	13-14	2.13 (1.52-2.99)	1.29 (1.02-1.81)	4.19 (2.75-7.36)	21.1 (9.36-46.6)	89.2 (35.3-426)	290
Asians	15-16	1.12 (.547-2.31)	.884 (<LOD-2.47)	2.94 (1.22-7.09)	11.1 (4.82-25.9)	22.8 (12.6-90.7)	299

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary 3-(Ethylcarbamoyl)benzoic acid (ECBA) (2015 - 2016)

CAS Number 126926-33-8

Metabolite of DEET

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	1.27 (.890-1.82)	1.02 (.646-1.47)	4.08 (2.55-6.66)	21.1 (11.7-37.4)	62.3 (31.2-134)	2964
Age 3-5 years	15-16	1.89 (1.32-2.72)	1.69 (1.12-2.44)	6.63 (3.86-11.6)	31.4 (14.1-55.5)	60.8 (33.3-139)	500
Age 6-11 years	15-16	2.24 (1.52-3.29)	1.99 (1.38-3.19)	7.53 (4.76-12.8)	29.9 (14.2-60.8)	61.8 (29.4-166)	412
Age 12-19 years	15-16	2.27 (1.41-3.68)	2.08 (1.25-3.98)	6.29 (4.13-13.2)	24.0 (9.45-72.2)	71.4 (20.5-298)	399
Age 20+ years	15-16	1.08 (.753-1.55)	.793 (.522-1.15)	3.30 (1.83-6.31)	17.6 (10.2-35.4)	50.5 (29.9-126)	1653
Males	15-16	1.45 (.982-2.14)	1.18 (.663-1.77)	4.75 (2.73-8.40)	26.8 (15.5-61.8)	72.2 (34.4-213)	1464
Females	15-16	1.12 (.799-1.58)	.867 (.582-1.30)	3.72 (2.31-5.74)	15.3 (10.2-29.8)	39.9 (22.1-116)	1500
Mexican Americans	15-16	1.52 (.780-2.97)	1.28 (.581-2.70)	5.21 (2.10-15.3)	26.0 (9.17-68.3)	64.3 (24.6-150)	599
Non-Hispanic blacks	15-16	1.45 (1.12-1.89)	1.19 (.834-1.67)	4.04 (2.91-5.50)	15.1 (9.85-29.4)	44.6 (21.4-108)	696
Non-Hispanic whites	15-16	1.32 (.797-2.17)	1.05 (.543-1.79)	4.21 (2.26-8.92)	23.3 (10.9-45.8)	64.6 (27.8-166)	857
All Hispanics	15-16	1.40 (.843-2.34)	1.25 (.599-2.10)	4.87 (2.55-9.89)	20.9 (8.93-44.5)	45.6 (21.1-150)	974
Asians	15-16	*	<LOD	.944 (.285-2.57)	4.18 (1.81-8.87)	8.87 (4.18-59.2)	295

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.200.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary 3-(Ethylcarbamoyl)benzoic acid (ECBA) (creatinine corrected) (2015 - 2016)

CAS Number 126926-33-8

Metabolite of DEET

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	1.34 (.944-1.89)	1.03 (.655-1.51)	3.88 (2.46-6.48)	18.3 (10.3-33.1)	48.8 (28.0-100)	2963
Age 3-5 years	15-16	4.25 (2.98-6.08)	3.91 (2.73-5.90)	13.8 (8.62-24.3)	50.1 (31.4-90.3)	112 (60.3-237)	499
Age 6-11 years	15-16	2.89 (1.91-4.38)	2.49 (1.40-4.16)	8.69 (4.61-17.3)	35.6 (18.7-67.7)	163 (34.0-249)	412
Age 12-19 years	15-16	1.77 (1.09-2.88)	1.70 (1.17-2.33)	4.15 (2.46-9.02)	16.5 (6.35-45.8)	43.0 (13.3-191)	399
Age 20+ years	15-16	1.12 (.793-1.58)	.778 (.538-1.17)	3.07 (1.88-5.13)	15.2 (8.32-28.4)	44.8 (22.2-98.0)	1653
Males	15-16	1.31 (.892-1.92)	1.00 (.583-1.52)	3.99 (2.46-7.21)	24.2 (12.8-42.5)	57.9 (30.8-121)	1464
Females	15-16	1.37 (.972-1.92)	1.07 (.700-1.60)	3.74 (2.38-6.26)	15.2 (8.38-24.5)	41.6 (18.0-112)	1499
Mexican Americans	15-16	1.67 (.859-3.24)	1.31 (.660-2.99)	5.67 (2.69-13.4)	23.7 (9.73-44.7)	42.7 (18.3-147)	599
Non-Hispanic blacks	15-16	1.16 (.943-1.44)	.875 (.667-1.06)	2.80 (2.19-3.62)	10.9 (6.69-18.3)	35.3 (18.3-114)	695
Non-Hispanic whites	15-16	1.44 (.902-2.30)	1.17 (.624-1.97)	4.01 (2.30-8.21)	21.2 (9.73-45.8)	54.7 (22.3-183)	857
All Hispanics	15-16	1.48 (.901-2.44)	1.13 (.700-1.98)	4.91 (2.62-9.73)	19.4 (9.80-34.0)	38.2 (19.4-112)	974
Asians	15-16	*	<LOD	1.05 (.548-2.76)	4.52 (1.55-8.96)	8.58 (3.38-35.8)	295

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary N,N-Diethyl-3-(hydroxymethyl) benzamide (DHMB) (2011 - 2014)

CAS Number 72236-22-7

Metabolite of DEET

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	.536 (<LOD-1.46)	2419
Total population	13-14	*	<LOD	<LOD	<LOD	.737 (.168-2.11)	2659
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	.683 (<LOD-1.63)	400
Age 6-11 years	13-14	*	<LOD	<LOD	.285 (<LOD-1.55)	1.45 (.265-6.31)	420
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	.526 (.181-.966)	389
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.701 (.177-1.33)	424
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	.536 (<LOD-1.47)	1630
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	.613 (<LOD-2.25)	1815
Males	11-12	*	<LOD	<LOD	<LOD	.647 (.185-1.46)	1230
Males	13-14	*	<LOD	<LOD	.175 (<LOD-.737)	.916 (.249-2.76)	1338
Females	11-12	*	<LOD	<LOD	<LOD	.337 (<LOD-1.71)	1189
Females	13-14	*	<LOD	<LOD	<LOD	.366 (<LOD-1.21)	1321
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	.790 (<LOD-1.20)	288
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.169 (<LOD-.518)	425
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	.475 (<LOD-1.19)	668
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.423 (<LOD-1.60)	586
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	.631 (<LOD-2.24)	778
Non-Hispanic whites	13-14	*	<LOD	<LOD	.188 (<LOD-.840)	.933 (.285-3.40)	1013
All Hispanics	11-12	*	<LOD	<LOD	<LOD	.964 (<LOD-2.76)	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	668
Asians	11-12	*	<LOD	<LOD	<LOD	.125 (<LOD-.372)	330
Asians	13-14	*	<LOD	<LOD	<LOD	.651 (<LOD-3.23)	290

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.089 and 0.089 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Urinary N,N-Diethyl-3-(hydroxymethyl) benzamide (DHMB) (creatinine corrected) (2011 - 2014)

CAS Number 72236-22-7

Metabolite of DEET

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	.661 (<LOD-1.37)	2419
Total population	13-14	*	<LOD	<LOD	<LOD	.721 (.346-2.03)	2657
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	1.05 (<LOD-6.45)	400
Age 6-11 years	13-14	*	<LOD	<LOD	.573 (<LOD-1.40)	1.69 (.594-7.63)	420
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	.405 (.252-1.08)	389
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.580 (.332-1.23)	424
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	.661 (<LOD-1.37)	1630
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	.629 (<LOD-2.11)	1813
Males	11-12	*	<LOD	<LOD	<LOD	.743 (.331-1.51)	1230
Males	13-14	*	<LOD	<LOD	.315 (<LOD-.661)	1.03 (.393-3.94)	1337
Females	11-12	*	<LOD	<LOD	<LOD	.617 (<LOD-1.29)	1189
Females	13-14	*	<LOD	<LOD	<LOD	.542 (<LOD-1.61)	1320
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	.786 (<LOD-1.29)	288
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.370 (<LOD-.676)	423
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	.415 (<LOD-.954)	668
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.333 (<LOD-1.12)	586
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	.699 (<LOD-1.51)	778
Non-Hispanic whites	13-14	*	<LOD	<LOD	.393 (<LOD-.886)	1.03 (.419-4.64)	1013
All Hispanics	11-12	*	<LOD	<LOD	<LOD	.798 (<LOD-1.64)	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	666
Asians	11-12	*	<LOD	<LOD	<LOD	.490 (<LOD-.786)	330
Asians	13-14	*	<LOD	<LOD	<LOD	.572 (<LOD-3.14)	290

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEET_BiomonitoringSummary.html

Neonicotinoid Insecticides

Urinary Acetamiprid (2015 - 2016)

CAS Number 135410-20-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3025
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	504
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	419
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	405
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1697
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1496
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1529
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	602
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	713
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	879
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	981
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	302

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.300.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Acetamiprid (creatinine corrected) (2015 - 2016)

CAS Number 135410-20-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3024
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	503
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	419
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	405
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1697
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1496
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1528
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	602
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	712
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	879
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	981
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	302

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Clothianidin (2015 - 2016)

CAS Number 210880-92-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	.396 (.283-.571)	3018
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	.463 (<LOD-.619)	505
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	.396 (<LOD-1.25)	419
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	.427 (<LOD-.579)	404
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	.393 (.283-.567)	1690
Males	15-16	*	<LOD	<LOD	<LOD	.375 (<LOD-.569)	1494
Females	15-16	*	<LOD	<LOD	<LOD	.463 (.272-.734)	1524
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	.592 (<LOD-1.37)	604
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	.573 (.270-1.10)	710
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	.318 (<LOD-.473)	874
All Hispanics	15-16	*	<LOD	<LOD	<LOD	.549 (<LOD-.930)	982
Asians	15-16	*	<LOD	<LOD	.354 (<LOD-.624)	.679 (.273-1.38)	304

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.200.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Clothianidin (creatinine corrected) (2015 - 2016)

CAS Number 210880-92-5

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	.741 (.667-.874)	3017
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	1.40 (<LOD-1.75)	504
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	.944 (<LOD-1.27)	419
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	.605 (<LOD-.922)	404
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	.727 (.656-.875)	1690
Males	15-16	*	<LOD	<LOD	<LOD	.618 (<LOD-.715)	1494
Females	15-16	*	<LOD	<LOD	<LOD	.875 (.700-1.17)	1523
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	.806 (<LOD-1.12)	604
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	.753 (.560-.922)	709
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	.737 (<LOD-.875)	874
All Hispanics	15-16	*	<LOD	<LOD	<LOD	.778 (<LOD-1.01)	982
Asians	15-16	*	<LOD	<LOD	.656 (<LOD-.708)	.875 (.667-1.31)	304

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Desmethylacetamiprid (2015 - 2016)

CAS Number 190604-92-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	.331 (.272-.385)	.797 (.640-.956)	1.29 (1.09-1.72)	3012
Age 3-5 years	15-16	*	.202 (<LOD-.238)	.707 (.533-.834)	1.50 (1.13-2.35)	2.57 (1.52-3.70)	503
Age 6-11 years	15-16	*	<LOD	.480 (.331-.662)	1.01 (.786-1.59)	1.62 (.981-2.23)	416
Age 12-19 years	15-16	*	<LOD	.380 (.265-.472)	.742 (.527-.956)	.998 (.742-1.69)	403
Age 20+ years	15-16	*	<LOD	.299 (.228-.376)	.695 (.562-.923)	1.27 (.963-1.87)	1690
Males	15-16	*	<LOD	.285 (.211-.376)	.640 (.498-.923)	1.16 (.903-1.85)	1491
Females	15-16	*	<LOD	.361 (.297-.450)	.934 (.760-1.00)	1.36 (1.16-1.86)	1521
Mexican Americans	15-16	*	<LOD	.352 (.251-.472)	.691 (.574-.882)	1.22 (.895-1.60)	601
Non-Hispanic blacks	15-16	*	<LOD	.323 (.260-.361)	.787 (.611-.945)	1.67 (1.07-2.11)	707
Non-Hispanic whites	15-16	*	<LOD	.309 (.246-.385)	.752 (.568-.976)	1.28 (.986-1.87)	876
All Hispanics	15-16	*	<LOD	.310 (.251-.376)	.674 (.550-.866)	1.16 (.882-1.60)	980
Asians	15-16	*	<LOD	.643 (.502-.831)	1.17 (.972-1.65)	1.77 (1.25-2.43)	299

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.200.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Desmethylacetamiprid (creatinine corrected) (2015 - 2016)

CAS Number 190604-92-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	.438 (.378-.488)	1.06 (.795-1.30)	1.93 (1.55-2.38)	3011
Age 3-5 years	15-16	*	.636 (<LOD-.737)	1.48 (1.16-1.95)	3.65 (2.52-4.59)	5.38 (4.30-6.10)	502
Age 6-11 years	15-16	*	<LOD	.667 (.518-.848)	1.42 (1.00-2.38)	2.73 (1.69-3.80)	416
Age 12-19 years	15-16	*	<LOD	.321 (.237-.457)	.665 (.483-1.15)	1.24 (.652-2.23)	403
Age 20+ years	15-16	*	<LOD	.394 (.346-.448)	.901 (.678-1.21)	1.67 (1.21-2.34)	1690
Males	15-16	*	<LOD	.318 (.275-.378)	.700 (.584-.900)	1.24 (.963-1.55)	1491
Females	15-16	*	<LOD	.538 (.438-.667)	1.40 (1.00-1.90)	2.22 (1.88-3.26)	1520
Mexican Americans	15-16	*	<LOD	.442 (.378-.545)	1.08 (.754-1.40)	1.96 (1.31-2.67)	601
Non-Hispanic blacks	15-16	*	<LOD	.311 (.263-.378)	.779 (.648-1.00)	1.35 (1.12-1.99)	706
Non-Hispanic whites	15-16	*	<LOD	.439 (.350-.500)	1.08 (.710-1.60)	2.00 (1.56-2.84)	876
All Hispanics	15-16	*	<LOD	.424 (.368-.470)	.963 (.737-1.17)	1.56 (1.29-2.33)	980
Asians	15-16	*	<LOD	.700 (.560-1.13)	1.45 (1.24-1.94)	2.77 (1.67-3.34)	299

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 5-Hydroxyimidacloprid (2015 - 2016)

CAS Number 380912-09-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	.872 (.719-.936)	1.37 (1.04-1.99)	2878
Age 3-5 years	15-16	*	<LOD	<LOD	.819 (.446-1.12)	1.14 (.715-2.17)	486
Age 6-11 years	15-16	*	<LOD	<LOD	.970 (.630-1.18)	1.38 (1.04-2.14)	404
Age 12-19 years	15-16	*	<LOD	<LOD	.834 (.483-1.04)	1.03 (.760-3.38)	390
Age 20+ years	15-16	*	<LOD	<LOD	.854 (.705-1.01)	1.38 (.990-2.34)	1598
Males	15-16	*	<LOD	<LOD	.858 (.650-1.08)	1.35 (.970-2.50)	1415
Females	15-16	*	<LOD	<LOD	.872 (.685-.954)	1.38 (.978-1.97)	1463
Mexican Americans	15-16	*	<LOD	<LOD	.682 (.566-.899)	1.12 (.858-1.43)	583
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.848 (.628-1.03)	1.25 (.936-1.48)	681
Non-Hispanic whites	15-16	*	<LOD	<LOD	.885 (.658-1.09)	1.61 (.922-2.73)	837
All Hispanics	15-16	*	<LOD	<LOD	.753 (.586-.936)	1.17 (.934-1.43)	944
Asians	15-16	*	<LOD	.573 (<LOD-.768)	1.25 (.805-2.03)	2.54 (1.38-3.57)	277

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.400.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 5-Hydroxyimidacloprid (creatinine corrected) (2015 - 2016)

CAS Number 380912-09-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	1.27 (1.08-1.44)	1.85 (1.58-2.15)	2877
Age 3-5 years	15-16	*	<LOD	<LOD	2.48 (1.87-3.03)	3.65 (2.80-4.89)	485
Age 6-11 years	15-16	*	<LOD	<LOD	1.51 (1.22-1.82)	2.41 (1.82-2.80)	404
Age 12-19 years	15-16	*	<LOD	<LOD	.757 (.582-1.33)	1.44 (.757-1.78)	390
Age 20+ years	15-16	*	<LOD	<LOD	1.20 (1.00-1.40)	1.83 (1.40-2.15)	1598
Males	15-16	*	<LOD	<LOD	1.06 (.902-1.27)	1.54 (1.16-1.87)	1415
Females	15-16	*	<LOD	<LOD	1.47 (1.27-1.68)	2.33 (1.68-2.99)	1462
Mexican Americans	15-16	*	<LOD	<LOD	1.20 (1.00-1.33)	1.67 (1.40-2.15)	583
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.881 (.781-1.04)	1.23 (1.12-1.51)	680
Non-Hispanic whites	15-16	*	<LOD	<LOD	1.38 (1.08-1.72)	2.03 (1.58-2.83)	837
All Hispanics	15-16	*	<LOD	<LOD	1.19 (1.00-1.28)	1.66 (1.40-2.00)	944
Asians	15-16	*	<LOD	1.04 (<LOD-1.16)	1.47 (1.22-1.89)	2.15 (1.40-6.11)	277

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Imidacloprid (2015 - 2016)

CAS Number 138261-41-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2995
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	.440 (<LOD-.497)	500
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	413
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	.401 (<LOD-.570)	398
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1684
Males	15-16	*	<LOD	<LOD	<LOD	.410 (<LOD-.468)	1481
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1514
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	.408 (<LOD-.563)	598
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	708
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	870
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	969
Asians	15-16	*	<LOD	<LOD	<LOD	.544 (<LOD-.692)	298

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.400.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Imidacloprid (creatinine corrected) (2015 - 2016)

CAS Number 138261-41-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2994
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	2.55 (<LOD-2.80)	499
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	413
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	.778 (<LOD-1.33)	398
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1684
Males	15-16	*	<LOD	<LOD	<LOD	1.08 (<LOD-1.22)	1481
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1513
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	1.22 (<LOD-1.40)	598
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	707
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	870
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	969
Asians	15-16	*	<LOD	<LOD	<LOD	1.40 (<LOD-2.00)	298

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Thiacloprid (2015 - 2016)

CAS Number 111988-49-9

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2998
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	504
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	417
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	399
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1678
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1484
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1514
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	601
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	700
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	869
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	978
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	302

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.030.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary Thiacloprid (creatinine corrected) (2015 - 2016)

CAS Number 111988-49-9

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2997
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	503
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	417
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	399
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1678
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1484
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1513
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	601
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	699
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	869
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	978
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	302

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Organophosphorus Insecticides: Specific Metabolites

Urinary 2-Isopropyl-4-methyl-6-hydroxypyrimidine (IMPY) (2011 - 2014)

CAS Number 2814-20-2

Metabolite of Diazinon

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.304 (.226-.451)	.608 (.570-.711)	2421
Total population	13-14	*	<LOD	<LOD	.232 (.180-.305)	.466 (.353-.593)	2648
Age 6-11 years	11-12	*	<LOD	<LOD	.292 (<LOD-.856)	.574 (.292-1.65)	397
Age 6-11 years	13-14	*	<LOD	<LOD	.229 (.157-.375)	.428 (.278-.884)	414
Age 12-19 years	11-12	*	<LOD	<LOD	.227 (.111-.608)	.482 (.304-1.41)	389
Age 12-19 years	13-14	*	<LOD	<LOD	.159 (.113-.227)	.267 (.171-.376)	426
Age 20+ years	11-12	*	<LOD	<LOD	.347 (.253-.451)	.623 (.570-.712)	1635
Age 20+ years	13-14	*	<LOD	<LOD	.242 (.189-.323)	.496 (.391-.652)	1808
Males	11-12	*	<LOD	<LOD	.368 (.210-.573)	.868 (.578-1.29)	1229
Males	13-14	*	<LOD	<LOD	.209 (.154-.322)	.477 (.296-.661)	1332
Females	11-12	*	<LOD	<LOD	.283 (.190-.416)	.529 (.406-.678)	1192
Females	13-14	*	<LOD	<LOD	.241 (.190-.318)	.465 (.371-.652)	1316
Mexican Americans	11-12	*	<LOD	<LOD	.228 (.156-.388)	.415 (.304-.689)	289
Mexican Americans	13-14	*	<LOD	<LOD	.163 (.135-.214)	.387 (.196-.815)	423
Non-Hispanic blacks	11-12	*	<LOD	.209 (.123-.300)	.533 (.362-.825)	1.23 (.782-1.67)	664
Non-Hispanic blacks	13-14	*	<LOD	.168 (.114-.241)	.434 (.306-.681)	.888 (.606-1.27)	583
Non-Hispanic whites	11-12	*	<LOD	<LOD	.263 (.161-.457)	.607 (.457-.765)	782
Non-Hispanic whites	13-14	*	<LOD	<LOD	.204 (.150-.270)	.391 (.264-.532)	1009
All Hispanics	11-12	*	<LOD	<LOD	.270 (.195-.347)	.498 (.379-.607)	558
All Hispanics	13-14	*	<LOD	<LOD	.205 (.155-.274)	.448 (.311-.754)	666
Asians	11-12	*	<LOD	<LOD	.253 (.138-.449)	.478 (.319-.932)	330
Asians	13-14	*	<LOD	<LOD	.202 (.118-.308)	.399 (.227-.698)	289

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Diazinon_BiomonitoringSummary.html

Urinary 2-Isopropyl-4-methyl-6-hydroxypyrimidine (IMPY) (creatinine corrected) (2011 - 2014)

CAS Number 2814-20-2

Metabolite of Diazinon

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.393 (.342-.438)	.636 (.566-.737)	2421
Total population	13-14	*	<LOD	<LOD	.318 (.282-.350)	.467 (.419-.577)	2646
Age 6-11 years	11-12	*	<LOD	<LOD	.538 (<LOD-.643)	.724 (.538-1.35)	397
Age 6-11 years	13-14	*	<LOD	<LOD	.387 (.308-.500)	.711 (.389-1.40)	414
Age 12-19 years	11-12	*	<LOD	<LOD	.280 (.206-.350)	.438 (.280-.717)	389
Age 12-19 years	13-14	*	<LOD	<LOD	.189 (.165-.298)	.368 (.189-.467)	426
Age 20+ years	11-12	*	<LOD	<LOD	.412 (.344-.456)	.655 (.538-.811)	1635
Age 20+ years	13-14	*	<LOD	<LOD	.318 (.280-.355)	.469 (.434-.584)	1806
Males	11-12	*	<LOD	<LOD	.368 (.290-.456)	.602 (.467-1.00)	1229
Males	13-14	*	<LOD	<LOD	.252 (.231-.304)	.409 (.333-.522)	1331
Females	11-12	*	<LOD	<LOD	.425 (.344-.500)	.636 (.535-.868)	1192
Females	13-14	*	<LOD	<LOD	.368 (.318-.412)	.562 (.443-.816)	1315
Mexican Americans	11-12	*	<LOD	<LOD	.329 (.259-.410)	.534 (.333-.688)	289
Mexican Americans	13-14	*	<LOD	<LOD	.318 (.219-.412)	.467 (.350-.756)	421
Non-Hispanic blacks	11-12	*	<LOD	.184 (.141-.226)	.459 (.312-.619)	.717 (.561-1.00)	664
Non-Hispanic blacks	13-14	*	<LOD	.152 (.135-.183)	.322 (.242-.490)	.622 (.374-.959)	583
Non-Hispanic whites	11-12	*	<LOD	<LOD	.402 (.333-.456)	.669 (.511-.975)	782
Non-Hispanic whites	13-14	*	<LOD	<LOD	.318 (.255-.368)	.438 (.368-.680)	1009
All Hispanics	11-12	*	<LOD	<LOD	.333 (.274-.394)	.500 (.400-.590)	558
All Hispanics	13-14	*	<LOD	<LOD	.333 (.292-.393)	.538 (.412-.756)	664
Asians	11-12	*	<LOD	<LOD	.435 (.333-.504)	.753 (.481-.987)	330
Asians	13-14	*	<LOD	<LOD	.331 (.259-.377)	.469 (.350-.636)	289

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Diazinon_BiomonitoringSummary.html

Urinary para-Nitrophenol (2011 - 2014)

CAS Number 100-02-7

Metabolite of Parathion, Methyl Parathion, O-Ethyl O-(4-nitrophenyl) phenylphosphonothioate

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.636 (.569-.710)	.632 (.571-.703)	1.17 (1.08-1.33)	2.17 (1.96-2.48)	3.31 (2.87-3.69)	2350
Total population	13-14	.644 (.601-.689)	.610 (.554-.675)	1.18 (1.09-1.30)	2.17 (1.94-2.30)	3.21 (2.92-3.69)	2584
Age 6-11 years	11-12	.615 (.503-.750)	.596 (.487-.806)	1.21 (.998-1.48)	2.08 (1.83-2.40)	2.78 (2.08-3.97)	394
Age 6-11 years	13-14	.839 (.717-.983)	.863 (.774-.977)	1.66 (1.30-2.12)	3.11 (2.55-3.42)	4.09 (3.13-4.64)	411
Age 12-19 years	11-12	.615 (.511-.740)	.637 (.489-.822)	1.15 (1.02-1.45)	1.85 (1.57-2.28)	2.51 (2.05-3.70)	376
Age 12-19 years	13-14	.664 (.573-.770)	.682 (.593-.822)	1.23 (1.05-1.44)	1.82 (1.55-2.45)	2.71 (1.94-2.90)	415
Age 20+ years	11-12	.641 (.571-.720)	.634 (.567-.712)	1.18 (1.08-1.32)	2.23 (1.99-2.56)	3.48 (3.07-3.95)	1580
Age 20+ years	13-14	.622 (.580-.667)	.572 (.526-.639)	1.14 (1.02-1.26)	2.07 (1.84-2.27)	3.21 (2.85-3.86)	1758
Males	11-12	.671 (.609-.739)	.700 (.615-.770)	1.24 (1.13-1.39)	2.21 (1.95-2.50)	3.19 (2.76-3.53)	1190
Males	13-14	.671 (.615-.732)	.650 (.560-.732)	1.17 (1.03-1.30)	2.02 (1.73-2.21)	3.03 (2.31-3.83)	1306
Females	11-12	.604 (.519-.702)	.582 (.500-.669)	1.13 (.996-1.33)	2.14 (1.82-2.63)	3.48 (2.87-3.81)	1160
Females	13-14	.618 (.564-.676)	.577 (.519-.641)	1.19 (1.07-1.39)	2.32 (2.03-2.76)	3.40 (2.91-4.06)	1278
Mexican Americans	11-12	.619 (.524-.732)	.682 (.514-.915)	1.18 (1.07-1.29)	1.84 (1.51-2.12)	2.51 (2.00-3.10)	285
Mexican Americans	13-14	.683 (.581-.802)	.670 (.528-.912)	1.30 (1.03-1.49)	2.07 (1.68-2.29)	2.64 (2.23-3.05)	403
Non-Hispanic blacks	11-12	.695 (.554-.873)	.722 (.603-.887)	1.37 (1.12-1.64)	2.34 (1.99-3.10)	3.47 (2.56-4.08)	642
Non-Hispanic blacks	13-14	.762 (.692-.840)	.780 (.660-.874)	1.37 (1.27-1.51)	2.49 (2.19-2.89)	3.59 (2.92-4.07)	576
Non-Hispanic whites	11-12	.620 (.542-.708)	.602 (.534-.691)	1.15 (1.06-1.33)	2.13 (1.82-2.63)	3.31 (2.62-4.10)	752
Non-Hispanic whites	13-14	.601 (.563-.642)	.566 (.518-.614)	1.10 (1.01-1.19)	2.03 (1.77-2.27)	3.16 (2.76-3.89)	986
All Hispanics	11-12	.643 (.576-.717)	.682 (.580-.782)	1.16 (1.06-1.28)	1.98 (1.78-2.46)	2.98 (2.51-3.79)	546
All Hispanics	13-14	.691 (.603-.791)	.672 (.551-.830)	1.29 (1.04-1.48)	2.17 (1.80-2.45)	2.82 (2.32-3.52)	637
Asians	11-12	.716 (.630-.814)	.618 (.514-.815)	1.54 (1.17-1.80)	2.84 (2.29-3.18)	3.87 (3.05-5.79)	325
Asians	13-14	.743 (.618-.893)	.633 (.512-.816)	1.39 (1.13-1.92)	3.16 (1.93-4.70)	4.90 (3.21-8.06)	284

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Nitrobenzene_BiomonitoringSummary.html

Urinary para-Nitrophenol (creatinine corrected) (2011 - 2014)

CAS Number 100-02-7

Metabolite of Parathion, Methyl Parathion, O-Ethyl O-(4-nitrophenyl) phenylphosphonothioate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	0.679 (.614-.750)	.648 (.603-.707)	1.10 (1.02-1.19)	2.04 (1.88-2.28)	2.97 (2.51-3.45)	2350
Total population	13-14	0.694 (.653-.737)	.645 (.594-.704)	1.13 (1.06-1.22)	1.97 (1.78-2.14)	3.04 (2.63-3.38)	2582
Age 6-11 years	11-12	0.879 (.739-1.05)	.878 (.720-1.04)	1.26 (1.12-1.62)	2.28 (1.81-3.04)	3.14 (2.38-4.11)	394
Age 6-11 years	13-14	1.09 (.981-1.22)	1.08 (.929-1.30)	1.74 (1.53-1.97)	2.89 (2.29-3.95)	4.18 (3.06-5.04)	411
Age 12-19 years	11-12	0.564 (.494-.644)	.581 (.499-.679)	.850 (.756-1.04)	1.35 (1.07-1.64)	1.77 (1.36-2.54)	376
Age 12-19 years	13-14	0.577 (.520-.640)	.556 (.497-.643)	.822 (.740-.951)	1.24 (1.06-1.49)	1.65 (1.24-2.35)	415
Age 20+ years	11-12	0.678 (.608-.757)	.644 (.584-.701)	1.12 (1.01-1.21)	2.14 (1.96-2.42)	3.24 (2.57-3.55)	1580
Age 20+ years	13-14	0.678 (.635-.724)	.625 (.576-.682)	1.10 (1.03-1.18)	1.93 (1.76-2.11)	3.05 (2.59-3.38)	1756
Males	11-12	0.622 (.573-.674)	.603 (.566-.647)	1.01 (.928-1.10)	1.70 (1.43-1.89)	2.28 (1.96-2.72)	1190
Males	13-14	0.619 (.572-.670)	.576 (.518-.640)	.979 (.874-1.10)	1.69 (1.41-1.91)	2.45 (1.91-3.16)	1305
Females	11-12	0.738 (.649-.839)	.707 (.644-.788)	1.21 (1.11-1.35)	2.48 (2.32-2.64)	3.46 (2.87-4.23)	1160
Females	13-14	0.774 (.724-.827)	.723 (.657-.795)	1.31 (1.17-1.40)	2.23 (1.97-2.64)	3.38 (2.89-3.65)	1277
Mexican Americans	11-12	0.621 (.547-.705)	.590 (.500-.714)	.992 (.874-1.15)	1.68 (1.33-1.82)	2.32 (1.72-2.64)	285
Mexican Americans	13-14	0.713 (.594-.856)	.673 (.553-.817)	1.10 (.932-1.31)	1.71 (1.46-2.03)	2.33 (1.89-2.75)	401
Non-Hispanic blacks	11-12	0.518 (.408-.659)	.527 (.450-.630)	.914 (.776-1.14)	1.52 (1.27-1.98)	2.34 (1.86-2.69)	642
Non-Hispanic blacks	13-14	0.588 (.530-.651)	.578 (.536-.627)	.928 (.824-1.07)	1.72 (1.50-1.92)	2.29 (1.87-2.74)	576
Non-Hispanic whites	11-12	0.706 (.640-.779)	.691 (.630-.732)	1.13 (1.03-1.23)	2.09 (1.88-2.42)	3.24 (2.36-4.16)	752
Non-Hispanic whites	13-14	0.689 (.648-.732)	.631 (.580-.693)	1.12 (1.03-1.27)	1.96 (1.75-2.23)	3.07 (2.34-3.60)	986
All Hispanics	11-12	0.656 (.599-.718)	.637 (.573-.726)	1.02 (.914-1.14)	1.72 (1.51-1.94)	2.48 (1.92-2.71)	546
All Hispanics	13-14	0.724 (.628-.835)	.681 (.578-.792)	1.12 (1.00-1.25)	1.76 (1.57-1.98)	2.64 (2.13-3.30)	635
Asians	11-12	0.962 (.852-1.09)	.931 (.707-1.11)	1.83 (1.53-2.19)	3.05 (2.56-3.95)	4.44 (3.72-5.30)	325
Asians	13-14	0.962 (.834-1.11)	.872 (.746-1.04)	1.79 (1.44-2.29)	3.44 (2.74-4.66)	4.85 (3.48-6.31)	284

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Nitrobenzene_BiomonitoringSummary.html

Organophosphorus Insecticides: Dialkyl Phosphate Metabolites

Urinary Diethylphosphate (DEP) (2011 - 2012)

CAS Number 598-02-7

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.18 (1.98-2.41)	2.16 (1.90-2.52)	4.99 (4.43-5.77)	11.3 (9.79-12.8)	19.5 (15.8-22.7)	2417
Age 6-11 years	11-12	2.78 (2.18-3.55)	2.73 (1.83-4.04)	7.42 (5.80-9.84)	17.3 (12.5-24.3)	28.9 (16.2-37.0)	397
Age 12-19 years	11-12	2.29 (1.97-2.67)	2.06 (1.74-2.66)	5.94 (3.80-7.84)	12.1 (10.3-16.3)	19.3 (13.6-33.5)	387
Age 20+ years	11-12	2.11 (1.89-2.37)	2.15 (1.89-2.49)	4.70 (4.29-5.46)	10.8 (9.16-12.4)	18.5 (13.6-21.9)	1633
Males	11-12	2.17 (1.93-2.44)	2.18 (1.90-2.62)	5.07 (4.34-5.86)	11.4 (10.4-13.0)	19.9 (13.6-23.1)	1222
Females	11-12	2.20 (1.92-2.53)	2.15 (1.79-2.54)	4.91 (4.28-5.97)	10.8 (8.99-13.7)	19.1 (13.6-25.3)	1195
Mexican Americans	11-12	2.09 (1.85-2.35)	2.10 (1.85-2.54)	4.71 (3.40-5.90)	8.43 (7.10-12.1)	17.3 (8.75-25.2)	288
Non-Hispanic blacks	11-12	2.88 (2.49-3.33)	2.87 (2.41-3.42)	6.16 (5.26-7.04)	14.0 (10.5-18.1)	20.7 (17.5-30.0)	669
Non-Hispanic whites	11-12	2.09 (1.81-2.42)	2.07 (1.75-2.50)	4.71 (3.93-5.86)	11.1 (9.34-12.3)	19.2 (12.3-28.7)	780
All Hispanics	11-12	2.16 (1.86-2.52)	2.11 (1.78-2.55)	4.78 (4.11-6.08)	11.0 (7.99-14.8)	19.1 (14.4-22.6)	555
Asians	11-12	1.82 (1.54-2.16)	1.94 (1.58-2.42)	4.19 (3.34-5.08)	7.86 (6.43-9.91)	12.8 (8.90-15.1)	325

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.370.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Diethylphosphate (DEP) (creatinine corrected) (2011 - 2012)

CAS Number 598-02-7

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.29 (2.11-2.49)	2.25 (1.98-2.55)	4.59 (4.11-5.39)	9.71 (8.46-10.9)	14.2 (12.4-16.8)	2417
Age 6-11 years	11-12	3.86 (3.24-4.58)	3.68 (2.91-4.51)	8.44 (6.42-10.7)	18.4 (13.0-27.2)	29.1 (16.5-35.8)	397
Age 12-19 years	11-12	2.07 (1.77-2.43)	1.80 (1.57-2.36)	4.32 (3.70-4.84)	9.28 (5.88-11.5)	11.5 (9.28-16.3)	387
Age 20+ years	11-12	2.19 (1.99-2.42)	2.19 (1.90-2.53)	4.46 (3.85-5.01)	8.77 (7.38-10.7)	13.3 (11.5-15.0)	1633
Males	11-12	1.98 (1.77-2.21)	1.88 (1.71-2.06)	4.31 (3.44-4.94)	8.70 (7.60-10.5)	14.7 (10.7-20.1)	1222
Females	11-12	2.62 (2.39-2.87)	2.64 (2.23-3.08)	5.01 (4.46-5.78)	10.6 (8.48-12.0)	13.9 (12.0-16.4)	1195
Mexican Americans	11-12	2.08 (1.83-2.37)	2.13 (1.64-2.70)	3.57 (3.05-4.84)	8.44 (5.70-10.9)	13.2 (10.3-15.0)	288
Non-Hispanic blacks	11-12	2.12 (1.82-2.48)	2.00 (1.60-2.67)	4.39 (3.67-5.17)	9.00 (6.83-10.9)	13.5 (9.72-18.6)	669
Non-Hispanic whites	11-12	2.33 (2.11-2.57)	2.31 (2.01-2.59)	4.62 (3.99-5.78)	9.81 (7.86-11.5)	15.0 (12.0-20.1)	780
All Hispanics	11-12	2.17 (1.93-2.43)	2.16 (1.70-2.62)	4.19 (3.33-4.94)	9.82 (7.15-10.9)	13.7 (10.9-16.3)	555
Asians	11-12	2.44 (2.12-2.81)	2.39 (2.04-2.60)	4.52 (3.24-5.49)	9.07 (7.44-11.5)	13.1 (10.8-15.6)	325

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Dimethylphosphate (DMP) (2011 - 2012)

CAS Number 813-78-5

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.34 (2.14-2.57)	2.33 (2.08-2.51)	5.31 (4.62-6.20)	11.0 (8.98-13.2)	18.8 (17.0-20.4)	2393
Age 6-11 years	11-12	2.89 (2.40-3.49)	3.07 (2.48-3.87)	7.50 (6.16-8.88)	17.6 (11.6-27.2)	28.8 (20.5-40.8)	392
Age 12-19 years	11-12	2.32 (1.92-2.81)	2.07 (1.75-2.44)	5.33 (3.99-6.65)	12.7 (8.98-16.5)	17.1 (14.5-20.4)	389
Age 20+ years	11-12	2.29 (2.04-2.58)	2.31 (2.05-2.52)	4.94 (4.29-6.17)	10.1 (8.64-12.9)	18.0 (14.6-20.7)	1612
Males	11-12	2.34 (2.04-2.69)	2.30 (2.07-2.59)	5.30 (4.57-6.24)	10.4 (8.43-13.7)	18.9 (15.7-25.1)	1213
Females	11-12	2.34 (2.06-2.66)	2.34 (2.00-2.61)	5.31 (4.33-6.30)	11.3 (9.32-13.8)	18.7 (15.0-19.6)	1180
Mexican Americans	11-12	3.15 (2.82-3.52)	3.22 (2.83-3.52)	6.43 (5.25-7.62)	14.3 (11.0-18.5)	21.6 (15.8-22.5)	287
Non-Hispanic blacks	11-12	2.91 (2.59-3.26)	2.85 (2.35-3.28)	6.56 (5.36-7.30)	12.1 (9.55-15.4)	21.1 (15.4-32.7)	662
Non-Hispanic whites	11-12	2.14 (1.88-2.44)	2.12 (1.76-2.40)	4.69 (4.23-5.98)	9.72 (8.18-12.2)	17.8 (13.5-19.9)	769
All Hispanics	11-12	2.81 (2.46-3.20)	3.04 (2.54-3.34)	6.08 (4.90-7.39)	12.7 (9.58-14.8)	18.5 (13.8-22.1)	554
Asians	11-12	2.21 (1.88-2.60)	2.16 (1.68-2.58)	4.86 (3.88-6.34)	11.6 (9.04-15.7)	18.1 (12.5-23.4)	321

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.470.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Dimethylphosphate (DMP) (creatinine corrected) (2011 - 2012)

CAS Number 813-78-5

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.45 (2.30-2.62)	2.32 (2.14-2.55)	4.87 (4.41-5.49)	10.6 (9.20-11.7)	17.3 (14.0-19.3)	2393
Age 6-11 years	11-12	4.01 (3.41-4.73)	4.01 (3.19-4.84)	8.70 (6.78-10.6)	19.9 (12.2-23.2)	25.7 (17.2-44.4)	392
Age 12-19 years	11-12	2.09 (1.74-2.51)	1.99 (1.65-2.26)	4.28 (2.87-5.42)	8.62 (5.29-12.5)	14.0 (9.06-19.9)	389
Age 20+ years	11-12	2.38 (2.16-2.62)	2.28 (2.05-2.55)	4.66 (4.04-5.41)	10.0 (8.41-11.3)	15.4 (13.3-18.1)	1612
Males	11-12	2.15 (1.91-2.42)	1.99 (1.82-2.30)	4.24 (3.79-4.81)	8.71 (7.54-11.9)	15.4 (12.6-19.3)	1213
Females	11-12	2.78 (2.54-3.04)	2.54 (2.27-2.93)	5.65 (4.67-6.95)	11.4 (10.0-12.8)	18.2 (13.3-23.4)	1180
Mexican Americans	11-12	3.14 (2.70-3.64)	2.90 (2.40-3.60)	5.98 (4.74-6.95)	11.3 (8.91-14.0)	17.6 (13.1-26.6)	287
Non-Hispanic blacks	11-12	2.14 (1.88-2.42)	2.06 (1.84-2.24)	4.00 (3.45-4.53)	8.30 (7.19-10.7)	17.2 (10.4-22.6)	662
Non-Hispanic whites	11-12	2.39 (2.18-2.63)	2.29 (2.04-2.59)	4.83 (3.99-5.76)	10.6 (8.62-12.1)	16.2 (13.1-20.9)	769
All Hispanics	11-12	2.82 (2.46-3.24)	2.71 (2.30-3.17)	5.18 (4.45-6.47)	11.5 (8.72-13.6)	17.0 (13.0-23.6)	554
Asians	11-12	2.92 (2.55-3.35)	2.60 (2.16-3.62)	5.76 (5.10-6.98)	12.0 (9.30-15.2)	17.0 (13.2-20.4)	321

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Diethylthiophosphate (DETP) (2011 - 2012)

CAS Number 5871-17-0

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.632 (<LOD-.775)	1.77 (1.41-2.09)	2.83 (2.37-3.31)	2397
Age 6-11 years	11-12	*	<LOD	.868 (.563-1.13)	2.29 (1.49-4.94)	5.68 (2.12-10.1)	398
Age 12-19 years	11-12	*	<LOD	.595 (<LOD-.731)	1.65 (.862-2.18)	2.70 (1.65-5.03)	388
Age 20+ years	11-12	*	<LOD	.623 (<LOD-.792)	1.76 (1.35-2.00)	2.82 (2.12-3.33)	1611
Males	11-12	*	<LOD	.645 (<LOD-.838)	1.82 (1.52-2.19)	2.82 (2.30-3.92)	1212
Females	11-12	*	<LOD	.626 (<LOD-.803)	1.66 (1.20-2.09)	2.86 (2.23-3.21)	1185
Mexican Americans	11-12	*	<LOD	.672 (<LOD-.880)	2.69 (1.11-3.62)	3.82 (2.69-6.47)	284
Non-Hispanic blacks	11-12	*	<LOD	.774 (.611-1.03)	2.18 (1.70-2.68)	3.70 (2.76-4.28)	665
Non-Hispanic whites	11-12	*	<LOD	.580 (<LOD-.797)	1.75 (1.07-2.09)	2.53 (1.98-2.96)	770
All Hispanics	11-12	*	<LOD	.646 (<LOD-.806)	1.79 (1.12-2.86)	3.33 (2.68-4.69)	549
Asians	11-12	*	<LOD	.764 (.614-.946)	1.67 (1.35-2.39)	3.25 (1.93-5.94)	326

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.560.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Diethylthiophosphate (DETP) (creatinine corrected) (2011 - 2012)

CAS Number 5871-17-0

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.623 (<LOD-.734)	1.51 (1.36-1.78)	2.63 (2.29-3.25)	2397
Age 6-11 years	11-12	*	<LOD	1.01 (.705-1.36)	2.66 (1.60-4.13)	4.28 (3.19-9.75)	398
Age 12-19 years	11-12	*	<LOD	.500 (<LOD-.725)	1.11 (.839-1.42)	1.83 (.980-3.75)	388
Age 20+ years	11-12	*	<LOD	.607 (<LOD-.727)	1.51 (1.36-1.73)	2.56 (2.15-3.01)	1611
Males	11-12	*	<LOD	.556 (<LOD-.728)	1.45 (1.07-1.70)	2.51 (1.76-3.69)	1212
Females	11-12	*	<LOD	.663 (<LOD-.800)	1.70 (1.28-2.24)	2.79 (2.05-3.44)	1185
Mexican Americans	11-12	*	<LOD	.650 (<LOD-.824)	2.10 (1.17-3.45)	3.76 (2.11-4.90)	284
Non-Hispanic blacks	11-12	*	<LOD	.515 (.411-.715)	1.37 (1.14-1.71)	2.33 (1.86-2.70)	665
Non-Hispanic whites	11-12	*	<LOD	.627 (<LOD-.811)	1.50 (1.31-1.73)	2.60 (1.93-3.31)	770
All Hispanics	11-12	*	<LOD	.596 (<LOD-.771)	1.76 (1.12-2.42)	3.48 (2.11-4.81)	549
Asians	11-12	*	<LOD	.864 (.705-1.00)	2.04 (1.48-2.91)	3.49 (2.28-5.00)	326

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Dimethylthiophosphate (DMTP) (2011 - 2012)

CAS Number 59401-04-6

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.55 (1.38-1.73)	1.51 (1.34-1.71)	4.45 (3.85-5.09)	11.9 (9.29-15.5)	25.1 (19.1-32.2)	2413
Age 6-11 years	11-12	1.77 (1.41-2.22)	1.58 (1.16-2.03)	5.68 (3.65-7.18)	20.5 (9.98-45.2)	47.7 (16.8-72.2)	397
Age 12-19 years	11-12	1.38 (1.10-1.72)	1.34 (.950-1.64)	3.31 (2.45-4.42)	9.49 (6.83-12.6)	26.3 (8.67-40.7)	387
Age 20+ years	11-12	1.55 (1.33-1.80)	1.59 (1.34-1.80)	4.48 (3.73-5.55)	11.6 (8.96-15.6)	21.5 (15.8-31.0)	1629
Males	11-12	1.55 (1.36-1.77)	1.56 (1.38-1.76)	4.29 (3.66-5.19)	12.7 (10.3-16.5)	25.1 (17.6-39.0)	1223
Females	11-12	1.54 (1.32-1.80)	1.41 (1.16-1.82)	4.47 (3.73-5.40)	10.8 (7.78-16.9)	23.3 (14.9-32.4)	1190
Mexican Americans	11-12	1.87 (1.55-2.26)	1.67 (1.39-2.12)	4.58 (3.46-6.64)	12.7 (8.41-23.0)	24.1 (13.2-43.3)	285
Non-Hispanic blacks	11-12	1.47 (1.23-1.75)	1.34 (1.04-1.79)	4.02 (3.19-5.04)	10.3 (8.21-11.7)	16.9 (11.7-29.0)	667
Non-Hispanic whites	11-12	1.55 (1.28-1.88)	1.59 (1.18-1.98)	4.62 (3.73-5.76)	13.9 (8.64-19.1)	27.5 (19.1-34.7)	781
All Hispanics	11-12	1.66 (1.44-1.92)	1.56 (1.34-1.79)	4.28 (3.36-4.98)	11.4 (8.19-16.6)	23.6 (12.7-36.2)	553
Asians	11-12	1.41 (1.17-1.71)	1.38 (1.00-1.78)	4.36 (2.92-5.81)	12.3 (8.50-16.5)	25.1 (12.3-53.6)	324

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.550.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Dimethylthiophosphate (DMTP) (creatinine corrected) (2011 - 2012)

CAS Number 59401-04-6

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.62 (1.47-1.78)	1.44 (1.29-1.54)	4.33 (3.55-5.09)	12.1 (9.55-16.4)	26.9 (18.6-34.9)	2413
Age 6-11 years	11-12	2.48 (2.01-3.06)	1.88 (1.48-2.58)	7.36 (4.53-11.8)	25.7 (15.4-44.0)	49.1 (21.7-70.3)	397
Age 12-19 years	11-12	1.24 (.983-1.56)	.915 (.721-1.33)	2.45 (1.74-3.42)	8.22 (4.96-17.4)	25.5 (7.80-39.8)	387
Age 20+ years	11-12	1.61 (1.40-1.85)	1.46 (1.27-1.68)	4.42 (3.52-5.17)	11.5 (8.30-16.4)	23.4 (16.3-32.4)	1629
Males	11-12	1.41 (1.26-1.59)	1.21 (1.03-1.40)	3.59 (3.08-4.68)	11.6 (9.55-14.5)	20.7 (15.1-33.1)	1223
Females	11-12	1.84 (1.64-2.06)	1.60 (1.34-1.90)	4.64 (3.92-5.40)	12.4 (8.83-20.7)	28.7 (18.6-39.8)	1190
Mexican Americans	11-12	1.85 (1.43-2.41)	1.82 (1.33-2.21)	4.30 (2.91-6.60)	13.1 (7.73-21.4)	26.9 (13.2-46.1)	285
Non-Hispanic blacks	11-12	1.08 (.899-1.30)	.940 (.783-1.16)	2.55 (2.01-3.40)	7.18 (5.09-9.99)	13.8 (9.16-20.3)	667
Non-Hispanic whites	11-12	1.73 (1.51-1.98)	1.48 (1.25-1.80)	4.81 (3.89-5.80)	13.6 (9.55-20.7)	29.7 (18.1-42.3)	781
All Hispanics	11-12	1.67 (1.40-1.99)	1.53 (1.30-1.77)	3.63 (2.82-4.86)	12.3 (8.14-18.6)	25.0 (15.1-37.8)	553
Asians	11-12	1.89 (1.58-2.27)	1.77 (1.44-2.14)	4.75 (3.89-6.41)	11.5 (7.24-29.8)	29.8 (12.1-42.4)	324

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Diethyldithiophosphate (DEDTP) (2011 - 2012)

CAS Number 298-06-6

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2425
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	398
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	389
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1638
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1227
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1198
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	288
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	671
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	782
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	558
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	328

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.390.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Diethyldithiophosphate (DEDTP) (creatinine corrected) (2011 - 2012)

CAS Number 298-06-6

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2425
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	398
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	389
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1638
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1227
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1198
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	288
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	671
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	782
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	558
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	328

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Dimethyldithiophosphate (DMDTP) (2011 - 2012)

CAS Number 756-80-9

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	1.46 (1.11-2.00)	3.18 (1.85-5.49)	2426
Age 6-11 years	11-12	*	<LOD	<LOD	1.84 (.890-2.97)	5.44 (1.92-9.78)	396
Age 12-19 years	11-12	*	<LOD	<LOD	1.29 (.729-3.15)	2.80 (1.21-5.84)	389
Age 20+ years	11-12	*	<LOD	<LOD	1.44 (1.04-2.08)	3.18 (1.65-5.36)	1641
Males	11-12	*	<LOD	<LOD	1.34 (.922-2.00)	3.77 (1.83-6.52)	1226
Females	11-12	*	<LOD	<LOD	1.51 (1.13-2.22)	3.15 (1.65-5.84)	1200
Mexican Americans	11-12	*	<LOD	<LOD	1.64 (.667-3.49)	4.60 (1.67-9.61)	288
Non-Hispanic blacks	11-12	*	<LOD	<LOD	1.06 (.797-1.66)	2.36 (1.48-3.28)	669
Non-Hispanic whites	11-12	*	<LOD	.511 (<LOD-.633)	1.63 (1.14-2.49)	3.90 (1.84-6.46)	783
All Hispanics	11-12	*	<LOD	<LOD	1.33 (.756-2.10)	2.81 (1.64-5.94)	558
Asians	11-12	*	<LOD	<LOD	1.20 (.731-1.66)	2.04 (1.48-2.87)	329

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.510.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Urinary Dimethyldithiophosphate (DMDTP) (creatinine corrected) (2011 - 2012)

CAS Number 756-80-9

Metabolite of Several Organophosphorus Insecticides

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	1.68 (1.06-2.43)	3.72 (2.18-5.15)	2426
Age 6-11 years	11-12	*	<LOD	<LOD	2.23 (1.39-4.83)	5.07 (2.23-8.51)	396
Age 12-19 years	11-12	*	<LOD	<LOD	1.13 (.561-2.01)	2.39 (1.13-8.50)	389
Age 20+ years	11-12	*	<LOD	<LOD	1.67 (1.01-2.75)	3.71 (2.02-5.29)	1641
Males	11-12	*	<LOD	<LOD	1.31 (1.05-1.92)	3.72 (1.72-4.52)	1226
Females	11-12	*	<LOD	<LOD	1.90 (1.10-2.75)	3.65 (2.18-5.32)	1200
Mexican Americans	11-12	*	<LOD	<LOD	1.60 (.759-3.88)	4.52 (1.60-11.8)	288
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.873 (.538-1.33)	1.92 (1.03-2.74)	669
Non-Hispanic whites	11-12	*	<LOD	.559 (<LOD-.752)	1.92 (1.17-3.58)	4.29 (2.38-6.94)	783
All Hispanics	11-12	*	<LOD	<LOD	1.35 (.858-2.66)	3.88 (1.87-6.92)	558
Asians	11-12	*	<LOD	<LOD	1.29 (.918-1.83)	2.19 (1.53-3.14)	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OP-DPM_BiomonitoringSummary.html

Pyrethroid Metabolites

Urinary trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (trans-DCCA) (2011 - 2014)

CAS Number 55701-05-8

Metabolite of Cyfluthrin, trans-Cypermethrin, and trans-Permethrin

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	4.22 (1.45-8.02)	2275
Total population	13-14	*	<LOD	.622 (<LOD-.805)	2.38 (2.05-2.84)	5.20 (4.05-7.02)	2622
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	3.56 (<LOD-12.1)	376
Age 6-11 years	13-14	*	<LOD	.736 (<LOD-1.17)	2.33 (1.07-3.60)	3.87 (2.02-12.1)	416
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	2.43 (.608-9.26)	363
Age 12-19 years	13-14	*	<LOD	<LOD	2.17 (1.17-3.01)	3.46 (2.39-8.18)	420
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	4.33 (1.50-8.33)	1536
Age 20+ years	13-14	*	<LOD	.622 (<LOD-.860)	2.51 (1.98-3.25)	6.30 (4.05-8.46)	1786
Males	11-12	*	<LOD	<LOD	<LOD	4.55 (1.16-13.8)	1168
Males	13-14	*	<LOD	.622 (<LOD-.789)	2.15 (1.46-2.90)	4.19 (2.99-7.02)	1319
Females	11-12	*	<LOD	<LOD	<LOD	3.98 (1.45-6.73)	1107
Females	13-14	*	<LOD	.620 (<LOD-.874)	2.80 (2.08-3.87)	6.34 (4.56-8.18)	1303
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	1.36 (<LOD-5.53)	284
Mexican Americans	13-14	*	<LOD	.617 (<LOD-.996)	1.85 (1.11-3.50)	4.62 (1.78-7.79)	425
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	4.20 (1.31-10.9)	616
Non-Hispanic blacks	13-14	*	<LOD	.601 (<LOD-.860)	2.55 (1.55-3.18)	5.95 (3.33-12.2)	581
Non-Hispanic whites	11-12	*	<LOD	<LOD	1.13 (<LOD-3.45)	4.55 (1.52-11.3)	746
Non-Hispanic whites	13-14	*	<LOD	.657 (<LOD-.959)	2.70 (2.21-3.49)	6.48 (4.56-9.06)	992
All Hispanics	11-12	*	<LOD	<LOD	<LOD	1.06 (<LOD-3.12)	523
All Hispanics	13-14	*	<LOD	<LOD	1.79 (1.22-2.28)	3.89 (2.01-6.63)	663
Asians	11-12	*	<LOD	<LOD	<LOD	4.24 (<LOD-8.42)	307
Asians	13-14	*	<LOD	<LOD	1.98 (1.25-3.07)	4.03 (2.13-11.3)	287

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.600 and 0.600 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cyfluthrin_Cypermethrin_Permethrin_BiomonitoringSummary.html

Urinary trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid (trans-DCCA) (creatinine corrected) (2011 - 2014)

CAS Number 55701-05-8

Metabolite of Cyfluthrin, trans-Cypermethrin, and trans-Permethrin

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	4.09 (2.64-7.33)	2275
Total population	13-14	*	<LOD	1.20 (<LOD-1.31)	2.63 (2.36-3.23)	6.11 (4.66-8.40)	2620
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	5.06 (<LOD-8.07)	376
Age 6-11 years	13-14	*	<LOD	1.40 (<LOD-1.81)	2.80 (2.00-4.17)	4.17 (2.63-18.1)	416
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	3.00 (1.68-7.02)	363
Age 12-19 years	13-14	*	<LOD	<LOD	2.22 (1.26-3.00)	3.03 (2.21-7.10)	420
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	4.20 (2.63-8.24)	1536
Age 20+ years	13-14	*	<LOD	1.20 (<LOD-1.37)	2.80 (2.30-3.75)	6.87 (4.87-10.3)	1784
Males	11-12	*	<LOD	<LOD	<LOD	5.71 (2.00-12.8)	1168
Males	13-14	*	<LOD	.947 (<LOD-1.11)	2.13 (1.95-2.47)	4.85 (3.00-8.10)	1318
Females	11-12	*	<LOD	<LOD	<LOD	3.79 (3.00-4.90)	1107
Females	13-14	*	<LOD	1.40 (<LOD-1.62)	3.50 (2.64-4.13)	7.25 (4.87-11.9)	1302
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	2.66 (<LOD-5.25)	284
Mexican Americans	13-14	*	<LOD	1.09 (<LOD-1.21)	2.15 (1.60-3.21)	4.36 (1.93-12.6)	423
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	3.66 (1.75-7.33)	616
Non-Hispanic blacks	13-14	*	<LOD	.793 (<LOD-1.06)	2.08 (1.55-2.53)	4.54 (2.94-7.48)	581
Non-Hispanic whites	11-12	*	<LOD	<LOD	2.47 (<LOD-3.79)	4.93 (2.63-12.5)	746
Non-Hispanic whites	13-14	*	<LOD	1.36 (<LOD-1.50)	3.17 (2.50-4.20)	8.10 (5.40-10.6)	992
All Hispanics	11-12	*	<LOD	<LOD	<LOD	2.63 (<LOD-3.50)	523
All Hispanics	13-14	*	<LOD	<LOD	2.00 (1.71-2.90)	3.82 (2.32-7.10)	661
Asians	11-12	*	<LOD	<LOD	<LOD	5.22 (<LOD-8.24)	307
Asians	13-14	*	<LOD	<LOD	2.47 (2.04-3.56)	3.96 (3.48-10.2)	287

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cyfluthrin_Cypermethrin_Permethrin_BiomonitoringSummary.html

Urinary 4-Fluoro-3-phenoxybenzoic acid (2011 - 2014)

CAS Number 77279-89-1

Metabolite of Cyfluthrin and Flumethrin

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.151 (.107-.218)	.342 (.245-.430)	2428
Total population	13-14	*	<LOD	<LOD	<LOD	.182 (.139-.231)	2669
Age 6-11 years	11-12	*	<LOD	<LOD	.106 (<LOD-.167)	.237 (.103-.451)	399
Age 6-11 years	13-14	*	<LOD	<LOD	.128 (<LOD-.224)	.235 (.165-.369)	421
Age 12-19 years	11-12	*	<LOD	<LOD	.108 (<LOD-.202)	.202 (.108-.424)	390
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.162 (<LOD-.220)	428
Age 20+ years	11-12	*	<LOD	<LOD	.164 (.120-.245)	.361 (.229-.495)	1639
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	.177 (.130-.222)	1820
Males	11-12	*	<LOD	<LOD	.146 (.106-.201)	.322 (.234-.388)	1231
Males	13-14	*	<LOD	<LOD	<LOD	.193 (.123-.345)	1344
Females	11-12	*	<LOD	<LOD	.154 (.107-.263)	.343 (.217-.495)	1197
Females	13-14	*	<LOD	<LOD	<LOD	.162 (.134-.201)	1325
Mexican Americans	11-12	*	<LOD	<LOD	.202 (.120-.321)	.385 (.211-.594)	290
Mexican Americans	13-14	*	<LOD	<LOD	.166 (<LOD-.353)	.240 (.183-.589)	428
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.209 (.159-.300)	.531 (.279-.954)	673
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.131 (.103-.161)	.246 (.161-.407)	589
Non-Hispanic whites	11-12	*	<LOD	<LOD	.142 (<LOD-.244)	.342 (.176-.443)	776
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	.154 (<LOD-.201)	1017
All Hispanics	11-12	*	<LOD	<LOD	.147 (<LOD-.237)	.287 (.229-.423)	560
All Hispanics	13-14	*	<LOD	<LOD	.142 (<LOD-.220)	.235 (.182-.460)	670
Asians	11-12	*	<LOD	<LOD	.125 (<LOD-.148)	.281 (.138-.391)	331
Asians	13-14	*	<LOD	<LOD	<LOD	.164 (<LOD-.356)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cyfluthrin_BiomonitoringSummary.html

Urinary 4-Fluoro-3-phenoxybenzoic acid (creatinine corrected) (2011 - 2014)

CAS Number 77279-89-1

Metabolite of Cyfluthrin and Flumethrin

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.282 (.247-.333)	.438 (.352-.538)	2428
Total population	13-14	*	<LOD	<LOD	<LOD	.350 (.318-.389)	2667
Age 6-11 years	11-12	*	<LOD	<LOD	.350 (<LOD-.560)	.583 (.318-.893)	399
Age 6-11 years	13-14	*	<LOD	<LOD	.330 (<LOD-.368)	.417 (.333-.619)	421
Age 12-19 years	11-12	*	<LOD	<LOD	.206 (<LOD-.259)	.280 (.233-.350)	390
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.350 (<LOD-.438)	428
Age 20+ years	11-12	*	<LOD	<LOD	.292 (.241-.337)	.438 (.337-.610)	1639
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	.333 (.292-.389)	1818
Males	11-12	*	<LOD	<LOD	.249 (.206-.292)	.333 (.282-.438)	1231
Males	13-14	*	<LOD	<LOD	<LOD	.318 (.241-.364)	1343
Females	11-12	*	<LOD	<LOD	.333 (.280-.394)	.506 (.394-.700)	1197
Females	13-14	*	<LOD	<LOD	<LOD	.368 (.333-.425)	1324
Mexican Americans	11-12	*	<LOD	<LOD	.280 (.219-.368)	.413 (.273-.821)	290
Mexican Americans	13-14	*	<LOD	<LOD	.279 (<LOD-.350)	.385 (.318-.441)	426
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.219 (.175-.269)	.468 (.258-.729)	673
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.163 (.134-.233)	.292 (.194-.389)	589
Non-Hispanic whites	11-12	*	<LOD	<LOD	.304 (<LOD-.343)	.438 (.343-.605)	776
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	.350 (<LOD-.386)	1017
All Hispanics	11-12	*	<LOD	<LOD	.259 (<LOD-.323)	.404 (.304-.524)	560
All Hispanics	13-14	*	<LOD	<LOD	.269 (<LOD-.333)	.361 (.304-.441)	668
Asians	11-12	*	<LOD	<LOD	.318 (<LOD-.467)	.610 (.389-.865)	331
Asians	13-14	*	<LOD	<LOD	<LOD	.520 (<LOD-.636)	291

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cyfluthrin_BiomonitoringSummary.html

Urinary 3-Phenoxybenzoic acid (2011 - 2014)

CAS Number 3739-38-6

Metabolite of Cypermethrin, Deltamethrin, Cyhalothrin, Fenpropathrin, Permethrin, Phenothrin, Tralomethrin and Esfenvalerate

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.669 (.606-.739)	.620 (.565-.686)	1.51 (1.31-1.70)	3.75 (2.98-4.73)	7.32 (5.37-9.31)	2416
Total population	13-14	.674 (.596-.762)	.632 (.553-.732)	1.51 (1.38-1.71)	4.16 (3.45-4.60)	7.14 (5.75-8.29)	2627
Age 6-11 years	11-12	.785 (.632-.975)	.715 (.611-.905)	1.91 (1.23-3.09)	5.37 (2.68-9.28)	9.75 (4.70-15.5)	398
Age 6-11 years	13-14	.726 (.522-1.01)	.810 (.520-.982)	1.68 (1.13-2.42)	3.86 (2.19-5.41)	5.41 (3.86-9.53)	408
Age 12-19 years	11-12	.648 (.527-.796)	.598 (.484-.786)	1.39 (.914-2.13)	2.93 (2.25-3.74)	5.34 (3.14-8.13)	386
Age 12-19 years	13-14	.637 (.483-.840)	.617 (.440-.846)	1.63 (1.00-2.78)	4.34 (2.86-5.44)	5.85 (4.38-9.12)	420
Age 20+ years	11-12	.661 (.587-.744)	.613 (.543-.694)	1.50 (1.23-1.72)	3.89 (2.79-4.88)	7.32 (4.88-10.2)	1632
Age 20+ years	13-14	.674 (.602-.754)	.620 (.529-.722)	1.48 (1.34-1.70)	4.18 (3.27-4.96)	7.36 (5.83-8.68)	1799
Males	11-12	.673 (.587-.773)	.600 (.537-.664)	1.44 (1.13-1.75)	3.96 (2.77-5.59)	7.41 (4.90-14.6)	1220
Males	13-14	.672 (.573-.788)	.638 (.554-.732)	1.47 (1.29-1.71)	4.09 (3.02-4.55)	6.21 (4.96-9.50)	1322
Females	11-12	.666 (.587-.755)	.648 (.565-.735)	1.57 (1.33-1.83)	3.67 (2.66-4.86)	6.94 (4.55-8.17)	1196
Females	13-14	.675 (.600-.759)	.622 (.537-.741)	1.52 (1.38-1.84)	4.22 (3.39-5.55)	7.42 (6.23-8.52)	1305
Mexican Americans	11-12	.593 (.496-.708)	.627 (.456-.773)	1.17 (1.02-1.73)	2.48 (1.91-3.71)	4.90 (2.48-8.74)	290
Mexican Americans	13-14	.618 (.529-.723)	.582 (.496-.711)	1.25 (1.10-1.45)	2.85 (2.16-3.95)	4.96 (2.42-10.2)	418
Non-Hispanic blacks	11-12	.766 (.671-.874)	.728 (.612-.840)	1.54 (1.34-1.85)	3.61 (2.77-4.56)	6.02 (4.69-8.88)	662
Non-Hispanic blacks	13-14	.791 (.692-.903)	.746 (.671-.867)	1.69 (1.39-1.98)	4.21 (2.64-5.99)	9.30 (5.80-15.5)	582
Non-Hispanic whites	11-12	.680 (.587-.787)	.610 (.538-.711)	1.63 (1.29-1.90)	4.37 (2.98-5.87)	7.91 (5.04-12.8)	776
Non-Hispanic whites	13-14	.685 (.589-.797)	.624 (.508-.776)	1.60 (1.41-1.90)	4.49 (3.59-5.47)	7.36 (5.75-8.94)	997
All Hispanics	11-12	.579 (.503-.665)	.590 (.468-.681)	1.13 (1.02-1.45)	2.63 (1.92-3.66)	4.60 (3.11-6.29)	560
All Hispanics	13-14	.613 (.539-.697)	.582 (.516-.648)	1.25 (1.14-1.43)	2.64 (2.23-3.31)	4.81 (2.95-7.27)	657
Asians	11-12	.564 (.466-.682)	.536 (.428-.650)	1.07 (.862-1.64)	3.02 (2.08-4.41)	5.54 (3.72-8.91)	330
Asians	13-14	.532 (.427-.662)	.520 (.352-.678)	1.22 (.879-1.65)	2.98 (1.93-4.92)	5.19 (3.02-9.67)	290

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

Biomonitoring Summary:
https://www.cdc.gov/biomonitoring/Cyhalothrin_Cypermethrin_Deltamethrin_Fenpropathrin_Permethrin_Tralomethrin_BiomonitoringSummary.html

Urinary 3-Phenoxybenzoic acid (creatinine corrected) (2011 - 2014)

CAS Number 3739-38-6

Metabolite of Cypermethrin, Deltamethrin, Cyhalothrin, Fenpropathrin, Permethrin, Phenothrin, Tralomethrin and Esfenvalerate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	0.702 (.630-.783)	.606 (.539-.700)	1.36 (1.22-1.50)	3.69 (3.00-4.74)	6.87 (5.33-8.34)	2416
Total population	13-14	0.719 (.630-.822)	.614 (.546-.696)	1.50 (1.30-1.79)	4.13 (3.49-4.88)	7.16 (5.96-8.61)	2625
Age 6-11 years	11-12	1.09 (.896-1.33)	1.00 (.800-1.19)	2.23 (1.61-2.88)	5.23 (3.33-7.59)	7.87 (4.92-16.6)	398
Age 6-11 years	13-14	0.939 (.694-1.27)	.974 (.733-1.27)	1.78 (1.28-2.96)	3.41 (2.44-7.67)	7.67 (3.17-15.0)	408
Age 12-19 years	11-12	0.587 (.460-.749)	.523 (.395-.717)	1.06 (.769-1.46)	2.51 (1.51-4.89)	5.89 (3.06-8.06)	386
Age 12-19 years	13-14	0.544 (.416-.712)	.500 (.383-.662)	1.15 (.765-2.02)	2.98 (1.31-7.25)	4.55 (2.98-8.34)	420
Age 20+ years	11-12	0.687 (.608-.777)	.595 (.530-.692)	1.32 (1.09-1.53)	3.60 (2.85-4.80)	6.87 (5.17-9.01)	1632
Age 20+ years	13-14	0.728 (.647-.819)	.598 (.548-.661)	1.52 (1.33-1.72)	4.35 (3.66-5.12)	7.47 (5.96-9.43)	1797
Males	11-12	0.613 (.547-.687)	.541 (.467-.595)	1.13 (.989-1.36)	3.05 (2.14-5.25)	7.09 (4.83-11.3)	1220
Males	13-14	0.617 (.524-.725)	.536 (.469-.620)	1.28 (1.08-1.52)	3.34 (2.58-3.87)	6.69 (4.31-7.68)	1321
Females	11-12	0.798 (.692-.920)	.700 (.596-.827)	1.48 (1.32-1.74)	4.26 (3.14-5.29)	6.40 (4.92-9.01)	1196
Females	13-14	0.835 (.739-.942)	.681 (.621-.797)	1.78 (1.52-2.01)	5.05 (4.24-5.63)	8.06 (5.84-11.2)	1304
Mexican Americans	11-12	0.593 (.499-.706)	.583 (.467-.690)	1.04 (.880-1.26)	2.53 (1.91-3.30)	4.09 (2.39-11.7)	290
Mexican Americans	13-14	0.636 (.548-.738)	.553 (.435-.660)	1.18 (.929-1.42)	2.50 (1.84-3.70)	4.68 (2.22-13.2)	416
Non-Hispanic blacks	11-12	0.567 (.495-.649)	.526 (.442-.590)	1.01 (.877-1.13)	2.56 (1.78-3.58)	4.76 (3.49-6.82)	662
Non-Hispanic blacks	13-14	0.604 (.511-.714)	.530 (.466-.606)	1.19 (.957-1.39)	3.05 (1.88-4.49)	6.35 (3.86-8.68)	582
Non-Hispanic whites	11-12	0.759 (.652-.884)	.661 (.548-.800)	1.52 (1.32-1.87)	4.63 (3.09-5.39)	7.50 (5.27-11.3)	776
Non-Hispanic whites	13-14	0.778 (.658-.920)	.659 (.556-.797)	1.81 (1.45-2.13)	4.98 (4.13-5.68)	7.97 (6.25-11.0)	997
All Hispanics	11-12	0.582 (.506-.668)	.559 (.486-.648)	.971 (.851-1.11)	2.33 (1.56-3.13)	3.94 (2.74-6.40)	560
All Hispanics	13-14	0.634 (.563-.713)	.555 (.496-.620)	1.09 (.956-1.34)	2.35 (2.03-2.97)	4.06 (2.76-9.07)	655
Asians	11-12	0.754 (.634-.896)	.685 (.592-.761)	1.51 (1.20-1.95)	3.82 (2.20-6.31)	7.79 (4.99-21.7)	330
Asians	13-14	0.679 (.567-.813)	.610 (.500-.768)	1.43 (1.10-1.71)	2.95 (2.13-5.03)	5.24 (3.88-6.50)	290

Biomonitoring Summary:
https://www.cdc.gov/biomonitoring/Cyhalothrin_Cypermethrin_Deltamethrin_Fenpropathrin_Permethrin_Tralomethrin_BiomonitoringSummary.html

Metals and Metalloids

Urinary Antimony (2011 - 2016)†

CAS Number 7440-36-0

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.047 (.042-.052)	.083 (.075-.091)	.144 (.125-.158)	.188 (.169-.222)	2504
Total population	13-14	.043 (.039-.048)	.041 (.036-.046)	.076 (.069-.086)	.130 (.120-.144)	.189 (.170-.214)	2664
Total population	15-16	.047 (.044-.051)	.046 (.043-.051)	.080 (.077-.085)	.137 (.126-.150)	.201 (.171-.218)	3061
Age 3-5 years	15-16	.049 (.044-.055)	.049 (.042-.054)	.087 (.075-.096)	.138 (.118-.164)	.188 (.152-.212)	486
Age 6-11 years	11-12	.064 (.059-.069)	.059 (.049-.072)	.108 (.094-.124)	.169 (.152-.188)	.206 (.182-.257)	399
Age 6-11 years	13-14	.052 (.045-.060)	.053 (.046-.065)	.096 (.089-.105)	.151 (.128-.172)	.228 (.168-.254)	402
Age 6-11 years	15-16	.061 (.054-.068)	.063 (.054-.067)	.102 (.089-.115)	.159 (.134-.176)	.207 (.168-.244)	379
Age 12-19 years	11-12	.065 (.057-.073)	.065 (.048-.081)	.106 (.098-.126)	.173 (.137-.202)	.218 (.166-.283)	390
Age 12-19 years	13-14	.051 (.043-.061)	.051 (.041-.062)	.088 (.070-.112)	.138 (.121-.166)	.203 (.152-.235)	451
Age 12-19 years	15-16	.059 (.051-.068)	.060 (.047-.069)	.094 (.080-.118)	.160 (.129-.207)	.259 (.178-.292)	402
Age 20+ years	11-12	*	.044 (<LOD-.051)	.076 (.066-.087)	.129 (.112-.152)	.171 (.158-.228)	1715
Age 20+ years	13-14	.042 (.038-.045)	.039 (.033-.043)	.071 (.065-.079)	.128 (.116-.137)	.184 (.161-.215)	1811
Age 20+ years	15-16	.045 (.042-.047)	.044 (.040-.048)	.077 (.073-.080)	.131 (.113-.147)	.191 (.161-.209)	1794
Males	11-12	.057 (.052-.063)	.052 (.044-.061)	.089 (.080-.100)	.152 (.124-.169)	.196 (.169-.259)	1262
Males	13-14	.048 (.044-.052)	.046 (.041-.051)	.082 (.072-.094)	.145 (.129-.161)	.213 (.182-.230)	1318
Males	15-16	.053 (.049-.058)	.053 (.047-.058)	.090 (.080-.103)	.156 (.137-.162)	.209 (.175-.248)	1524
Females	11-12	*	.043 (<LOD-.049)	.074 (.068-.082)	.131 (.122-.149)	.182 (.166-.218)	1242
Females	13-14	.040 (.036-.044)	.036 (.030-.043)	.070 (.062-.078)	.122 (.105-.132)	.169 (.146-.200)	1346
Females	15-16	.042 (.039-.045)	.042 (.037-.045)	.072 (.067-.078)	.117 (.107-.131)	.178 (.150-.205)	1537
Mexican Americans	11-12	.056 (.051-.062)	.053 (.044-.062)	.086 (.075-.091)	.134 (.110-.164)	.174 (.149-.261)	317
Mexican Americans	13-14	.048 (.038-.060)	.047 (.033-.057)	.082 (.066-.106)	.172 (.109-.248)	.252 (.170-.432)	453
Mexican Americans	15-16	.057 (.052-.062)	.057 (.053-.063)	.090 (.084-.098)	.139 (.121-.165)	.194 (.167-.284)	585
Non-Hispanic blacks	11-12	.070 (.063-.079)	.068 (.062-.074)	.110 (.096-.125)	.182 (.148-.229)	.254 (.200-.354)	669
Non-Hispanic blacks	13-14	.065 (.056-.075)	.066 (.060-.070)	.111 (.097-.128)	.189 (.146-.225)	.245 (.218-.303)	581
Non-Hispanic blacks	15-16	.068 (.062-.075)	.066 (.057-.073)	.110 (.097-.127)	.192 (.166-.219)	.265 (.211-.319)	671
Non-Hispanic whites	11-12	*	.044 (<LOD-.049)	.081 (.069-.095)	.143 (.118-.159)	.180 (.159-.231)	820
Non-Hispanic whites	13-14	.041 (.037-.045)	.037 (.032-.043)	.071 (.063-.079)	.118 (.104-.130)	.167 (.143-.184)	985
Non-Hispanic whites	15-16	.044 (.041-.047)	.043 (.039-.047)	.075 (.068-.081)	.129 (.112-.144)	.178 (.155-.208)	924
All Hispanics	11-12	*	.046 (<LOD-.053)	.079 (.066-.088)	.128 (.110-.149)	.174 (.149-.208)	573
All Hispanics	13-14	.047 (.040-.055)	.045 (.038-.052)	.079 (.069-.096)	.155 (.116-.218)	.231 (.178-.318)	701
All Hispanics	15-16	.054 (.050-.058)	.053 (.048-.058)	.086 (.080-.094)	.136 (.117-.161)	.205 (.167-.264)	982
Asians	11-12	*	<LOD	.066 (.054-.075)	.103 (.075-.145)	.145 (.100-.194)	353
Asians	13-14	*	.027 (<LOD-.036)	.052 (.045-.061)	.080 (.065-.098)	.099 (.083-.169)	292
Asians	15-16	.033 (.028-.038)	.030 (.022-.039)	.051 (.042-.061)	.092 (.062-.134)	.139 (.095-.208)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.041, 0.022, and 0.022 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Antimony_BiomonitoringSummary.html

Urinary Antimony (creatinine corrected) (2011 - 2016)†

CAS Number 7440-36-0

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.059 (.055-.063)	.092 (.085-.100)	.152 (.135-.171)	.223 (.181-.261)	2502
Total population	13-14	.050 (.046-.055)	.047 (.044-.051)	.073 (.068-.079)	.114 (.103-.127)	.160 (.145-.172)	2663
Total population	15-16	.053 (.050-.056)	.049 (.047-.052)	.079 (.071-.087)	.124 (.115-.137)	.176 (.152-.190)	3058
Age 3-5 years	15-16	.113 (.103-.124)	.108 (.097-.117)	.163 (.149-.181)	.255 (.220-.291)	.328 (.274-.425)	485
Age 6-11 years	11-12	.091 (.081-.102)	.091 (.078-.100)	.130 (.116-.147)	.206 (.153-.283)	.308 (.218-.340)	398
Age 6-11 years	13-14	.077 (.068-.088)	.076 (.067-.084)	.114 (.098-.133)	.177 (.154-.193)	.225 (.191-.238)	402
Age 6-11 years	15-16	.086 (.077-.096)	.084 (.073-.096)	.125 (.114-.137)	.183 (.155-.210)	.250 (.196-.300)	379
Age 12-19 years	11-12	.062 (.055-.069)	.058 (.051-.067)	.085 (.070-.106)	.147 (.115-.181)	.222 (.122-.373)	390
Age 12-19 years	13-14	.046 (.041-.053)	.047 (.039-.052)	.064 (.057-.071)	.103 (.084-.115)	.144 (.109-.172)	451
Age 12-19 years	15-16	.055 (.049-.062)	.050 (.045-.059)	.075 (.065-.085)	.114 (.096-.133)	.148 (.128-.200)	402
Age 20+ years	11-12	*	.056 (<LOD-.060)	.088 (.078-.097)	.145 (.127-.171)	.215 (.179-.240)	1714
Age 20+ years	13-14	.049 (.044-.053)	.046 (.043-.049)	.070 (.064-.076)	.104 (.095-.115)	.151 (.130-.170)	1810
Age 20+ years	15-16	.049 (.046-.051)	.046 (.043-.048)	.070 (.064-.078)	.113 (.103-.122)	.151 (.130-.177)	1792
Males	11-12	.054 (.050-.058)	.051 (.048-.057)	.078 (.071-.089)	.132 (.120-.151)	.186 (.161-.224)	1261
Males	13-14	.048 (.043-.053)	.045 (.040-.049)	.068 (.061-.076)	.114 (.099-.123)	.163 (.145-.177)	1317
Males	15-16	.051 (.047-.055)	.047 (.044-.052)	.076 (.067-.089)	.125 (.112-.140)	.178 (.151-.211)	1524
Females	11-12	*	.066 (<LOD-.071)	.104 (.094-.112)	.165 (.145-.193)	.226 (.183-.303)	1241
Females	13-14	.053 (.048-.057)	.050 (.046-.055)	.077 (.071-.084)	.114 (.104-.133)	.156 (.145-.171)	1346
Females	15-16	.055 (.052-.059)	.051 (.048-.055)	.081 (.073-.090)	.123 (.114-.139)	.172 (.144-.196)	1534
Mexican Americans	11-12	.063 (.059-.067)	.061 (.057-.064)	.089 (.079-.100)	.133 (.121-.153)	.183 (.150-.246)	317
Mexican Americans	13-14	.055 (.046-.066)	.049 (.043-.057)	.076 (.063-.099)	.138 (.107-.172)	.196 (.137-.381)	453
Mexican Americans	15-16	.062 (.057-.069)	.056 (.051-.062)	.094 (.084-.101)	.140 (.126-.166)	.224 (.166-.275)	584
Non-Hispanic blacks	11-12	.055 (.049-.060)	.052 (.047-.058)	.077 (.069-.088)	.121 (.104-.147)	.175 (.140-.232)	669
Non-Hispanic blacks	13-14	.049 (.046-.053)	.048 (.044-.052)	.068 (.064-.073)	.110 (.095-.122)	.164 (.133-.221)	581
Non-Hispanic blacks	15-16	.054 (.049-.060)	.048 (.045-.052)	.080 (.068-.088)	.136 (.113-.179)	.226 (.167-.280)	669
Non-Hispanic whites	11-12	*	.060 (<LOD-.067)	.097 (.088-.108)	.161 (.135-.183)	.224 (.181-.273)	818
Non-Hispanic whites	13-14	.050 (.044-.056)	.047 (.042-.053)	.075 (.068-.081)	.113 (.098-.127)	.156 (.133-.171)	984
Non-Hispanic whites	15-16	.052 (.048-.055)	.049 (.046-.053)	.077 (.068-.089)	.120 (.106-.132)	.160 (.138-.180)	924
All Hispanics	11-12	*	.058 (<LOD-.065)	.085 (.073-.097)	.132 (.113-.161)	.181 (.153-.214)	573
All Hispanics	13-14	.052 (.047-.059)	.047 (.043-.054)	.076 (.065-.089)	.137 (.107-.164)	.196 (.143-.326)	701
All Hispanics	15-16	.061 (.055-.067)	.055 (.049-.060)	.092 (.085-.100)	.143 (.132-.162)	.246 (.186-.300)	981
Asians	11-12	*	<LOD	.087 (.072-.107)	.153 (.132-.177)	.215 (.171-.290)	353
Asians	13-14	*	.047 (<LOD-.050)	.067 (.060-.077)	.114 (.087-.145)	.160 (.133-.201)	292
Asians	15-16	.045 (.039-.051)	.041 (.037-.047)	.067 (.056-.080)	.114 (.087-.144)	.167 (.125-.223)	332

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Antimony_BiomonitoringSummary.html

Urinary Total Arsenic (2011 - 2016)†

CAS Number 7440-38-2

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.85 (5.85-8.02)	6.09 (5.22-7.12)	13.0 (10.9-16.6)	32.0 (25.9-39.0)	52.5 (41.9-66.2)	2504
Total population	13-14	6.29 (5.58-7.08)	5.82 (5.10-6.69)	11.7 (10.5-13.2)	26.6 (23.7-30.1)	46.0 (37.5-56.1)	2662
Total population	15-16	5.96 (5.53-6.43)	5.41 (4.92-5.84)	11.1 (9.91-12.2)	25.0 (20.8-30.0)	44.6 (35.7-53.8)	3061
Age 3-5 years	15-16	4.05 (3.58-4.58)	3.72 (3.27-4.23)	6.67 (5.66-8.35)	12.8 (9.93-19.9)	22.4 (13.4-54.8)	486
Age 6-11 years	11-12	6.02 (5.03-7.19)	5.50 (4.58-6.56)	10.5 (7.93-14.1)	30.1 (16.7-46.5)	53.0 (37.5-70.3)	399
Age 6-11 years	13-14	5.21 (4.57-5.95)	4.78 (4.27-5.57)	8.79 (7.52-10.3)	17.1 (12.4-25.3)	29.0 (17.9-47.7)	402
Age 6-11 years	15-16	4.89 (4.29-5.56)	4.51 (4.21-4.96)	7.59 (6.66-8.71)	15.7 (11.1-22.7)	28.9 (17.1-56.9)	379
Age 12-19 years	11-12	6.01 (4.45-8.11)	5.26 (3.95-7.47)	10.9 (7.74-16.9)	25.9 (16.6-44.0)	44.0 (25.9-153)	390
Age 12-19 years	13-14	5.79 (4.96-6.75)	5.33 (4.83-5.91)	9.40 (8.44-11.8)	22.0 (17.4-28.1)	44.1 (27.0-90.8)	451
Age 12-19 years	15-16	5.00 (4.52-5.54)	4.75 (4.07-5.23)	8.78 (7.64-10.6)	17.1 (14.6-20.1)	29.8 (19.2-35.6)	402
Age 20+ years	11-12	7.09 (6.03-8.33)	6.31 (5.32-7.45)	13.6 (11.3-18.3)	33.2 (26.7-39.5)	52.5 (41.9-77.3)	1715
Age 20+ years	13-14	6.49 (5.72-7.36)	6.12 (5.22-7.06)	12.1 (10.9-14.2)	27.9 (24.1-32.1)	48.0 (37.5-57.5)	1809
Age 20+ years	15-16	6.35 (5.88-6.84)	5.74 (5.15-6.59)	11.9 (10.7-13.7)	27.6 (23.5-33.2)	49.9 (38.9-59.9)	1794
Males	11-12	7.69 (6.35-9.31)	6.84 (5.33-8.59)	15.4 (11.7-19.7)	33.5 (27.7-41.9)	56.5 (42.2-78.0)	1262
Males	13-14	6.67 (5.97-7.46)	6.37 (5.68-7.12)	11.7 (10.8-13.0)	27.0 (22.3-32.5)	48.5 (33.3-57.5)	1316
Males	15-16	6.54 (6.03-7.09)	5.66 (5.14-6.46)	11.3 (9.95-13.3)	26.7 (22.8-33.2)	49.9 (35.5-67.2)	1524
Females	11-12	6.14 (5.22-7.22)	5.42 (4.79-6.25)	11.6 (9.85-13.7)	29.0 (22.5-38.2)	50.6 (37.5-79.8)	1242
Females	13-14	5.94 (5.18-6.80)	5.38 (4.68-6.28)	11.2 (9.49-13.7)	26.0 (21.8-31.1)	43.6 (36.0-55.8)	1346
Females	15-16	5.46 (4.89-6.10)	5.07 (4.50-5.65)	10.7 (9.14-12.1)	22.7 (17.6-29.5)	43.0 (32.1-51.1)	1537
Mexican Americans	11-12	7.12 (5.73-8.84)	6.94 (5.34-8.70)	12.2 (9.84-16.5)	24.2 (18.4-35.7)	44.0 (23.8-70.3)	317
Mexican Americans	13-14	5.73 (5.01-6.56)	5.64 (4.93-6.47)	9.19 (8.10-10.2)	17.5 (11.2-36.6)	36.6 (15.4-73.0)	453
Mexican Americans	15-16	5.80 (5.30-6.35)	5.65 (5.15-6.17)	10.2 (8.62-11.3)	17.3 (14.6-22.8)	28.0 (18.8-54.7)	585
Non-Hispanic blacks	11-12	9.31 (7.19-12.0)	8.18 (6.16-10.8)	17.9 (13.1-25.3)	46.8 (28.8-76.5)	82.1 (53.1-107)	669
Non-Hispanic blacks	13-14	8.17 (6.87-9.72)	6.99 (6.01-8.20)	14.9 (10.9-18.2)	30.7 (25.5-38.2)	59.8 (40.0-79.0)	579
Non-Hispanic blacks	15-16	7.89 (6.85-9.09)	7.00 (6.11-8.66)	15.5 (13.3-17.4)	31.2 (24.6-49.2)	62.7 (33.8-133)	671
Non-Hispanic whites	11-12	5.89 (4.92-7.06)	5.08 (4.56-6.06)	10.8 (8.48-15.5)	26.3 (20.3-34.9)	43.2 (34.9-56.0)	820
Non-Hispanic whites	13-14	5.67 (4.88-6.59)	5.30 (4.40-6.62)	11.0 (9.16-12.7)	22.4 (17.6-29.9)	39.0 (30.8-50.6)	985
Non-Hispanic whites	15-16	5.17 (4.75-5.62)	4.64 (4.39-4.96)	9.61 (8.15-11.2)	20.4 (15.3-25.2)	36.1 (25.2-46.3)	924
All Hispanics	11-12	7.62 (6.63-8.76)	7.32 (6.31-8.35)	13.7 (11.7-16.6)	25.8 (21.2-29.8)	45.6 (28.7-55.8)	573
All Hispanics	13-14	6.16 (5.24-7.22)	5.93 (5.02-6.82)	10.4 (9.11-11.9)	20.2 (14.2-30.1)	37.5 (24.1-57.9)	701
All Hispanics	15-16	6.38 (5.83-6.98)	5.94 (5.56-6.34)	11.1 (9.43-12.5)	22.9 (17.8-28.0)	40.6 (28.0-70.1)	982
Asians	11-12	16.7 (14.7-18.9)	14.9 (12.8-19.0)	39.0 (33.2-44.8)	83.2 (61.4-108)	117 (88.4-145)	353
Asians	13-14	12.1 (10.4-14.1)	11.5 (9.08-13.6)	30.8 (23.2-37.0)	70.7 (52.5-90.8)	126 (79.2-181)	292
Asians	15-16	14.3 (11.6-17.7)	14.7 (10.9-17.9)	32.1 (21.2-47.4)	62.4 (50.5-85.5)	92.5 (65.7-127)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.25, 0.260, and 0.260 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Total Arsenic (creatinine corrected) (2011 - 2016)†

CAS Number 7440-38-2

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	7.77 (6.85-8.81)	6.39 (5.57-7.24)	13.7 (11.5-16.5)	30.8 (24.6-38.6)	50.4 (38.2-70.1)	2502
Total population	13-14	7.27 (6.62-7.99)	6.10 (5.39-6.88)	11.9 (10.5-13.5)	27.6 (23.8-32.8)	52.0 (43.5-60.9)	2661
Total population	15-16	6.69 (6.32-7.08)	5.56 (5.32-5.85)	10.7 (9.74-11.5)	24.9 (20.1-30.0)	45.8 (32.0-65.3)	3058
Age 3-5 years	15-16	9.31 (8.18-10.6)	8.27 (7.40-9.15)	12.5 (10.6-14.9)	21.1 (17.3-28.8)	40.9 (22.8-83.5)	485
Age 6-11 years	11-12	8.63 (7.26-10.3)	6.87 (5.84-8.00)	12.3 (9.58-15.5)	27.7 (17.7-57.7)	91.2 (26.2-129)	398
Age 6-11 years	13-14	7.78 (7.08-8.54)	6.91 (5.91-7.65)	12.5 (10.3-13.6)	17.7 (16.1-21.1)	29.9 (20.4-52.1)	402
Age 6-11 years	15-16	6.93 (6.48-7.41)	6.09 (5.66-6.56)	9.53 (8.15-11.0)	18.2 (13.6-25.0)	28.1 (21.9-40.6)	379
Age 12-19 years	11-12	5.75 (4.49-7.36)	4.69 (3.70-5.73)	8.73 (6.26-13.3)	22.1 (11.5-52.6)	34.9 (21.1-159)	390
Age 12-19 years	13-14	5.24 (4.53-6.06)	4.21 (3.61-4.61)	7.92 (5.75-10.3)	17.6 (12.6-23.0)	30.5 (20.3-54.1)	451
Age 12-19 years	15-16	4.67 (4.34-5.03)	3.94 (3.55-4.54)	7.09 (5.91-7.91)	14.7 (11.6-16.8)	22.3 (15.4-31.5)	402
Age 20+ years	11-12	8.04 (7.07-9.14)	6.52 (5.88-7.69)	14.8 (12.1-18.8)	32.4 (25.2-39.8)	49.7 (38.2-70.1)	1714
Age 20+ years	13-14	7.58 (6.87-8.36)	6.39 (5.66-7.29)	12.4 (10.9-14.7)	31.0 (26.0-37.9)	54.0 (47.9-66.1)	1808
Age 20+ years	15-16	6.92 (6.51-7.35)	5.62 (5.27-5.95)	11.0 (10.3-12.5)	28.1 (21.9-33.6)	56.2 (36.5-74.6)	1792
Males	11-12	7.20 (6.15-8.43)	6.13 (5.18-7.23)	12.5 (10.5-15.2)	28.3 (20.2-34.9)	50.4 (33.3-69.6)	1261
Males	13-14	6.69 (6.07-7.38)	5.55 (4.96-6.26)	10.9 (9.50-12.5)	26.0 (19.5-30.6)	47.9 (36.5-55.3)	1315
Males	15-16	6.21 (5.75-6.71)	5.23 (4.70-5.70)	9.81 (8.68-11.0)	22.3 (18.1-28.1)	43.3 (30.4-61.5)	1524
Females	11-12	8.35 (7.40-9.42)	6.64 (6.12-7.37)	15.0 (12.2-19.1)	33.1 (26.1-41.4)	50.7 (39.8-79.0)	1241
Females	13-14	7.88 (7.03-8.82)	6.67 (5.82-7.78)	13.1 (10.9-15.6)	31.3 (24.9-39.4)	54.1 (46.3-68.3)	1346
Females	15-16	7.19 (6.54-7.89)	5.94 (5.47-6.40)	11.3 (9.96-13.8)	25.9 (20.0-33.4)	48.2 (31.5-71.1)	1534
Mexican Americans	11-12	8.00 (6.85-9.36)	6.91 (6.07-7.98)	11.9 (9.05-14.6)	26.1 (16.7-39.4)	40.8 (24.0-70.1)	317
Mexican Americans	13-14	6.54 (5.70-7.51)	5.83 (5.08-6.54)	8.97 (7.32-11.6)	17.1 (12.6-20.8)	29.2 (15.1-72.2)	453
Mexican Americans	15-16	6.30 (5.77-6.88)	5.41 (5.14-5.91)	9.08 (7.94-10.8)	16.9 (13.8-20.2)	26.4 (19.5-41.2)	584
Non-Hispanic blacks	11-12	7.24 (5.51-9.51)	5.83 (4.65-7.96)	13.5 (9.02-19.0)	28.8 (21.5-46.3)	55.4 (31.6-87.1)	669
Non-Hispanic blacks	13-14	6.23 (5.25-7.39)	4.86 (4.24-6.22)	10.3 (8.03-13.4)	22.7 (17.8-29.1)	37.4 (25.8-70.5)	579
Non-Hispanic blacks	15-16	6.28 (5.43-7.26)	5.21 (4.58-6.14)	11.1 (8.39-14.3)	26.5 (20.0-32.3)	41.2 (29.1-72.2)	669
Non-Hispanic whites	11-12	7.13 (6.05-8.39)	5.72 (5.05-6.70)	12.4 (10.3-15.4)	28.4 (21.7-37.5)	46.5 (33.1-75.8)	818
Non-Hispanic whites	13-14	7.01 (6.25-7.87)	5.87 (5.13-6.88)	11.6 (9.92-13.7)	27.5 (21.6-35.8)	49.5 (40.8-55.3)	984
Non-Hispanic whites	15-16	6.09 (5.64-6.59)	5.14 (4.80-5.52)	9.30 (8.16-10.6)	19.9 (15.7-25.9)	33.8 (25.3-62.5)	924
All Hispanics	11-12	8.53 (7.74-9.40)	7.60 (6.84-8.42)	12.8 (11.2-14.1)	25.3 (20.8-30.8)	37.5 (28.2-50.6)	573
All Hispanics	13-14	6.87 (6.08-7.76)	6.26 (5.36-6.89)	10.3 (8.75-11.9)	18.7 (14.3-24.0)	28.7 (18.9-50.7)	701
All Hispanics	15-16	7.19 (6.70-7.72)	6.05 (5.58-6.80)	11.0 (9.69-12.1)	20.8 (18.3-24.0)	39.5 (26.6-61.2)	981
Asians	11-12	22.3 (19.1-26.1)	20.1 (16.3-25.2)	39.4 (32.2-61.0)	100 (73.2-129)	162 (114-202)	353
Asians	13-14	19.0 (16.1-22.5)	15.2 (13.0-19.2)	41.9 (31.1-59.2)	95.0 (74.2-131)	137 (111-229)	292
Asians	15-16	19.6 (15.9-24.1)	18.6 (13.9-25.4)	41.0 (30.9-47.6)	74.3 (51.3-113)	118 (73.7-173)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Inorganic-related Arsenic Species (2011 - 2016)†

CAS Number 7440-38-2

*Sum of arsenic acid, arsenous acid, dimethylarsenic acid, and methlyarsonic acid**

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	5.59 (5.24-5.96)	5.15 (4.73-5.56)	7.73 (7.09-8.57)	12.2 (11.1-13.9)	17.2 (14.6-19.9)	2517
Total population	13-14	4.80 (4.53-5.09)	4.53 (4.18-4.94)	7.22 (6.74-7.70)	11.2 (10.3-12.0)	14.7 (13.5-16.8)	2654
Total population	15-16	4.41 (4.17-4.67)	4.08 (3.79-4.49)	6.55 (6.16-7.06)	10.5 (9.43-11.7)	14.5 (12.8-17.3)	3094
Age 3-5 years	15-16	4.03 (3.71-4.36)	3.75 (3.50-3.96)	5.57 (5.12-6.43)	9.54 (7.82-11.8)	13.2 (10.3-20.6)	507
Age 6-11 years	11-12	5.48 (5.05-5.95)	5.36 (4.50-5.98)	7.58 (7.08-8.34)	11.2 (9.93-12.1)	13.4 (11.6-16.2)	401
Age 6-11 years	13-14	4.91 (4.44-5.43)	4.59 (4.02-5.00)	7.21 (6.20-8.38)	11.3 (9.91-13.9)	14.2 (11.4-19.6)	397
Age 6-11 years	15-16	4.32 (4.00-4.68)	4.12 (3.66-4.56)	6.15 (5.45-6.66)	9.05 (7.98-11.1)	13.1 (10.2-21.0)	380
Age 12-19 years	11-12	5.37 (4.67-6.17)	5.09 (4.24-6.00)	7.28 (6.27-8.32)	11.1 (8.34-14.9)	15.6 (10.8-23.9)	392
Age 12-19 years	13-14	5.09 (4.64-5.57)	5.02 (4.51-5.46)	7.29 (6.53-8.08)	11.9 (9.80-13.7)	14.5 (12.5-15.9)	450
Age 12-19 years	15-16	4.32 (3.97-4.70)	4.01 (3.58-4.52)	6.03 (5.37-6.77)	10.1 (8.75-11.8)	14.2 (11.2-17.1)	402
Age 20+ years	11-12	5.64 (5.28-6.01)	5.15 (4.71-5.57)	7.83 (7.07-8.88)	12.5 (11.2-14.8)	17.6 (15.2-20.0)	1724
Age 20+ years	13-14	4.75 (4.46-5.05)	4.45 (4.08-4.91)	7.20 (6.63-7.72)	11.2 (10.3-11.8)	14.8 (12.9-17.1)	1807
Age 20+ years	15-16	4.45 (4.20-4.73)	4.14 (3.79-4.58)	6.78 (6.30-7.26)	11.0 (9.56-12.2)	14.6 (12.8-17.9)	1805
Males	11-12	6.00 (5.52-6.52)	5.63 (5.11-6.28)	8.31 (7.29-9.94)	13.4 (11.7-16.5)	18.8 (16.7-20.8)	1264
Males	13-14	5.02 (4.78-5.28)	4.92 (4.45-5.32)	7.45 (7.09-7.94)	11.4 (10.3-12.1)	14.8 (13.5-16.1)	1308
Males	15-16	4.67 (4.38-4.98)	4.44 (3.94-4.93)	6.92 (6.36-7.68)	11.3 (9.65-12.6)	14.7 (12.8-18.3)	1537
Females	11-12	5.23 (4.90-5.58)	4.70 (4.36-5.05)	7.16 (6.47-8.01)	11.6 (10.1-12.9)	14.9 (12.3-20.5)	1253
Females	13-14	4.59 (4.26-4.96)	4.29 (3.87-4.69)	6.94 (5.99-7.67)	10.8 (10.0-12.1)	14.7 (12.8-18.3)	1346
Females	15-16	4.18 (3.95-4.42)	3.89 (3.53-4.08)	6.36 (5.79-6.78)	10.0 (8.86-11.3)	14.3 (12.7-16.2)	1557
Mexican Americans	11-12	5.76 (5.37-6.18)	5.26 (5.02-5.77)	7.71 (7.37-8.54)	11.9 (10.1-13.8)	16.8 (12.1-19.9)	317
Mexican Americans	13-14	5.01 (4.77-5.27)	5.14 (4.62-5.52)	7.21 (6.84-7.70)	10.3 (9.54-11.3)	12.4 (11.2-16.2)	455
Mexican Americans	15-16	4.75 (4.34-5.21)	4.58 (4.16-5.01)	6.73 (6.07-7.73)	10.9 (9.32-13.0)	15.2 (11.3-19.3)	591
Non-Hispanic blacks	11-12	6.20 (5.52-6.97)	5.77 (5.09-6.42)	8.81 (7.43-10.6)	14.4 (12.1-18.0)	20.5 (16.5-25.4)	672
Non-Hispanic blacks	13-14	5.58 (5.03-6.20)	5.28 (4.84-5.81)	7.81 (6.82-9.63)	13.4 (10.6-15.7)	19.2 (13.5-25.0)	576
Non-Hispanic blacks	15-16	5.07 (4.60-5.59)	4.84 (4.21-5.38)	7.99 (6.54-8.91)	12.8 (11.5-14.9)	18.1 (14.1-21.4)	678
Non-Hispanic whites	11-12	5.10 (4.79-5.43)	4.69 (4.35-5.11)	7.01 (6.36-7.72)	10.7 (8.90-12.1)	12.9 (11.9-16.0)	825
Non-Hispanic whites	13-14	4.35 (4.02-4.71)	4.12 (3.67-4.47)	6.46 (5.79-7.21)	9.95 (8.65-10.9)	12.3 (10.9-14.0)	980
Non-Hispanic whites	15-16	3.93 (3.72-4.15)	3.60 (3.37-3.94)	5.86 (5.29-6.51)	8.54 (7.90-9.02)	11.4 (9.56-12.8)	937
All Hispanics	11-12	6.22 (5.52-7.01)	5.72 (5.08-6.51)	8.97 (7.41-11.1)	14.5 (11.4-19.0)	19.9 (15.8-21.6)	574
All Hispanics	13-14	5.31 (4.87-5.80)	5.34 (4.64-6.01)	7.92 (7.18-8.84)	11.7 (10.5-12.9)	14.8 (12.4-16.2)	703
All Hispanics	15-16	5.04 (4.60-5.52)	4.80 (4.41-5.21)	7.41 (6.49-8.96)	12.1 (10.3-14.0)	17.1 (13.6-19.3)	992
Asians	11-12	10.1 (9.11-11.2)	9.53 (8.32-11.1)	17.8 (14.6-19.9)	29.6 (24.5-34.2)	42.3 (33.0-46.4)	356
Asians	13-14	7.60 (7.10-8.14)	7.69 (6.65-8.90)	13.8 (11.0-14.9)	23.0 (18.3-24.3)	28.0 (23.1-39.4)	291
Asians	15-16	8.15 (7.14-9.30)	7.93 (6.77-9.35)	14.7 (12.2-17.3)	23.2 (17.4-30.8)	30.8 (23.7-43.8)	334

* See Calculation of Inorganic-related Arsenic Species for additional information. Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 4.04, 3.02, and 3.02, respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Inorganic-related Arsenic Species (creatinine corrected) (2011 - 2016)†

CAS Number 7440-38-2

*Sum of arsenic acid, arsenous acid, dimethylarsenic acid, and methlyarsonic acid**

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.31 (6.02-6.63)	6.00 (5.64-6.37)	9.46 (8.88-10.1)	15.1 (13.4-16.5)	19.6 (18.3-20.4)	2516
Total population	13-14	5.53 (5.24-5.83)	5.28 (4.91-5.61)	8.09 (7.61-8.62)	13.0 (11.9-14.1)	17.4 (15.6-18.8)	2653
Total population	15-16	4.94 (4.70-5.20)	4.77 (4.60-5.05)	7.51 (7.29-7.66)	11.6 (10.7-12.5)	16.2 (14.3-17.9)	3091
Age 3-5 years	15-16	8.95 (8.20-9.78)	8.52 (7.89-9.27)	12.9 (11.4-14.1)	19.0 (15.4-22.4)	23.7 (21.3-30.4)	506
Age 6-11 years	11-12	7.77 (7.36-8.20)	7.33 (6.95-8.26)	10.6 (9.74-11.9)	15.9 (14.3-16.8)	20.2 (16.8-22.3)	401
Age 6-11 years	13-14	7.38 (6.78-8.04)	6.73 (5.99-8.30)	10.4 (9.30-12.3)	15.4 (14.1-16.8)	17.8 (15.5-19.4)	397
Age 6-11 years	15-16	6.16 (5.78-6.56)	5.92 (5.49-6.27)	8.53 (7.98-9.36)	12.6 (11.2-15.2)	17.7 (14.2-20.7)	380
Age 12-19 years	11-12	5.13 (4.48-5.88)	4.76 (4.40-5.11)	7.40 (5.86-8.81)	11.4 (8.17-16.8)	16.8 (11.4-28.7)	392
Age 12-19 years	13-14	4.61 (4.14-5.15)	4.38 (3.92-4.81)	6.57 (5.55-7.69)	9.38 (8.11-11.1)	11.7 (9.46-16.7)	450
Age 12-19 years	15-16	4.04 (3.78-4.31)	3.96 (3.46-4.43)	5.59 (5.20-6.16)	8.64 (7.50-10.2)	12.9 (9.76-15.3)	402
Age 20+ years	11-12	6.37 (6.08-6.67)	6.09 (5.72-6.52)	9.53 (8.98-10.2)	15.6 (13.6-17.0)	19.6 (18.3-20.4)	1723
Age 20+ years	13-14	5.51 (5.24-5.79)	5.29 (4.95-5.57)	7.95 (7.61-8.52)	12.9 (11.9-14.2)	17.7 (15.6-19.4)	1806
Age 20+ years	15-16	4.84 (4.58-5.13)	4.73 (4.53-4.95)	7.35 (6.99-7.61)	11.2 (10.1-12.3)	16.1 (13.3-18.3)	1803
Males	11-12	5.61 (5.24-6.01)	5.27 (4.81-5.87)	8.39 (7.73-9.04)	12.4 (10.6-13.9)	16.8 (13.6-19.1)	1263
Males	13-14	5.02 (4.79-5.26)	4.72 (4.44-5.04)	7.04 (6.66-7.54)	11.4 (10.7-12.8)	17.0 (14.2-17.8)	1307
Males	15-16	4.42 (4.12-4.75)	4.42 (3.94-4.77)	6.46 (6.15-6.99)	10.1 (9.18-11.1)	13.7 (11.8-16.8)	1537
Females	11-12	7.06 (6.69-7.45)	6.77 (6.30-7.15)	11.0 (10.2-11.9)	16.8 (15.3-19.1)	21.5 (19.4-24.2)	1253
Females	13-14	6.06 (5.62-6.54)	5.80 (5.33-6.46)	9.14 (8.21-10.1)	13.9 (12.5-15.5)	18.0 (15.9-19.5)	1346
Females	15-16	5.49 (5.23-5.77)	5.20 (4.93-5.61)	8.33 (7.92-8.53)	12.8 (11.9-14.2)	17.3 (15.5-20.4)	1554
Mexican Americans	11-12	6.48 (6.05-6.94)	6.33 (5.77-6.82)	9.18 (7.97-9.86)	12.4 (11.2-13.3)	16.0 (13.0-19.0)	317
Mexican Americans	13-14	5.71 (5.39-6.06)	5.52 (5.15-5.87)	7.61 (6.97-8.52)	10.9 (9.87-12.4)	13.9 (12.2-15.8)	455
Mexican Americans	15-16	5.14 (4.66-5.67)	5.06 (4.44-5.70)	7.51 (6.87-8.16)	10.7 (9.58-11.6)	13.4 (11.8-15.1)	590
Non-Hispanic blacks	11-12	4.83 (4.23-5.53)	4.53 (3.92-5.26)	7.30 (6.09-8.27)	10.9 (9.40-13.2)	16.2 (12.6-17.3)	672
Non-Hispanic blacks	13-14	4.21 (3.77-4.72)	4.00 (3.42-4.75)	6.13 (5.48-6.97)	8.70 (7.90-10.5)	12.2 (9.92-15.4)	576
Non-Hispanic blacks	15-16	4.02 (3.60-4.49)	3.87 (3.40-4.46)	6.15 (5.33-6.79)	9.63 (7.89-12.2)	13.7 (11.8-16.3)	676
Non-Hispanic whites	11-12	6.13 (5.77-6.50)	5.81 (5.27-6.36)	9.09 (8.41-9.86)	14.3 (12.4-16.2)	18.6 (16.2-19.8)	824
Non-Hispanic whites	13-14	5.36 (4.99-5.76)	5.14 (4.65-5.55)	7.69 (7.04-8.64)	12.5 (11.1-13.9)	16.0 (14.1-18.3)	979
Non-Hispanic whites	15-16	4.64 (4.39-4.90)	4.65 (4.49-4.84)	6.87 (6.38-7.35)	9.71 (9.07-10.7)	12.5 (11.2-15.5)	937
All Hispanics	11-12	6.96 (6.56-7.38)	6.90 (6.45-7.36)	9.80 (9.30-10.5)	13.4 (12.0-15.9)	17.2 (14.7-20.3)	574
All Hispanics	13-14	5.93 (5.59-6.28)	5.76 (5.43-6.09)	8.05 (7.53-8.71)	11.9 (10.5-13.0)	15.2 (12.4-19.0)	703
All Hispanics	15-16	5.64 (5.24-6.07)	5.51 (5.06-5.86)	8.31 (7.93-8.80)	12.5 (11.5-13.4)	16.4 (14.2-17.8)	991
Asians	11-12	13.6 (11.9-15.4)	13.2 (11.4-14.6)	20.8 (16.5-24.6)	33.9 (24.6-58.3)	58.8 (36.4-71.5)	356
Asians	13-14	11.8 (10.6-13.2)	11.2 (10.0-12.8)	18.6 (14.7-21.7)	30.3 (23.9-40.3)	44.5 (31.2-48.9)	291
Asians	15-16	11.1 (9.71-12.6)	11.1 (9.54-12.8)	17.8 (15.2-22.0)	29.6 (24.5-34.3)	34.9 (30.2-36.7)	334

* See Calculation of Inorganic-related Arsenic Species for additional information.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenic (V) acid (2011 - 2016)†

CAS Number 7440-38-2

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2517
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2654
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3094
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	.820 (<LOD-1.12)	507
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	401
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	397
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	380
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	392
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	450
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	402
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1724
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1807
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1805
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1264
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1308
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1537
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1253
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1346
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1557
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	317
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	455
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	591
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	672
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	576
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	678
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	825
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	980
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	937
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	574
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	703
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	992
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	356
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	334

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.870, 0.790, and 0.790 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenic (V) acid (creatinine corrected) (2011 - 2016)†

CAS Number 7440-38-2

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2516
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2653
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3091
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	5.09 (<LOD-5.60)	506
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	401
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	397
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	380
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	392
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	450
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	402
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1723
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1806
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1803
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1263
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1307
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1537
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1253
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1346
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1554
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	317
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	455
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	590
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	672
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	576
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	676
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	824
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	979
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	937
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	574
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	703
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	991
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	356
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	291
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	334

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenobetaine (2011 - 2016)†

CAS Number 64436-13-1

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	4.62 (3.25-6.25)	18.0 (13.7-23.2)	36.5 (25.7-51.9)	2517
Total population	13-14	*	<LOD	3.70 (2.77-5.00)	15.1 (12.4-19.6)	30.5 (24.2-39.7)	2654
Total population	15-16	*	<LOD	3.44 (2.77-4.44)	14.6 (10.9-18.1)	27.6 (22.1-38.6)	3094
Age 3-5 years	15-16	*	<LOD	<LOD	2.87 (1.95-7.01)	10.1 (2.96-22.0)	507
Age 6-11 years	11-12	*	<LOD	1.58 (<LOD-4.12)	15.2 (6.60-35.6)	49.6 (20.0-60.1)	401
Age 6-11 years	13-14	*	<LOD	1.45 (<LOD-2.03)	5.63 (2.82-10.8)	11.7 (6.29-30.8)	397
Age 6-11 years	15-16	*	<LOD	<LOD	5.52 (2.57-7.33)	13.0 (5.54-22.3)	380
Age 12-19 years	11-12	*	<LOD	1.82 (<LOD-8.46)	17.6 (6.92-26.5)	32.6 (15.3-100)	392
Age 12-19 years	13-14	*	<LOD	1.55 (<LOD-2.76)	11.6 (7.52-16.2)	29.8 (13.0-77.9)	450
Age 12-19 years	15-16	*	<LOD	1.58 (<LOD-2.94)	7.27 (5.48-9.32)	13.1 (7.70-21.3)	402
Age 20+ years	11-12	*	<LOD	5.26 (4.07-6.58)	18.1 (13.4-24.0)	36.5 (24.4-53.4)	1724
Age 20+ years	13-14	*	<LOD	4.35 (3.13-6.09)	17.8 (13.6-21.2)	34.0 (24.5-41.5)	1807
Age 20+ years	15-16	*	<LOD	4.22 (3.26-5.70)	17.3 (12.6-21.8)	33.9 (24.2-41.9)	1805
Males	11-12	*	<LOD	5.22 (3.38-7.16)	18.4 (13.7-25.9)	41.7 (26.4-60.3)	1264
Males	13-14	*	<LOD	3.88 (2.95-5.17)	14.7 (10.3-20.6)	30.0 (20.7-41.8)	1308
Males	15-16	*	<LOD	3.66 (2.95-4.86)	16.1 (10.6-20.5)	30.8 (20.9-48.2)	1537
Females	11-12	*	<LOD	4.18 (2.84-6.11)	17.0 (10.6-22.7)	33.5 (22.1-53.1)	1253
Females	13-14	*	<LOD	3.53 (2.37-4.95)	16.0 (12.4-21.2)	33.2 (24.3-45.4)	1346
Females	15-16	*	<LOD	2.94 (2.00-4.69)	12.5 (7.51-19.0)	26.0 (19.9-35.2)	1557
Mexican Americans	11-12	*	<LOD	3.78 (1.93-5.84)	12.5 (6.11-17.6)	19.3 (12.9-34.7)	317
Mexican Americans	13-14	*	<LOD	1.85 (<LOD-2.66)	7.45 (2.97-21.7)	21.3 (7.45-45.8)	455
Mexican Americans	15-16	*	<LOD	1.96 (1.34-2.75)	7.72 (4.70-10.2)	17.5 (8.53-44.7)	591
Non-Hispanic blacks	11-12	*	1.19 (<LOD-2.91)	7.09 (3.79-13.4)	30.2 (17.2-51.9)	57.9 (36.1-81.5)	672
Non-Hispanic blacks	13-14	*	1.25 (<LOD-1.71)	5.04 (3.56-8.35)	21.2 (15.2-26.4)	36.4 (26.4-70.9)	576
Non-Hispanic blacks	15-16	*	1.30 (<LOD-1.85)	6.25 (3.88-10.4)	22.4 (14.4-27.6)	44.4 (23.9-89.0)	678
Non-Hispanic whites	11-12	*	<LOD	4.07 (2.39-6.12)	16.7 (9.30-22.5)	30.0 (23.2-47.0)	825
Non-Hispanic whites	13-14	*	<LOD	3.33 (2.30-5.12)	14.0 (8.82-20.8)	29.4 (20.7-39.7)	980
Non-Hispanic whites	15-16	*	<LOD	2.88 (2.15-4.07)	12.0 (7.38-16.0)	23.2 (15.0-35.2)	937
All Hispanics	11-12	*	<LOD	3.78 (2.65-4.73)	12.2 (7.70-16.8)	19.3 (13.9-37.4)	574
All Hispanics	13-14	*	<LOD	2.30 (1.85-2.81)	9.56 (5.03-14.9)	21.3 (12.0-33.2)	703
All Hispanics	15-16	*	<LOD	2.52 (1.86-3.66)	10.5 (7.58-17.5)	26.5 (17.0-50.8)	992
Asians	11-12	5.15 (4.31-6.14)	4.80 (3.76-5.82)	17.3 (13.2-21.3)	46.1 (29.1-74.1)	85.6 (51.8-110)	356
Asians	13-14	3.74 (3.04-4.60)	2.31 (1.35-4.24)	11.6 (8.96-17.4)	42.1 (27.3-60.7)	79.5 (48.4-123)	291
Asians	15-16	4.18 (3.08-5.67)	3.37 (2.09-5.71)	14.6 (8.35-21.8)	35.4 (24.6-62.8)	64.8 (42.3-86.2)	334

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.19, 1.16, and 1.16 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenobetaine (creatinine corrected) (2011 - 2016)†

CAS Number 64436-13-1

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	5.63 (4.42-7.22)	18.0 (13.8-26.1)	36.9 (26.9-45.6)	2516
Total population	13-14	*	<LOD	4.91 (3.98-6.31)	16.3 (12.7-21.2)	38.7 (33.3-46.8)	2653
Total population	15-16	*	<LOD	4.55 (3.73-5.29)	13.7 (10.3-18.4)	29.0 (20.2-46.7)	3091
Age 3-5 years	15-16	*	<LOD	<LOD	9.54 (6.31-13.3)	20.5 (10.9-34.6)	506
Age 6-11 years	11-12	*	<LOD	4.35 (<LOD-6.46)	16.0 (8.00-39.5)	69.0 (16.0-102)	401
Age 6-11 years	13-14	*	<LOD	3.57 (<LOD-5.38)	9.00 (6.77-11.1)	12.6 (10.1-28.6)	397
Age 6-11 years	15-16	*	<LOD	<LOD	6.88 (4.74-9.92)	17.1 (7.97-20.5)	380
Age 12-19 years	11-12	*	<LOD	3.36 (<LOD-8.94)	14.4 (5.56-23.8)	25.9 (13.6-104)	392
Age 12-19 years	13-14	*	<LOD	2.28 (<LOD-3.15)	9.59 (4.56-16.5)	19.7 (12.2-46.9)	450
Age 12-19 years	15-16	*	<LOD	2.24 (<LOD-3.11)	6.80 (4.45-9.81)	12.3 (8.16-19.5)	402
Age 20+ years	11-12	*	<LOD	6.25 (4.78-8.46)	19.3 (14.0-28.4)	35.8 (26.8-44.1)	1723
Age 20+ years	13-14	*	<LOD	5.63 (4.54-7.37)	17.8 (14.2-25.2)	44.9 (35.5-52.1)	1806
Age 20+ years	15-16	*	<LOD	5.08 (4.10-6.18)	16.4 (12.0-21.6)	36.6 (24.6-60.9)	1803
Males	11-12	*	<LOD	4.94 (3.50-6.67)	16.7 (12.6-25.7)	35.7 (23.4-52.8)	1263
Males	13-14	*	<LOD	4.42 (3.42-5.97)	14.5 (10.7-20.1)	37.8 (24.1-47.7)	1307
Males	15-16	*	<LOD	4.32 (3.43-5.38)	12.5 (9.69-18.2)	27.0 (18.4-42.3)	1537
Females	11-12	*	<LOD	6.48 (4.79-8.60)	18.8 (15.4-28.1)	37.0 (26.2-46.8)	1253
Females	13-14	*	<LOD	5.39 (4.56-7.07)	17.8 (13.8-25.8)	41.3 (33.3-53.2)	1346
Females	15-16	*	<LOD	4.57 (3.57-5.85)	15.4 (9.53-20.9)	31.8 (18.5-58.3)	1554
Mexican Americans	11-12	*	<LOD	3.87 (2.80-5.76)	12.6 (8.36-22.6)	25.9 (13.4-40.3)	317
Mexican Americans	13-14	*	<LOD	2.93 (<LOD-4.10)	7.28 (4.10-14.4)	16.6 (6.84-41.5)	455
Mexican Americans	15-16	*	<LOD	3.08 (2.46-3.91)	8.77 (5.47-12.7)	17.4 (9.05-32.2)	590
Non-Hispanic blacks	11-12	*	1.50 (<LOD-2.18)	6.00 (2.63-12.4)	20.3 (12.8-30.0)	38.7 (22.6-78.2)	672
Non-Hispanic blacks	13-14	*	1.30 (<LOD-1.56)	4.39 (3.28-6.05)	13.7 (10.4-19.3)	29.2 (16.8-60.0)	576
Non-Hispanic blacks	15-16	*	1.49 (<LOD-2.00)	4.71 (3.25-7.38)	16.0 (12.0-20.5)	29.3 (17.8-66.4)	676
Non-Hispanic whites	11-12	*	<LOD	5.00 (4.06-7.55)	16.8 (12.7-28.7)	35.7 (21.0-45.6)	824
Non-Hispanic whites	13-14	*	<LOD	5.08 (3.73-7.46)	16.4 (11.9-24.4)	39.2 (29.3-47.7)	979
Non-Hispanic whites	15-16	*	<LOD	4.10 (3.28-5.06)	10.7 (7.70-17.5)	26.7 (15.4-51.3)	937
All Hispanics	11-12	*	<LOD	4.00 (3.48-4.75)	13.5 (9.17-17.1)	24.9 (16.6-30.9)	574
All Hispanics	13-14	*	<LOD	3.28 (2.56-4.24)	7.95 (5.80-13.7)	17.2 (9.76-29.2)	703
All Hispanics	15-16	*	<LOD	3.70 (3.15-4.30)	12.8 (8.63-17.7)	28.5 (17.6-36.5)	991
Asians	11-12	6.90 (5.54-8.60)	6.02 (4.78-7.88)	21.5 (14.0-30.7)	60.4 (42.8-82.0)	95.7 (75.6-120)	356
Asians	13-14	5.83 (4.56-7.44)	4.08 (3.42-6.68)	17.4 (12.3-28.7)	71.3 (46.4-81.5)	89.3 (80.4-159)	291
Asians	15-16	5.68 (4.16-7.76)	5.05 (3.07-9.55)	18.2 (12.6-26.0)	44.8 (35.4-58.5)	81.3 (46.6-129)	334

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenocholine (2011 - 2016)†

CAS Number 96055-45-7

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2517
Total population	13-14	*	<LOD	<LOD	.200 (.140-.250)	.320 (.290-.350)	2654
Total population	15-16	*	<LOD	<LOD	.220 (<LOD-.400)	.440 (.290-.570)	3094
Age 3-5 years	15-16	*	<LOD	<LOD	.180 (<LOD-.480)	.410 (<LOD-.630)	507
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	401
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.260 (<LOD-.750)	397
Age 6-11 years	15-16	*	<LOD	<LOD	.180 (<LOD-.330)	.380 (.130-.550)	380
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	392
Age 12-19 years	13-14	*	<LOD	<LOD	.160 (<LOD-.260)	.260 (.140-.370)	450
Age 12-19 years	15-16	*	<LOD	<LOD	.210 (<LOD-.520)	.430 (.150-.780)	402
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1724
Age 20+ years	13-14	*	<LOD	<LOD	.210 (.150-.260)	.330 (.290-.370)	1807
Age 20+ years	15-16	*	<LOD	<LOD	.230 (<LOD-.390)	.440 (.310-.600)	1805
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1264
Males	13-14	*	<LOD	<LOD	.220 (.130-.290)	.340 (.290-.380)	1308
Males	15-16	*	<LOD	<LOD	.260 (.110-.470)	.470 (.330-.680)	1537
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1253
Females	13-14	*	<LOD	<LOD	.180 (.110-.230)	.290 (.220-.360)	1346
Females	15-16	*	<LOD	<LOD	.200 (<LOD-.340)	.380 (.240-.520)	1557
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	317
Mexican Americans	13-14	*	<LOD	<LOD	.180 (<LOD-.260)	.320 (.220-.390)	455
Mexican Americans	15-16	*	<LOD	.120 (<LOD-.300)	.380 (.190-.560)	.550 (.420-.650)	591
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	672
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.260 (.200-.310)	.370 (.310-.410)	576
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.330 (.160-.690)	.690 (.330-1.09)	678
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	825
Non-Hispanic whites	13-14	*	<LOD	<LOD	.160 (<LOD-.250)	.280 (.200-.360)	980
Non-Hispanic whites	15-16	*	<LOD	<LOD	.160 (<LOD-.380)	.370 (.150-.550)	937
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	574
All Hispanics	13-14	*	<LOD	<LOD	.180 (<LOD-.270)	.330 (.250-.390)	703
All Hispanics	15-16	*	<LOD	<LOD	.350 (.170-.520)	.520 (.410-.610)	992
Asians	11-12	*	<LOD	<LOD	.310 (<LOD-.450)	.560 (.370-.930)	356
Asians	13-14	*	<LOD	.130 (<LOD-.230)	.430 (.340-.570)	.860 (.480-1.83)	291
Asians	15-16	*	<LOD	<LOD	.360 (.210-.580)	.580 (.310-.990)	334

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.280, 0.110, and 0.110 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenocholine (creatinine corrected) (2011 - 2016)†

CAS Number 96055-45-7

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2516
Total population	13-14	*	<LOD	<LOD	.333 (.296-.381)	.533 (.444-.615)	2653
Total population	15-16	*	<LOD	<LOD	.348 (<LOD-.430)	.533 (.413-.672)	3091
Age 3-5 years	15-16	*	<LOD	<LOD	.788 (<LOD-1.14)	1.06 (<LOD-2.00)	506
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	401
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.533 (<LOD-.974)	397
Age 6-11 years	15-16	*	<LOD	<LOD	.400 (<LOD-.500)	.571 (.392-.889)	380
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	392
Age 12-19 years	13-14	*	<LOD	<LOD	.229 (<LOD-.276)	.308 (.250-.348)	450
Age 12-19 years	15-16	*	<LOD	<LOD	.267 (<LOD-.421)	.421 (.250-.889)	402
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1723
Age 20+ years	13-14	*	<LOD	<LOD	.351 (.314-.400)	.571 (.471-.667)	1806
Age 20+ years	15-16	*	<LOD	<LOD	.333 (<LOD-.414)	.533 (.402-.638)	1803
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1263
Males	13-14	*	<LOD	<LOD	.276 (.250-.320)	.526 (.338-.603)	1307
Males	15-16	*	<LOD	<LOD	.302 (.239-.412)	.495 (.348-.677)	1537
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1253
Females	13-14	*	<LOD	<LOD	.381 (.333-.444)	.533 (.471-.667)	1346
Females	15-16	*	<LOD	<LOD	.393 (<LOD-.444)	.595 (.444-.672)	1554
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	317
Mexican Americans	13-14	*	<LOD	<LOD	.276 (<LOD-.308)	.348 (.286-.490)	455
Mexican Americans	15-16	*	<LOD	.218 (<LOD-.316)	.400 (.276-.624)	.624 (.468-.872)	590
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	672
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.235 (.190-.259)	.316 (.259-.364)	576
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.308 (.237-.400)	.429 (.318-.800)	676
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	824
Non-Hispanic whites	13-14	*	<LOD	<LOD	.364 (<LOD-.444)	.571 (.444-.667)	979
Non-Hispanic whites	15-16	*	<LOD	<LOD	.333 (<LOD-.421)	.471 (.378-.667)	937
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	574
All Hispanics	13-14	*	<LOD	<LOD	.283 (<LOD-.320)	.364 (.308-.444)	703
All Hispanics	15-16	*	<LOD	<LOD	.421 (.308-.597)	.633 (.500-.857)	991
Asians	11-12	*	<LOD	<LOD	.952 (<LOD-1.33)	1.43 (.952-2.00)	356
Asians	13-14	*	<LOD	.333 (<LOD-.421)	.727 (.485-1.14)	1.25 (.800-4.25)	291
Asians	15-16	*	<LOD	<LOD	.528 (.431-.622)	.721 (.528-1.16)	334

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenous (III) acid (2011 - 2016)†

CAS Number 13464-48-9

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.520 (<LOD-.600)	.840 (.760-.960)	1.11 (.980-1.27)	2517
Total population	13-14	.316 (.275-.365)	.470 (.360-.560)	.730 (.660-.810)	1.00 (.930-1.07)	1.19 (1.12-1.29)	2654
Total population	15-16	*	<LOD	.530 (.390-.670)	.880 (.700-1.10)	1.12 (.960-1.33)	3094
Age 3-5 years	15-16	*	<LOD	.490 (.330-.590)	.770 (.620-.950)	1.10 (.760-1.32)	507
Age 6-11 years	11-12	*	<LOD	.540 (<LOD-.660)	.870 (.710-1.00)	1.03 (.820-1.22)	401
Age 6-11 years	13-14	.360 (.278-.466)	.540 (.370-.630)	.810 (.680-.880)	1.05 (.930-1.13)	1.22 (1.07-1.32)	397
Age 6-11 years	15-16	*	.160 (<LOD-.330)	.540 (.460-.640)	.790 (.660-.970)	1.00 (.790-1.21)	380
Age 12-19 years	11-12	*	<LOD	.610 (.480-.720)	.920 (.810-1.14)	1.18 (.980-1.43)	392
Age 12-19 years	13-14	.429 (.358-.515)	.570 (.490-.630)	.830 (.730-.930)	1.12 (1.00-1.28)	1.35 (1.13-1.57)	450
Age 12-19 years	15-16	.276 (.211-.362)	.320 (.140-.490)	.710 (.540-.880)	1.06 (.900-1.24)	1.35 (1.06-1.74)	402
Age 20+ years	11-12	*	<LOD	.500 (<LOD-.570)	.830 (.750-.940)	1.11 (.980-1.27)	1724
Age 20+ years	13-14	.299 (.258-.346)	.430 (.300-.540)	.720 (.650-.790)	.970 (.890-1.07)	1.16 (1.08-1.27)	1807
Age 20+ years	15-16	*	<LOD	.520 (.360-.640)	.860 (.650-1.09)	1.11 (.910-1.31)	1805
Males	11-12	*	<LOD	.600 (.520-.680)	.980 (.840-1.13)	1.31 (1.11-1.59)	1264
Males	13-14	.365 (.306-.436)	.540 (.420-.630)	.800 (.710-.890)	1.04 (.970-1.12)	1.21 (1.14-1.35)	1308
Males	15-16	*	.260 (<LOD-.410)	.590 (.470-.800)	.980 (.780-1.21)	1.24 (1.02-1.60)	1537
Females	11-12	*	<LOD	<LOD	.760 (.600-.840)	.940 (.810-1.07)	1253
Females	13-14	.276 (.241-.315)	.400 (.260-.490)	.660 (.600-.730)	.940 (.850-1.04)	1.13 (1.05-1.28)	1346
Females	15-16	*	<LOD	.440 (.310-.580)	.770 (.630-.970)	1.02 (.830-1.20)	1557
Mexican Americans	11-12	*	<LOD	.570 (.490-.660)	.830 (.770-1.03)	1.14 (.880-1.37)	317
Mexican Americans	13-14	.416 (.351-.494)	.580 (.460-.700)	.870 (.750-.990)	1.08 (1.03-1.18)	1.29 (1.17-1.47)	455
Mexican Americans	15-16	.266 (.201-.351)	.350 (<LOD-.500)	.650 (.520-.830)	1.03 (.800-1.32)	1.33 (1.03-1.60)	591
Non-Hispanic blacks	11-12	*	<LOD	.520 (<LOD-.680)	.880 (.700-1.10)	1.21 (.980-1.57)	672
Non-Hispanic blacks	13-14	.416 (.378-.458)	.550 (.490-.600)	.840 (.730-.900)	1.12 (1.00-1.20)	1.33 (1.18-1.46)	576
Non-Hispanic blacks	15-16	*	.230 (<LOD-.480)	.670 (.470-.840)	1.09 (.830-1.40)	1.45 (.940-2.11)	678
Non-Hispanic whites	11-12	*	<LOD	<LOD	.800 (.640-.900)	1.03 (.830-1.18)	825
Non-Hispanic whites	13-14	.267 (.225-.316)	.380 (.170-.520)	.670 (.600-.730)	.900 (.820-.950)	1.05 (.940-1.21)	980
Non-Hispanic whites	15-16	*	<LOD	.450 (.270-.590)	.760 (.540-1.00)	.990 (.750-1.20)	937
All Hispanics	11-12	*	<LOD	.620 (.510-.760)	.910 (.820-1.07)	1.29 (1.07-1.43)	574
All Hispanics	13-14	.423 (.358-.501)	.580 (.460-.700)	.880 (.790-.980)	1.11 (1.06-1.18)	1.35 (1.20-1.40)	703
All Hispanics	15-16	.268 (.211-.339)	.340 (.150-.470)	.660 (.540-.830)	1.04 (.930-1.27)	1.32 (1.09-1.58)	992
Asians	11-12	*	.510 (<LOD-.610)	.900 (.740-.990)	1.32 (1.10-1.63)	1.79 (1.53-2.31)	356
Asians	13-14	.456 (.393-.528)	.600 (.500-.680)	.900 (.790-1.09)	1.34 (1.15-1.56)	1.66 (1.37-2.14)	291
Asians	15-16	.302 (.232-.392)	.370 (.220-.520)	.760 (.610-.910)	1.17 (.960-1.62)	1.62 (1.24-2.21)	334

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.480, 0.120, and 0.120 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Arsenous (III) acid (creatinine corrected) (2011 - 2016)†

CAS Number 13464-48-9

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.791 (<LOD-.850)	1.35 (1.21-1.42)	1.79 (1.55-1.89)	2516
Total population	13-14	.365 (.311-.427)	.387 (.320-.460)	.715 (.612-.851)	1.23 (1.05-1.39)	1.62 (1.38-1.85)	2653
Total population	15-16	*	<LOD	.469 (.348-.606)	.803 (.667-1.00)	1.14 (.918-1.34)	3091
Age 3-5 years	15-16	*	<LOD	.800 (.573-1.00)	1.35 (1.00-2.00)	1.95 (1.33-2.83)	506
Age 6-11 years	11-12	*	<LOD	1.03 (<LOD-1.13)	1.54 (1.26-1.79)	2.00 (1.55-2.62)	401
Age 6-11 years	13-14	.541 (.415-.706)	.578 (.451-.711)	1.03 (.764-1.40)	1.70 (1.22-1.98)	1.94 (1.60-2.92)	397
Age 6-11 years	15-16	*	.313 (<LOD-.400)	.534 (.425-.694)	.957 (.694-1.23)	1.27 (.966-1.79)	380
Age 12-19 years	11-12	*	<LOD	.709 (.607-.850)	1.11 (.971-1.31)	1.36 (1.03-2.50)	392
Age 12-19 years	13-14	.389 (.335-.452)	.390 (.321-.497)	.683 (.536-.862)	1.03 (.866-1.37)	1.43 (1.04-1.77)	450
Age 12-19 years	15-16	.258 (.206-.324)	.268 (.195-.371)	.535 (.421-.627)	.837 (.733-.925)	1.12 (.922-1.31)	402
Age 20+ years	11-12	*	<LOD	.773 (<LOD-.850)	1.36 (1.19-1.48)	1.79 (1.55-1.95)	1723
Age 20+ years	13-14	.347 (.296-.407)	.366 (.303-.444)	.691 (.592-.832)	1.21 (1.00-1.37)	1.56 (1.36-1.82)	1806
Age 20+ years	15-16	*	<LOD	.434 (.320-.574)	.750 (.615-.984)	1.08 (.860-1.27)	1803
Males	11-12	*	<LOD	.708 (.645-.756)	1.12 (.981-1.25)	1.48 (1.28-1.70)	1263
Males	13-14	.366 (.306-.436)	.388 (.311-.475)	.702 (.592-.825)	1.23 (.942-1.40)	1.59 (1.33-1.86)	1307
Males	15-16	*	.250 (<LOD-.321)	.477 (.348-.621)	.773 (.644-1.05)	1.11 (.814-1.29)	1537
Females	11-12	*	<LOD	<LOD	1.42 (1.36-1.62)	1.89 (1.70-2.27)	1253
Females	13-14	.364 (.311-.426)	.387 (.320-.459)	.727 (.616-.889)	1.24 (1.05-1.42)	1.65 (1.40-1.91)	1346
Females	15-16	*	<LOD	.457 (.338-.590)	.854 (.667-1.00)	1.16 (.918-1.45)	1554
Mexican Americans	11-12	*	<LOD	.723 (.630-.850)	1.13 (.919-1.42)	1.55 (1.13-2.20)	317
Mexican Americans	13-14	.475 (.386-.584)	.471 (.394-.634)	.843 (.692-1.11)	1.50 (1.19-1.79)	1.85 (1.67-2.07)	455
Mexican Americans	15-16	.290 (.215-.392)	.308 (<LOD-.470)	.574 (.429-.788)	1.00 (.710-1.29)	1.27 (1.01-1.49)	590
Non-Hispanic blacks	11-12	*	<LOD	.514 (<LOD-.586)	.919 (.739-1.06)	1.22 (.971-1.64)	672
Non-Hispanic blacks	13-14	.314 (.272-.362)	.328 (.285-.398)	.577 (.483-.673)	.878 (.782-.957)	1.05 (.957-1.24)	576
Non-Hispanic blacks	15-16	*	.204 (<LOD-.321)	.422 (.308-.566)	.708 (.540-.932)	.965 (.690-1.25)	676
Non-Hispanic whites	11-12	*	<LOD	<LOD	1.36 (1.21-1.48)	1.79 (1.51-2.00)	824
Non-Hispanic whites	13-14	.329 (.275-.393)	.351 (.278-.433)	.653 (.553-.793)	1.17 (.900-1.37)	1.49 (1.30-1.72)	979
Non-Hispanic whites	15-16	*	<LOD	.400 (.287-.557)	.706 (.538-.934)	1.00 (.733-1.25)	937
All Hispanics	11-12	*	<LOD	.762 (.704-.833)	1.21 (1.00-1.48)	1.55 (1.34-1.95)	574
All Hispanics	13-14	.472 (.388-.575)	.482 (.392-.638)	.851 (.718-1.05)	1.41 (1.13-1.74)	1.84 (1.65-2.06)	703
All Hispanics	15-16	.301 (.239-.379)	.327 (.226-.442)	.612 (.500-.741)	1.01 (.780-1.27)	1.31 (1.16-1.55)	991
Asians	11-12	*	.739 (<LOD-.850)	1.21 (1.06-1.45)	1.96 (1.62-2.43)	2.91 (2.00-3.64)	356
Asians	13-14	.709 (.590-.854)	.779 (.596-.938)	1.22 (1.08-1.33)	1.98 (1.48-3.00)	3.04 (1.98-4.15)	291
Asians	15-16	.410 (.315-.532)	.427 (.326-.596)	.894 (.616-1.21)	1.52 (1.05-2.29)	2.14 (1.41-3.31)	334

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Dimethylarsinic acid (2011 - 2016)†

CAS Number 917-76-0

Metabolite of Arsenic

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.47 (3.18-3.78)	3.37 (3.06-3.66)	5.81 (5.14-6.59)	9.55 (8.43-11.2)	14.0 (11.4-16.5)	2517
Total population	13-14	3.20 (2.97-3.44)	3.08 (2.73-3.41)	5.15 (4.68-5.69)	8.60 (8.02-9.25)	11.8 (10.6-13.5)	2654
Total population	15-16	3.04 (2.89-3.21)	2.85 (2.65-3.12)	4.85 (4.59-5.13)	8.25 (7.32-9.53)	11.8 (10.0-14.6)	3094
Age 3-5 years	15-16	2.76 (2.53-3.03)	2.62 (2.37-2.77)	4.09 (3.75-4.70)	8.03 (6.18-9.27)	10.5 (8.11-16.3)	507
Age 6-11 years	11-12	3.43 (3.06-3.85)	3.53 (2.81-4.05)	5.81 (5.21-6.38)	8.60 (7.55-9.73)	11.4 (9.35-13.7)	401
Age 6-11 years	13-14	3.33 (2.95-3.75)	3.12 (2.68-3.56)	5.27 (4.31-6.14)	8.69 (7.44-10.8)	11.8 (8.62-18.5)	397
Age 6-11 years	15-16	3.01 (2.75-3.30)	2.98 (2.50-3.26)	4.48 (3.89-5.02)	7.32 (5.49-9.21)	11.3 (7.81-18.5)	380
Age 12-19 years	11-12	3.27 (2.71-3.94)	3.33 (2.49-4.20)	5.02 (4.33-6.05)	8.53 (6.29-11.1)	11.6 (8.74-17.9)	392
Age 12-19 years	13-14	3.30 (2.99-3.63)	3.24 (2.86-3.66)	4.95 (4.53-5.66)	9.02 (6.97-10.6)	11.4 (10.0-13.1)	450
Age 12-19 years	15-16	2.84 (2.64-3.06)	2.65 (2.36-2.79)	4.15 (3.69-4.78)	7.12 (5.87-8.60)	9.88 (8.56-13.8)	402
Age 20+ years	11-12	3.51 (3.22-3.82)	3.37 (3.05-3.67)	5.91 (5.20-6.83)	9.94 (8.57-11.5)	14.1 (12.2-16.4)	1724
Age 20+ years	13-14	3.17 (2.93-3.43)	3.02 (2.66-3.41)	5.18 (4.68-5.78)	8.53 (7.82-9.21)	11.7 (10.3-14.2)	1807
Age 20+ years	15-16	3.09 (2.92-3.27)	2.95 (2.67-3.17)	4.99 (4.65-5.25)	8.64 (7.53-9.93)	12.0 (10.1-15.0)	1805
Males	11-12	3.79 (3.40-4.23)	3.71 (3.33-4.29)	6.27 (5.36-7.61)	10.3 (8.75-12.5)	15.3 (12.5-16.7)	1264
Males	13-14	3.31 (3.12-3.51)	3.25 (3.02-3.56)	5.34 (5.03-5.61)	8.56 (8.11-9.30)	11.6 (10.3-12.8)	1308
Males	15-16	3.20 (3.02-3.39)	3.08 (2.70-3.38)	5.13 (4.73-5.33)	8.62 (7.52-9.93)	11.8 (9.93-15.1)	1537
Females	11-12	3.19 (2.92-3.48)	3.01 (2.73-3.30)	5.30 (4.61-5.96)	8.96 (7.72-10.5)	12.2 (9.56-17.8)	1253
Females	13-14	3.09 (2.81-3.40)	2.81 (2.53-3.23)	4.85 (4.27-5.82)	8.60 (7.56-9.54)	11.9 (10.6-14.6)	1346
Females	15-16	2.90 (2.74-3.07)	2.70 (2.43-2.95)	4.63 (4.29-5.00)	7.96 (6.81-9.65)	11.9 (10.0-13.8)	1557
Mexican Americans	11-12	3.67 (3.33-4.04)	3.58 (3.27-4.18)	5.82 (5.24-6.47)	9.05 (7.91-10.0)	12.1 (9.61-17.4)	317
Mexican Americans	13-14	3.32 (3.10-3.54)	3.45 (2.94-3.84)	5.19 (4.79-5.75)	7.74 (7.22-8.45)	9.94 (8.21-12.7)	455
Mexican Americans	15-16	3.28 (2.96-3.63)	3.16 (2.88-3.61)	4.97 (4.43-5.57)	8.06 (6.80-11.3)	11.9 (8.70-16.0)	591
Non-Hispanic blacks	11-12	4.05 (3.46-4.74)	4.05 (3.35-4.65)	6.78 (5.46-8.21)	12.0 (10.0-14.2)	17.4 (14.2-19.8)	672
Non-Hispanic blacks	13-14	3.83 (3.35-4.39)	3.62 (3.21-4.05)	5.84 (4.60-7.84)	10.2 (8.42-13.2)	15.7 (10.9-20.7)	576
Non-Hispanic blacks	15-16	3.54 (3.23-3.88)	3.39 (2.92-3.80)	5.96 (4.86-6.80)	10.7 (9.30-11.7)	14.3 (11.2-19.6)	678
Non-Hispanic whites	11-12	3.06 (2.82-3.33)	2.97 (2.72-3.29)	4.95 (4.39-5.77)	7.98 (6.92-9.02)	10.5 (8.71-13.0)	825
Non-Hispanic whites	13-14	2.86 (2.59-3.15)	2.69 (2.29-3.10)	4.56 (3.96-5.21)	7.52 (6.61-8.52)	9.62 (8.53-11.3)	980
Non-Hispanic whites	15-16	2.67 (2.55-2.80)	2.46 (2.30-2.65)	4.28 (3.87-4.63)	6.40 (5.73-7.06)	9.18 (7.61-10.1)	937
All Hispanics	11-12	4.02 (3.45-4.69)	3.96 (3.33-4.68)	6.73 (5.49-8.39)	11.1 (8.53-16.6)	16.8 (12.1-19.7)	574
All Hispanics	13-14	3.54 (3.16-3.97)	3.61 (3.07-4.11)	5.63 (5.01-6.88)	9.09 (7.80-10.3)	11.8 (9.98-12.9)	703
All Hispanics	15-16	3.51 (3.17-3.88)	3.32 (3.05-3.71)	5.54 (4.92-6.34)	9.17 (7.89-11.8)	13.9 (10.5-16.0)	992
Asians	11-12	7.38 (6.50-8.37)	7.52 (6.45-8.74)	14.4 (11.7-17.2)	24.7 (20.3-31.3)	38.6 (28.5-40.5)	356
Asians	13-14	5.59 (5.13-6.09)	5.62 (5.08-6.53)	11.3 (9.01-12.4)	19.9 (15.6-22.1)	23.6 (19.7-34.6)	291
Asians	15-16	6.31 (5.46-7.29)	6.52 (5.05-7.50)	12.0 (9.86-14.2)	19.8 (14.2-28.8)	27.3 (19.8-40.6)	334

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.80, 1.91, and 1.91 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Dimethylarsinic acid (creatinine corrected) (2011 - 2016)†

CAS Number 917-76-0

Metabolite of Arsenic

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.92 (3.69-4.16)	3.65 (3.47-3.91)	5.92 (5.40-6.49)	9.86 (8.68-11.3)	13.1 (11.5-15.2)	2516
Total population	13-14	3.68 (3.46-3.92)	3.47 (3.17-3.79)	5.53 (5.11-5.97)	9.18 (8.11-10.2)	12.7 (11.4-13.6)	2653
Total population	15-16	3.41 (3.26-3.56)	3.32 (3.15-3.48)	5.19 (5.03-5.40)	8.45 (7.56-9.51)	12.6 (10.6-14.4)	3091
Age 3-5 years	15-16	6.15 (5.58-6.77)	5.87 (5.31-6.14)	8.65 (7.61-9.97)	13.2 (11.8-15.0)	17.3 (13.5-22.5)	506
Age 6-11 years	11-12	4.86 (4.54-5.21)	4.44 (4.10-4.70)	6.82 (6.15-7.69)	9.77 (8.65-11.5)	13.8 (10.3-15.0)	401
Age 6-11 years	13-14	5.00 (4.56-5.50)	4.59 (4.06-5.40)	7.50 (6.62-8.44)	10.8 (9.11-12.3)	13.3 (12.0-14.4)	397
Age 6-11 years	15-16	4.29 (4.01-4.59)	3.97 (3.79-4.42)	6.01 (5.34-6.43)	9.44 (7.50-11.5)	14.4 (10.5-18.6)	380
Age 12-19 years	11-12	3.13 (2.68-3.64)	3.02 (2.48-3.34)	4.51 (3.49-5.62)	7.03 (5.08-10.8)	10.8 (6.13-18.1)	392
Age 12-19 years	13-14	2.99 (2.68-3.33)	2.74 (2.57-3.00)	4.32 (3.65-5.28)	6.80 (5.81-7.46)	9.30 (6.94-12.8)	450
Age 12-19 years	15-16	2.65 (2.49-2.83)	2.52 (2.29-2.75)	3.80 (3.29-4.22)	6.42 (5.29-7.27)	8.90 (7.02-12.3)	402
Age 20+ years	11-12	3.96 (3.75-4.19)	3.73 (3.52-3.94)	6.05 (5.45-6.68)	10.1 (8.97-11.3)	13.1 (11.5-15.5)	1723
Age 20+ years	13-14	3.68 (3.46-3.91)	3.48 (3.21-3.75)	5.47 (5.12-5.89)	9.32 (8.24-10.3)	13.0 (11.3-14.7)	1806
Age 20+ years	15-16	3.36 (3.20-3.53)	3.30 (3.11-3.47)	5.12 (4.89-5.40)	8.44 (7.50-9.51)	12.2 (10.4-14.5)	1803
Males	11-12	3.55 (3.27-3.86)	3.34 (3.11-3.69)	5.32 (4.75-6.06)	8.47 (7.35-9.73)	11.0 (9.45-14.1)	1263
Males	13-14	3.31 (3.12-3.51)	3.03 (2.92-3.29)	4.79 (4.57-5.05)	8.05 (7.51-9.13)	11.4 (10.3-12.8)	1307
Males	15-16	3.03 (2.85-3.23)	2.92 (2.66-3.19)	4.62 (4.42-4.82)	7.42 (6.47-8.44)	10.4 (8.54-13.3)	1537
Females	11-12	4.30 (4.06-4.56)	4.10 (3.85-4.35)	6.68 (5.93-7.36)	10.8 (9.77-12.4)	14.9 (12.4-17.0)	1253
Females	13-14	4.08 (3.75-4.44)	3.94 (3.54-4.29)	6.16 (5.64-6.90)	9.84 (8.39-12.0)	13.4 (11.3-15.4)	1346
Females	15-16	3.81 (3.62-4.00)	3.65 (3.50-3.86)	5.63 (5.40-5.82)	9.73 (8.70-10.6)	13.5 (11.5-16.9)	1554
Mexican Americans	11-12	4.12 (3.83-4.44)	4.10 (3.43-4.59)	5.77 (5.29-6.37)	8.06 (7.49-9.54)	10.5 (8.70-14.8)	317
Mexican Americans	13-14	3.78 (3.61-3.96)	3.72 (3.55-3.94)	5.11 (4.81-5.40)	7.29 (6.75-7.94)	9.73 (7.53-11.7)	455
Mexican Americans	15-16	3.55 (3.20-3.93)	3.46 (3.14-3.92)	5.14 (4.82-5.71)	7.11 (6.75-8.44)	10.3 (8.44-11.5)	590
Non-Hispanic blacks	11-12	3.16 (2.66-3.74)	3.05 (2.41-3.67)	4.98 (4.01-6.08)	8.27 (6.68-9.70)	11.3 (8.87-13.7)	672
Non-Hispanic blacks	13-14	2.89 (2.53-3.30)	2.68 (2.33-3.05)	4.40 (3.70-5.00)	6.81 (5.84-8.72)	10.1 (7.41-12.5)	576
Non-Hispanic blacks	15-16	2.81 (2.53-3.12)	2.62 (2.41-3.00)	4.50 (3.94-4.89)	7.14 (5.79-9.62)	11.3 (8.34-14.7)	676
Non-Hispanic whites	11-12	3.68 (3.44-3.93)	3.47 (3.31-3.63)	5.32 (5.04-5.93)	9.07 (7.47-10.3)	11.5 (9.87-13.1)	824
Non-Hispanic whites	13-14	3.52 (3.22-3.84)	3.38 (2.94-3.75)	5.24 (4.70-5.87)	8.64 (7.50-10.1)	12.0 (9.54-13.5)	979
Non-Hispanic whites	15-16	3.15 (3.01-3.30)	3.15 (2.94-3.38)	4.76 (4.50-5.00)	6.75 (6.08-7.84)	9.59 (8.00-11.1)	937
All Hispanics	11-12	4.50 (4.14-4.89)	4.38 (4.20-4.82)	6.62 (5.91-7.47)	9.46 (8.09-10.6)	13.0 (9.66-16.6)	574
All Hispanics	13-14	3.95 (3.69-4.23)	3.84 (3.64-4.08)	5.56 (5.12-6.09)	7.92 (6.98-9.33)	11.0 (8.07-14.0)	703
All Hispanics	15-16	3.93 (3.61-4.26)	3.75 (3.38-4.22)	6.04 (5.44-6.50)	9.00 (8.38-10.3)	12.4 (10.4-14.9)	991
Asians	11-12	9.89 (8.57-11.4)	9.72 (8.10-11.0)	15.6 (12.4-20.5)	28.6 (20.1-41.1)	45.1 (34.3-57.2)	356
Asians	13-14	8.71 (7.85-9.67)	8.44 (7.33-9.33)	13.8 (12.2-17.0)	24.7 (18.7-34.4)	37.9 (27.5-44.4)	291
Asians	15-16	8.57 (7.46-9.85)	8.56 (7.40-9.64)	14.6 (11.7-18.2)	25.2 (20.7-28.5)	29.4 (26.8-34.8)	334

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Monomethylarsonic acid (2011 - 2016)†

CAS Number 65513-69-1

Metabolite of Arsenic

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	1.36 (1.17-1.55)	1.83 (1.57-2.07)	2517
Total population	13-14	.411 (.372-.454)	.460 (.390-.530)	.810 (.750-.870)	1.22 (1.11-1.33)	1.53 (1.36-1.74)	2654
Total population	15-16	*	.280 (<LOD-.440)	.680 (.590-.790)	1.10 (.970-1.29)	1.45 (1.29-1.58)	3094
Age 3-5 years	15-16	*	<LOD	.590 (.420-.670)	1.01 (.760-1.18)	1.20 (1.05-1.36)	507
Age 6-11 years	11-12	*	<LOD	<LOD	1.21 (.970-1.40)	1.42 (1.24-1.54)	401
Age 6-11 years	13-14	*	.380 (<LOD-.530)	.710 (.600-.850)	1.11 (.920-1.29)	1.47 (1.22-1.52)	397
Age 6-11 years	15-16	*	.230 (<LOD-.340)	.590 (.470-.680)	.960 (.730-1.25)	1.27 (.960-1.73)	380
Age 12-19 years	11-12	*	<LOD	.900 (<LOD-1.09)	1.28 (1.09-1.57)	1.59 (1.26-3.30)	392
Age 12-19 years	13-14	.506 (.430-.596)	.580 (.480-.710)	.980 (.820-1.11)	1.28 (1.09-1.58)	1.58 (1.26-1.77)	450
Age 12-19 years	15-16	.367 (.299-.450)	.340 (.210-.520)	.770 (.590-.930)	1.31 (1.05-1.46)	1.51 (1.42-1.92)	402
Age 20+ years	11-12	*	<LOD	<LOD	1.41 (1.15-1.67)	1.88 (1.58-2.08)	1724
Age 20+ years	13-14	.406 (.365-.450)	.450 (.370-.520)	.790 (.740-.850)	1.21 (1.10-1.33)	1.57 (1.36-1.79)	1807
Age 20+ years	15-16	*	.280 (<LOD-.450)	.680 (.590-.800)	1.10 (.970-1.29)	1.45 (1.29-1.67)	1805
Males	11-12	*	<LOD	.950 (<LOD-1.14)	1.50 (1.26-1.85)	2.04 (1.79-2.40)	1264
Males	13-14	.456 (.408-.510)	.520 (.450-.600)	.900 (.850-.940)	1.26 (1.18-1.37)	1.57 (1.39-1.74)	1308
Males	15-16	*	.400 (.210-.530)	.760 (.650-.890)	1.21 (1.03-1.44)	1.55 (1.42-1.72)	1537
Females	11-12	*	<LOD	<LOD	1.15 (1.02-1.40)	1.57 (1.41-1.79)	1253
Females	13-14	.372 (.336-.412)	.400 (.300-.490)	.740 (.680-.770)	1.14 (.990-1.33)	1.49 (1.26-1.88)	1346
Females	15-16	*	.220 (<LOD-.320)	.590 (.520-.680)	1.02 (.890-1.15)	1.32 (1.18-1.46)	1557
Mexican Americans	11-12	*	<LOD	<LOD	1.25 (1.04-1.65)	1.85 (1.25-3.26)	317
Mexican Americans	13-14	.406 (.370-.446)	.470 (.380-.560)	.780 (.750-.860)	1.14 (1.01-1.27)	1.43 (1.17-1.69)	455
Mexican Americans	15-16	*	.300 (<LOD-.420)	.690 (.560-.890)	1.17 (.910-1.46)	1.52 (1.25-2.08)	591
Non-Hispanic blacks	11-12	*	<LOD	<LOD	1.26 (1.01-1.55)	1.65 (1.34-2.02)	672
Non-Hispanic blacks	13-14	.446 (.400-.496)	.520 (.430-.600)	.820 (.750-.890)	1.23 (1.03-1.39)	1.55 (1.28-1.96)	576
Non-Hispanic blacks	15-16	*	.390 (<LOD-.590)	.820 (.680-.970)	1.29 (1.10-1.46)	1.59 (1.40-1.78)	678
Non-Hispanic whites	11-12	*	<LOD	<LOD	1.24 (1.03-1.49)	1.71 (1.34-2.04)	825
Non-Hispanic whites	13-14	.390 (.338-.451)	.430 (.320-.530)	.780 (.700-.860)	1.17 (1.04-1.31)	1.48 (1.22-1.81)	980
Non-Hispanic whites	15-16	*	.240 (<LOD-.360)	.610 (.550-.710)	1.01 (.820-1.15)	1.22 (1.05-1.46)	937
All Hispanics	11-12	*	<LOD	.960 (<LOD-1.25)	1.60 (1.32-1.99)	2.38 (1.65-3.29)	574
All Hispanics	13-14	.443 (.399-.491)	.520 (.460-.570)	.860 (.770-.950)	1.28 (1.08-1.49)	1.68 (1.32-1.76)	703
All Hispanics	15-16	.366 (.307-.436)	.380 (.200-.520)	.780 (.620-.920)	1.29 (1.05-1.58)	1.78 (1.42-2.03)	992
Asians	11-12	*	<LOD	1.32 (1.19-1.54)	2.09 (1.71-2.56)	2.76 (2.24-3.64)	356
Asians	13-14	.499 (.445-.559)	.570 (.430-.660)	.980 (.790-1.23)	1.58 (1.42-1.80)	2.04 (1.72-2.65)	291
Asians	15-16	.486 (.412-.574)	.520 (.410-.640)	1.04 (.880-1.27)	1.89 (1.58-2.17)	2.31 (2.07-2.87)	334

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.890, 0.200, and 0.200 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Monomethylarsonic acid (creatinine corrected) (2011 - 2016)†

CAS Number 65513-69-1

Metabolite of Arsenic

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	2.21 (2.03-2.42)	2.86 (2.63-3.32)	2516
Total population	13-14	.474 (.425-.527)	.489 (.424-.556)	.812 (.734-.904)	1.27 (1.17-1.40)	1.61 (1.45-1.84)	2653
Total population	15-16	*	.378 (<LOD-.424)	.642 (.560-.734)	1.01 (.929-1.15)	1.31 (1.24-1.41)	3091
Age 3-5 years	15-16	*	<LOD	1.02 (.845-1.27)	1.71 (1.40-2.00)	2.16 (1.75-2.76)	506
Age 6-11 years	11-12	*	<LOD	<LOD	2.55 (2.17-3.15)	3.32 (2.52-4.50)	401
Age 6-11 years	13-14	*	.543 (<LOD-.667)	.933 (.700-1.15)	1.43 (1.08-1.87)	1.71 (1.44-2.22)	397
Age 6-11 years	15-16	*	.418 (<LOD-.483)	.687 (.583-.756)	1.24 (.927-1.57)	1.60 (1.23-1.78)	380
Age 12-19 years	11-12	*	<LOD	1.07 (<LOD-1.24)	1.75 (1.30-2.42)	2.52 (1.62-7.00)	392
Age 12-19 years	13-14	.459 (.397-.530)	.462 (.362-.603)	.727 (.634-.848)	1.10 (.877-1.50)	1.51 (1.11-2.00)	450
Age 12-19 years	15-16	.343 (.289-.407)	.339 (.285-.403)	.582 (.487-.696)	.919 (.730-1.17)	1.20 (.981-1.35)	402
Age 20+ years	11-12	*	<LOD	<LOD	2.25 (2.00-2.42)	2.74 (2.52-3.32)	1723
Age 20+ years	13-14	.471 (.423-.524)	.488 (.424-.545)	.815 (.740-.900)	1.28 (1.18-1.38)	1.62 (1.44-1.82)	1806
Age 20+ years	15-16	*	.378 (<LOD-.420)	.636 (.538-.727)	1.00 (.908-1.13)	1.26 (1.19-1.36)	1803
Males	11-12	*	<LOD	1.13 (<LOD-1.24)	1.72 (1.58-1.85)	2.31 (1.92-2.67)	1263
Males	13-14	.456 (.413-.504)	.475 (.421-.535)	.772 (.695-.851)	1.20 (1.09-1.30)	1.56 (1.38-1.69)	1307
Males	15-16	*	.361 (.309-.416)	.626 (.516-.727)	.951 (.846-1.08)	1.23 (1.08-1.41)	1537
Females	11-12	*	<LOD	<LOD	2.52 (2.27-2.74)	3.32 (2.74-3.94)	1253
Females	13-14	.491 (.435-.555)	.500 (.424-.583)	.842 (.741-1.00)	1.33 (1.18-1.46)	1.68 (1.41-2.08)	1346
Females	15-16	*	.398 (<LOD-.441)	.682 (.560-.741)	1.11 (.928-1.27)	1.36 (1.25-1.58)	1554
Mexican Americans	11-12	*	<LOD	<LOD	1.95 (1.54-2.25)	2.63 (1.85-3.32)	317
Mexican Americans	13-14	.463 (.409-.524)	.488 (.438-.554)	.743 (.674-.850)	1.20 (1.01-1.33)	1.49 (1.31-1.66)	455
Mexican Americans	15-16	*	.354 (<LOD-.432)	.682 (.548-.768)	1.00 (.824-1.41)	1.41 (1.01-1.78)	590
Non-Hispanic blacks	11-12	*	<LOD	<LOD	1.38 (1.21-1.62)	1.97 (1.75-2.33)	672
Non-Hispanic blacks	13-14	.336 (.296-.382)	.329 (.294-.392)	.557 (.486-.631)	.806 (.735-.910)	1.06 (.910-1.25)	576
Non-Hispanic blacks	15-16	*	.313 (<LOD-.414)	.545 (.440-.677)	.841 (.737-.933)	1.07 (.873-1.30)	676
Non-Hispanic whites	11-12	*	<LOD	<LOD	2.33 (2.03-2.52)	2.86 (2.52-3.50)	824
Non-Hispanic whites	13-14	.481 (.423-.546)	.495 (.418-.568)	.824 (.733-.933)	1.25 (1.10-1.42)	1.56 (1.36-1.84)	979
Non-Hispanic whites	15-16	*	.378 (<LOD-.412)	.571 (.508-.682)	.933 (.778-1.08)	1.20 (1.02-1.36)	937
All Hispanics	11-12	*	<LOD	1.34 (<LOD-1.48)	2.02 (1.62-2.52)	2.63 (1.97-3.50)	574
All Hispanics	13-14	.494 (.446-.548)	.520 (.467-.586)	.819 (.713-.931)	1.31 (1.18-1.50)	1.71 (1.49-1.97)	703
All Hispanics	15-16	.411 (.353-.478)	.410 (.341-.521)	.767 (.650-.907)	1.18 (1.02-1.37)	1.58 (1.30-1.83)	991
Asians	11-12	*	<LOD	2.06 (1.63-2.33)	3.07 (2.69-3.68)	4.50 (3.43-5.09)	356
Asians	13-14	.777 (.667-.906)	.800 (.623-1.04)	1.33 (1.08-1.61)	1.94 (1.56-2.53)	2.54 (2.00-3.16)	291
Asians	15-16	.660 (.562-.775)	.740 (.565-.828)	1.19 (1.04-1.40)	2.00 (1.42-2.56)	2.56 (2.00-3.15)	334

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Trimethylarsine oxide (2011 - 2012)†

CAS Number 4964-14-1

Geometric mean and selected percentiles of urine concentrations (in µg As/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2517
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	.300 (<LOD-.960)	401
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	392
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1724
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1264
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1253
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	317
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	672
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	825
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	574
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	356

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.250.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Not measured after Survey years 2011-2012

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Trimethylarsine oxide (creatinine corrected) (2011 - 2012)†

CAS Number 4964-14-1

Geometric mean and selected percentiles of urine concentrations (in µg As/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2516
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	1.06 (<LOD-1.39)	401
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	392
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1723
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1263
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1253
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	317
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	672
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	824
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	574
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	356

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Not measured after Survey years 2011-2012

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Arsenic_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Arsenic_FactSheet.html

Urinary Barium (2011 - 2016)†

CAS Number 81-25-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.19 (1.11-1.28)	1.23 (1.14-1.33)	2.40 (2.24-2.54)	4.04 (3.76-4.35)	5.52 (4.92-5.95)	2504
Total population	13-14	1.09 (1.03-1.16)	1.10 (.980-1.21)	2.17 (2.05-2.31)	4.01 (3.61-4.28)	5.67 (5.29-6.09)	2664
Total population	15-16	1.15 (1.08-1.22)	1.21 (1.13-1.30)	2.26 (2.08-2.51)	3.89 (3.66-4.16)	5.59 (4.99-6.19)	3061
Age 3-5 years	15-16	.954 (.875-1.04)	1.06 (.950-1.26)	2.04 (1.85-2.41)	3.28 (2.87-4.13)	4.59 (3.56-6.06)	486
Age 6-11 years	11-12	1.39 (1.24-1.55)	1.46 (1.21-1.62)	2.96 (2.33-3.52)	4.92 (4.52-5.29)	6.68 (5.25-7.92)	399
Age 6-11 years	13-14	1.13 (.962-1.33)	1.20 (.970-1.43)	2.06 (1.73-2.64)	3.48 (2.64-5.02)	5.02 (2.96-9.85)	402
Age 6-11 years	15-16	1.30 (1.17-1.45)	1.41 (1.18-1.63)	2.65 (2.30-2.87)	4.04 (3.40-5.61)	6.16 (4.69-7.46)	379
Age 12-19 years	11-12	1.52 (1.25-1.84)	1.61 (1.24-1.90)	2.98 (2.40-4.03)	5.37 (4.27-6.08)	6.63 (5.53-8.77)	390
Age 12-19 years	13-14	1.43 (1.19-1.70)	1.49 (1.10-1.75)	2.78 (2.23-3.49)	5.67 (4.18-6.69)	6.92 (6.14-8.11)	451
Age 12-19 years	15-16	1.45 (1.25-1.68)	1.47 (1.26-1.77)	2.93 (2.37-3.45)	4.95 (3.90-6.02)	7.56 (5.78-9.20)	402
Age 20+ years	11-12	1.13 (1.06-1.21)	1.19 (1.09-1.27)	2.24 (2.09-2.44)	3.74 (3.39-4.01)	5.05 (4.37-5.78)	1715
Age 20+ years	13-14	1.05 (.989-1.11)	1.03 (.930-1.16)	2.13 (1.93-2.31)	3.88 (3.33-4.25)	5.60 (4.78-5.96)	1811
Age 20+ years	15-16	1.10 (1.03-1.18)	1.17 (1.07-1.28)	2.15 (2.02-2.33)	3.73 (3.42-3.99)	5.39 (4.55-5.60)	1794
Males	11-12	1.29 (1.20-1.38)	1.30 (1.24-1.41)	2.52 (2.25-2.71)	4.29 (3.74-4.58)	5.96 (4.49-7.35)	1262
Males	13-14	1.20 (1.10-1.31)	1.24 (1.05-1.43)	2.38 (2.09-2.68)	4.27 (3.76-4.95)	5.96 (5.60-6.69)	1318
Males	15-16	1.29 (1.17-1.43)	1.38 (1.23-1.56)	2.56 (2.10-2.93)	4.16 (3.72-4.99)	6.06 (5.17-7.67)	1524
Females	11-12	1.11 (.989-1.25)	1.14 (1.00-1.35)	2.33 (2.06-2.57)	3.90 (3.34-4.35)	5.13 (4.44-5.57)	1242
Females	13-14	.998 (.940-1.06)	.980 (.870-1.12)	2.03 (1.85-2.19)	3.66 (3.21-4.07)	5.19 (4.42-5.74)	1346
Females	15-16	1.03 (.953-1.11)	1.04 (.980-1.12)	2.08 (1.94-2.24)	3.66 (3.25-3.96)	4.99 (4.46-5.61)	1537
Mexican Americans	11-12	1.08 (.961-1.22)	1.06 (.910-1.23)	2.10 (1.79-2.57)	3.95 (3.24-4.86)	5.58 (4.10-7.22)	317
Mexican Americans	13-14	.938 (.853-1.03)	.870 (.760-1.02)	2.00 (1.61-2.25)	3.15 (2.84-3.53)	4.19 (3.48-4.95)	453
Mexican Americans	15-16	.974 (.873-1.09)	1.03 (.880-1.20)	1.87 (1.63-2.22)	3.55 (2.93-4.35)	4.71 (3.98-5.61)	585
Non-Hispanic blacks	11-12	.997 (.891-1.12)	1.05 (.910-1.20)	2.08 (1.79-2.29)	3.63 (3.09-4.08)	4.68 (4.02-5.19)	669
Non-Hispanic blacks	13-14	.947 (.865-1.04)	.940 (.860-1.06)	1.81 (1.59-2.08)	3.48 (2.94-4.01)	4.50 (3.92-5.95)	581
Non-Hispanic blacks	15-16	.981 (.844-1.14)	1.05 (.910-1.19)	1.95 (1.72-2.44)	3.40 (2.83-4.19)	4.63 (4.16-5.55)	671
Non-Hispanic whites	11-12	1.27 (1.17-1.38)	1.32 (1.22-1.43)	2.50 (2.25-2.71)	4.33 (3.63-4.81)	5.57 (4.87-6.35)	820
Non-Hispanic whites	13-14	1.18 (1.10-1.26)	1.20 (1.05-1.35)	2.32 (2.16-2.53)	4.27 (3.74-4.94)	5.99 (5.57-6.44)	985
Non-Hispanic whites	15-16	1.25 (1.14-1.37)	1.30 (1.18-1.45)	2.45 (2.11-2.84)	3.97 (3.68-4.59)	5.67 (4.76-7.12)	924
All Hispanics	11-12	1.08 (.970-1.19)	1.07 (.940-1.23)	2.15 (1.86-2.47)	3.74 (2.99-4.34)	4.82 (3.96-5.98)	573
All Hispanics	13-14	.927 (.840-1.03)	.890 (.760-1.05)	1.92 (1.72-2.14)	3.15 (2.84-3.53)	4.25 (3.60-4.82)	701
All Hispanics	15-16	.951 (.875-1.03)	1.00 (.880-1.14)	1.98 (1.72-2.20)	3.51 (2.93-4.15)	4.96 (4.22-5.94)	982
Asians	11-12	1.16 (1.03-1.30)	1.21 (1.02-1.35)	2.28 (1.94-2.67)	3.90 (3.20-4.47)	5.50 (4.01-6.40)	353
Asians	13-14	.962 (.831-1.12)	.920 (.790-1.13)	1.93 (1.47-2.33)	3.79 (2.95-4.75)	5.67 (4.19-6.61)	292
Asians	15-16	1.00 (.919-1.09)	1.00 (.830-1.13)	1.99 (1.77-2.27)	3.73 (3.06-4.78)	5.24 (3.50-8.42)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.100, 0.060, and 0.060 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Barium_BiomonitoringSummary.html

Urinary Barium (creatinine corrected) (2011 - 2016)†

CAS Number 81-25-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.35 (1.24-1.48)	1.38 (1.27-1.47)	2.44 (2.10-2.84)	4.19 (3.72-4.85)	6.27 (5.20-6.66)	2502
Total population	13-14	1.26 (1.19-1.34)	1.24 (1.13-1.38)	2.33 (2.18-2.50)	4.06 (3.75-4.26)	5.59 (5.02-6.06)	2663
Total population	15-16	1.29 (1.20-1.39)	1.32 (1.20-1.42)	2.29 (2.12-2.52)	4.04 (3.43-4.48)	5.27 (4.83-6.00)	3058
Age 3-5 years	15-16	2.19 (1.97-2.44)	2.39 (2.02-2.66)	4.07 (3.62-4.59)	6.91 (5.88-9.67)	10.3 (7.15-11.6)	485
Age 6-11 years	11-12	1.99 (1.80-2.19)	2.18 (1.70-2.61)	3.72 (3.35-4.03)	5.82 (4.95-6.45)	6.78 (5.98-8.18)	398
Age 6-11 years	13-14	1.69 (1.39-2.05)	1.61 (1.24-2.20)	3.10 (2.29-3.80)	5.24 (3.54-7.57)	6.62 (5.03-9.83)	402
Age 6-11 years	15-16	1.85 (1.63-2.10)	1.85 (1.65-2.12)	3.27 (2.79-4.25)	5.68 (4.51-6.72)	7.37 (5.68-8.88)	379
Age 12-19 years	11-12	1.45 (1.24-1.70)	1.42 (1.24-1.78)	2.81 (1.96-3.19)	4.90 (3.82-5.69)	6.29 (4.90-6.57)	390
Age 12-19 years	13-14	1.29 (1.18-1.42)	1.36 (1.20-1.59)	2.33 (2.12-2.64)	3.69 (3.24-4.20)	4.80 (4.09-5.05)	451
Age 12-19 years	15-16	1.35 (1.16-1.57)	1.42 (1.11-1.70)	2.60 (2.18-2.93)	3.83 (3.21-5.27)	5.44 (4.03-7.88)	402
Age 20+ years	11-12	1.29 (1.17-1.41)	1.31 (1.20-1.43)	2.21 (1.95-2.63)	3.83 (3.50-4.31)	5.54 (4.38-6.84)	1714
Age 20+ years	13-14	1.22 (1.16-1.29)	1.18 (1.10-1.28)	2.23 (2.04-2.43)	4.00 (3.69-4.31)	5.59 (5.00-6.11)	1810
Age 20+ years	15-16	1.21 (1.12-1.30)	1.24 (1.14-1.36)	2.12 (1.95-2.32)	3.57 (2.98-4.28)	4.83 (4.28-5.35)	1792
Males	11-12	1.20 (1.10-1.32)	1.17 (1.08-1.33)	2.09 (1.85-2.53)	3.72 (3.37-4.22)	5.35 (4.11-6.34)	1261
Males	13-14	1.20 (1.13-1.28)	1.16 (1.09-1.30)	2.26 (1.97-2.48)	3.80 (3.39-4.28)	4.79 (4.42-5.24)	1317
Males	15-16	1.23 (1.11-1.35)	1.28 (1.16-1.38)	2.18 (2.02-2.41)	3.75 (3.09-4.42)	5.27 (4.55-6.15)	1524
Females	11-12	1.51 (1.36-1.68)	1.51 (1.39-1.67)	2.73 (2.39-3.12)	4.83 (3.88-5.63)	6.52 (5.32-8.33)	1241
Females	13-14	1.32 (1.23-1.43)	1.33 (1.17-1.52)	2.42 (2.18-2.72)	4.24 (3.96-4.60)	6.23 (5.29-8.04)	1346
Females	15-16	1.35 (1.26-1.45)	1.39 (1.24-1.55)	2.43 (2.24-2.67)	4.28 (3.51-4.80)	5.25 (4.93-6.15)	1534
Mexican Americans	11-12	1.22 (1.09-1.36)	1.16 (1.02-1.31)	2.20 (1.82-2.71)	4.00 (3.08-4.84)	5.74 (3.94-7.90)	317
Mexican Americans	13-14	1.07 (.985-1.16)	1.02 (.943-1.13)	1.88 (1.68-2.19)	3.53 (2.78-4.32)	4.76 (4.28-5.62)	453
Mexican Americans	15-16	1.07 (.962-1.19)	1.07 (.955-1.15)	2.03 (1.76-2.33)	3.31 (2.91-3.72)	4.42 (3.73-5.34)	584
Non-Hispanic blacks	11-12	.775 (.698-.861)	.744 (.664-.918)	1.48 (1.32-1.64)	2.64 (2.24-3.06)	3.56 (3.21-3.86)	669
Non-Hispanic blacks	13-14	.721 (.660-.786)	.717 (.657-.790)	1.31 (1.18-1.49)	2.42 (1.95-2.85)	3.26 (2.85-4.46)	581
Non-Hispanic blacks	15-16	.779 (.690-.880)	.793 (.675-.896)	1.48 (1.30-1.79)	2.49 (2.27-2.93)	3.55 (2.90-4.83)	669
Non-Hispanic whites	11-12	1.54 (1.38-1.70)	1.53 (1.44-1.64)	2.71 (2.18-3.18)	4.71 (3.82-5.54)	6.45 (5.36-7.63)	818
Non-Hispanic whites	13-14	1.45 (1.38-1.52)	1.46 (1.27-1.63)	2.59 (2.45-2.87)	4.31 (3.99-4.59)	6.06 (5.03-6.79)	984
Non-Hispanic whites	15-16	1.48 (1.37-1.59)	1.46 (1.36-1.62)	2.43 (2.20-2.79)	4.29 (3.55-4.83)	5.63 (4.91-6.51)	924
All Hispanics	11-12	1.21 (1.09-1.34)	1.19 (1.09-1.28)	2.20 (1.81-2.70)	3.70 (3.10-4.66)	5.17 (3.73-6.49)	573
All Hispanics	13-14	1.04 (.960-1.12)	1.01 (.935-1.10)	1.86 (1.68-2.00)	3.15 (2.78-3.64)	4.52 (3.76-5.32)	701
All Hispanics	15-16	1.08 (.975-1.19)	1.09 (.964-1.20)	2.11 (1.91-2.33)	3.48 (3.14-3.85)	4.70 (4.19-5.35)	981
Asians	11-12	1.55 (1.40-1.71)	1.49 (1.35-1.73)	2.86 (2.34-3.33)	5.03 (4.00-5.95)	7.26 (5.03-9.71)	353
Asians	13-14	1.51 (1.34-1.69)	1.56 (1.19-1.82)	2.79 (2.37-3.21)	4.42 (3.96-5.51)	6.27 (4.99-8.05)	292
Asians	15-16	1.37 (1.24-1.52)	1.41 (1.25-1.55)	2.61 (2.02-3.18)	4.52 (3.57-5.50)	5.78 (4.67-6.17)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Barium_BiomonitoringSummary.html

Blood Cadmium (2011 - 2016)

CAS Number 81271-94-5

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.279 (.267-.292)	.250 (.230-.260)	.460 (.430-.490)	.960 (.870-1.10)	1.50 (1.30-1.70)	7920
Total population	13-14	.235 (.224-.247)	.210 (.200-.220)	.410 (.370-.450)	.840 (.730-.940)	1.22 (1.03-1.40)	5215
Total population	15-16	.238 (.224-.253)	.220 (.200-.230)	.400 (.370-.430)	.810 (.700-.920)	1.22 (1.07-1.37)	4988
Age 1-5 years	11-12	*	<LOD	<LOD	.190 (.160-.200)	.210 (.190-.240)	713
Age 1-5 years	13-14	*	<LOD	.100 (<LOD-.100)	.130 (.120-.140)	.150 (.140-.170)	818
Age 1-5 years	15-16	*	<LOD	.100 (<LOD-.120)	.140 (.130-.150)	.160 (.140-.180)	790
Age 6-11 years	11-12	*	<LOD	.160 (<LOD-.180)	.210 (.190-.230)	.240 (.220-.280)	1048
Age 6-11 years	13-14	*	<LOD	.120 (.110-.130)	.150 (.140-.170)	.190 (.170-.200)	1075
Age 6-11 years	15-16	*	.100 (<LOD-.100)	.140 (.120-.150)	.180 (.160-.190)	.200 (.180-.230)	1023
Age 12-19 years	11-12	*	.160 (<LOD-.170)	.230 (.210-.240)	.340 (.290-.470)	.650 (.470-.880)	1129
Age 12-19 years	13-14	.134 (.123-.146)	.120 (.110-.130)	.180 (.160-.190)	.280 (.220-.460)	.490 (.300-.960)	627
Age 12-19 years	15-16	.133 (.123-.144)	.130 (.120-.140)	.180 (.160-.210)	.260 (.230-.280)	.330 (.270-.490)	565
Age 20 + years	11-12	.337 (.323-.353)	.300 (.290-.320)	.550 (.520-.580)	1.14 (1.01-1.28)	1.70 (1.50-1.80)	5030
Age 20 + years	13-14	.297 (.280-.315)	.270 (.260-.290)	.510 (.450-.570)	.940 (.830-1.08)	1.36 (1.17-1.64)	2695
Age 20 + years	15-16	.295 (.277-.314)	.270 (.250-.290)	.480 (.440-.520)	.940 (.830-1.09)	1.35 (1.22-1.48)	2610
Males	11-12	.255 (.238-.274)	.210 (.200-.230)	.410 (.360-.480)	.940 (.820-1.09)	1.48 (1.20-1.70)	3968
Males	13-14	.206 (.192-.221)	.180 (.170-.190)	.330 (.300-.370)	.750 (.610-.940)	1.18 (.940-1.42)	2587
Males	15-16	.215 (.201-.230)	.180 (.170-.200)	.350 (.310-.400)	.820 (.650-.940)	1.17 (.990-1.37)	2488
Females	11-12	.304 (.289-.320)	.280 (.260-.300)	.490 (.460-.510)	.980 (.850-1.16)	1.53 (1.30-1.70)	3952
Females	13-14	.267 (.252-.283)	.250 (.240-.280)	.480 (.440-.530)	.890 (.790-.960)	1.29 (1.09-1.53)	2628
Females	15-16	.263 (.244-.282)	.250 (.230-.270)	.440 (.410-.470)	.800 (.680-.940)	1.25 (1.10-1.40)	2500
Mexican Americans	11-12	.217 (.202-.233)	.200 (.180-.220)	.310 (.290-.340)	.550 (.510-.600)	.810 (.710-.920)	1077
Mexican Americans	13-14	.182 (.166-.199)	.180 (.150-.200)	.280 (.250-.310)	.490 (.400-.620)	.740 (.660-.800)	969
Mexican Americans	15-16	.194 (.180-.209)	.180 (.170-.200)	.300 (.280-.320)	.540 (.440-.660)	.870 (.570-1.27)	994
Non-Hispanic blacks	11-12	.291 (.274-.309)	.260 (.240-.270)	.470 (.430-.520)	1.07 (.950-1.20)	1.50 (1.40-1.60)	2195
Non-Hispanic blacks	13-14	.252 (.225-.281)	.220 (.190-.260)	.480 (.390-.620)	1.03 (.930-1.17)	1.48 (1.24-1.67)	1119
Non-Hispanic blacks	15-16	.278 (.253-.306)	.250 (.230-.280)	.490 (.440-.550)	.930 (.830-1.05)	1.38 (1.14-1.95)	1070
Non-Hispanic whites	11-12	.284 (.264-.305)	.250 (.230-.270)	.470 (.420-.520)	1.02 (.810-1.25)	1.65 (1.30-1.90)	2493
Non-Hispanic whites	13-14	.242 (.227-.257)	.220 (.200-.230)	.430 (.380-.480)	.860 (.700-1.02)	1.30 (1.03-1.65)	1848
Non-Hispanic whites	15-16	.239 (.219-.261)	.220 (.190-.240)	.410 (.370-.440)	.830 (.660-1.00)	1.25 (1.00-1.43)	1511
All Hispanics	11-12	.227 (.211-.244)	.210 (.190-.230)	.330 (.310-.380)	.600 (.540-.660)	.900 (.760-1.00)	1931
All Hispanics	13-14	.186 (.170-.204)	.180 (.160-.190)	.290 (.250-.330)	.560 (.450-.680)	.800 (.740-.870)	1481
All Hispanics	15-16	.193 (.180-.207)	.180 (.170-.200)	.300 (.280-.320)	.520 (.450-.610)	.840 (.620-1.16)	1664
Asians	11-12	.394 (.355-.437)	.390 (.340-.450)	.680 (.610-.760)	1.04 (.960-1.18)	1.40 (1.20-1.48)	1005
Asians	13-14	.339 (.302-.380)	.330 (.300-.390)	.590 (.540-.660)	.900 (.740-1.11)	1.31 (.940-1.46)	510
Asians	15-16	.359 (.329-.392)	.340 (.310-.410)	.570 (.510-.630)	.930 (.760-1.11)	1.33 (1.10-1.57)	479

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.160, 0.100, and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cadmium_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Cadmium_FactSheet.html

Urinary Cadmium (2011 - 2016)†

CAS Number 81271-94-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.155 (.143-.169)	.153 (.134-.175)	.310 (.281-.352)	.629 (.590-.670)	.874 (.806-1.08)	2504
Total population	13-14	.124 (.116-.133)	.126 (.116-.137)	.273 (.243-.302)	.576 (.519-.621)	.842 (.767-.945)	2664
Total population	15-16	.129 (.117-.141)	.131 (.119-.139)	.289 (.263-.330)	.616 (.516-.713)	.909 (.727-1.10)	3061
Age 3-5 years	15-16	*	<LOD	<LOD	.057 (.048-.066)	.078 (.066-.088)	486
Age 6-11 years	11-12	*	<LOD	.070 (.056-.076)	.107 (.088-.128)	.148 (.118-.200)	399
Age 6-11 years	13-14	*	<LOD	.050 (.044-.059)	.087 (.077-.101)	.113 (.098-.140)	402
Age 6-11 years	15-16	*	<LOD	.058 (.049-.073)	.103 (.083-.122)	.134 (.101-.203)	379
Age 12-19 years	11-12	*	.069 (<LOD-.080)	.118 (.100-.152)	.218 (.191-.267)	.280 (.219-.339)	390
Age 12-19 years	13-14	.064 (.055-.075)	.063 (.044-.078)	.116 (.092-.146)	.206 (.146-.292)	.292 (.184-.379)	451
Age 12-19 years	15-16	.055 (.048-.064)	.049 (.043-.057)	.097 (.073-.111)	.171 (.136-.204)	.248 (.192-.278)	402
Age 20+ years	11-12	.194 (.178-.211)	.192 (.175-.217)	.375 (.336-.417)	.715 (.664-.790)	1.08 (.846-1.27)	1715
Age 20+ years	13-14	.156 (.146-.167)	.158 (.147-.170)	.314 (.279-.359)	.654 (.603-.726)	.971 (.842-1.08)	1811
Age 20+ years	15-16	.174 (.157-.193)	.179 (.159-.203)	.359 (.311-.419)	.706 (.616-.806)	1.08 (.839-1.20)	1794
Males	11-12	.150 (.136-.166)	.152 (.131-.170)	.292 (.262-.331)	.589 (.518-.675)	.832 (.769-.941)	1262
Males	13-14	.118 (.110-.126)	.123 (.107-.135)	.238 (.214-.278)	.492 (.394-.617)	.777 (.578-1.09)	1318
Males	15-16	.122 (.113-.132)	.125 (.116-.135)	.272 (.243-.296)	.532 (.442-.634)	.765 (.678-.924)	1524
Females	11-12	.160 (.142-.181)	.153 (.123-.192)	.332 (.292-.375)	.669 (.607-.741)	1.07 (.798-1.31)	1242
Females	13-14	.131 (.118-.145)	.132 (.112-.154)	.297 (.271-.331)	.622 (.553-.719)	.896 (.773-1.05)	1346
Females	15-16	.135 (.120-.153)	.137 (.117-.155)	.312 (.277-.368)	.683 (.554-.806)	1.07 (.743-1.27)	1537
Mexican Americans	11-12	.121 (.112-.132)	.115 (.094-.139)	.221 (.183-.274)	.456 (.386-.547)	.643 (.539-.705)	317
Mexican Americans	13-14	.101 (.092-.111)	.096 (.079-.109)	.219 (.168-.264)	.424 (.331-.522)	.615 (.439-.785)	453
Mexican Americans	15-16	.107 (.097-.116)	.098 (.081-.124)	.238 (.197-.275)	.475 (.409-.533)	.721 (.548-.770)	585
Non-Hispanic blacks	11-12	.193 (.172-.216)	.199 (.174-.216)	.366 (.304-.445)	.719 (.594-.831)	1.05 (.825-1.38)	669
Non-Hispanic blacks	13-14	.179 (.146-.219)	.182 (.136-.239)	.387 (.305-.519)	.772 (.625-.947)	1.14 (.885-1.37)	581
Non-Hispanic blacks	15-16	.178 (.157-.201)	.166 (.149-.204)	.403 (.329-.491)	.803 (.679-.986)	1.11 (.878-1.48)	671
Non-Hispanic whites	11-12	.152 (.135-.170)	.148 (.123-.183)	.303 (.269-.352)	.615 (.524-.684)	.846 (.759-1.09)	820
Non-Hispanic whites	13-14	.121 (.110-.134)	.124 (.106-.140)	.267 (.232-.302)	.552 (.486-.621)	.842 (.692-.987)	985
Non-Hispanic whites	15-16	.124 (.112-.139)	.129 (.109-.142)	.284 (.254-.344)	.611 (.464-.765)	.909 (.683-1.14)	924
All Hispanics	11-12	.133 (.118-.150)	.127 (.105-.153)	.267 (.207-.325)	.546 (.452-.609)	.782 (.646-.976)	573
All Hispanics	13-14	.101 (.092-.111)	.096 (.079-.110)	.212 (.174-.259)	.424 (.340-.501)	.617 (.470-.801)	701
All Hispanics	15-16	.108 (.096-.122)	.101 (.087-.120)	.235 (.201-.274)	.475 (.408-.592)	.727 (.592-.918)	982
Asians	11-12	.218 (.190-.249)	.215 (.172-.251)	.453 (.405-.604)	.865 (.762-1.23)	1.34 (1.02-1.75)	353
Asians	13-14	.171 (.146-.201)	.172 (.147-.206)	.417 (.304-.566)	.803 (.664-1.14)	1.19 (.817-1.27)	292
Asians	15-16	.180 (.160-.204)	.193 (.170-.232)	.363 (.326-.429)	.650 (.541-.762)	.934 (.686-1.06)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.056, 0.036, and 0.036 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cadmium_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cadmium_FactSheet.html

Urinary Cadmium (creatinine corrected) (2011 - 2016)†

CAS Number 81271-94-5

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.176 (.165-.187)	.172 (.159-.182)	.346 (.313-.378)	.582 (.551-.639)	.907 (.772-.997)	2502
Total population	13-14	.144 (.136-.152)	.138 (.125-.151)	.288 (.263-.311)	.563 (.487-.621)	.800 (.712-.859)	2663
Total population	15-16	.144 (.135-.154)	.139 (.128-.152)	.293 (.264-.320)	.523 (.459-.589)	.781 (.675-.906)	3058
Age 3-5 years	15-16	*	<LOD	<LOD	.167 (.139-.192)	.227 (.179-.278)	485
Age 6-11 years	11-12	*	<LOD	.118 (.107-.129)	.168 (.150-.211)	.235 (.180-.300)	398
Age 6-11 years	13-14	*	<LOD	.086 (.076-.096)	.147 (.119-.167)	.175 (.140-.214)	402
Age 6-11 years	15-16	*	<LOD	.086 (.073-.104)	.130 (.111-.139)	.157 (.132-.189)	379
Age 12-19 years	11-12	*	.071 (<LOD-.078)	.118 (.103-.135)	.176 (.153-.204)	.250 (.176-.444)	390
Age 12-19 years	13-14	.058 (.053-.064)	.055 (.045-.068)	.092 (.080-.107)	.133 (.117-.176)	.178 (.133-.233)	451
Age 12-19 years	15-16	.052 (.047-.058)	.050 (.044-.057)	.074 (.063-.082)	.117 (.098-.134)	.147 (.121-.187)	402
Age 20+ years	11-12	.220 (.204-.237)	.213 (.198-.230)	.416 (.374-.443)	.678 (.594-.772)	.977 (.892-1.15)	1714
Age 20+ years	13-14	.182 (.173-.191)	.181 (.163-.195)	.335 (.306-.368)	.626 (.586-.674)	.868 (.750-1.00)	1810
Age 20+ years	15-16	.190 (.175-.205)	.188 (.166-.208)	.346 (.318-.385)	.623 (.538-.709)	.882 (.765-.963)	1792
Males	11-12	.140 (.127-.156)	.136 (.120-.148)	.244 (.213-.309)	.492 (.424-.554)	.713 (.583-.801)	1261
Males	13-14	.118 (.108-.128)	.107 (.098-.121)	.218 (.195-.253)	.402 (.349-.471)	.613 (.519-.675)	1317
Males	15-16	.116 (.109-.123)	.111 (.104-.118)	.211 (.187-.239)	.378 (.344-.431)	.561 (.494-.671)	1524
Females	11-12	.218 (.202-.236)	.222 (.200-.243)	.430 (.382-.456)	.707 (.594-.868)	1.08 (.904-1.22)	1241
Females	13-14	.174 (.162-.186)	.173 (.151-.204)	.355 (.311-.382)	.663 (.621-.726)	.964 (.844-1.09)	1346
Females	15-16	.178 (.162-.196)	.185 (.165-.206)	.369 (.315-.408)	.667 (.533-.806)	.915 (.754-1.08)	1534
Mexican Americans	11-12	.137 (.127-.147)	.124 (.105-.144)	.244 (.196-.315)	.409 (.367-.506)	.519 (.406-1.00)	317
Mexican Americans	13-14	.115 (.102-.129)	.114 (.096-.128)	.216 (.186-.260)	.388 (.297-.502)	.546 (.463-.729)	453
Mexican Americans	15-16	.116 (.108-.126)	.115 (.094-.131)	.208 (.193-.244)	.385 (.333-.417)	.547 (.461-.676)	584
Non-Hispanic blacks	11-12	.150 (.135-.166)	.139 (.126-.164)	.286 (.259-.307)	.476 (.416-.659)	.761 (.636-.857)	669
Non-Hispanic blacks	13-14	.136 (.114-.162)	.132 (.100-.170)	.281 (.218-.382)	.583 (.419-.663)	.691 (.616-.833)	581
Non-Hispanic blacks	15-16	.141 (.126-.159)	.133 (.109-.163)	.278 (.234-.320)	.543 (.400-.698)	.765 (.600-.897)	669
Non-Hispanic whites	11-12	.183 (.167-.202)	.180 (.158-.200)	.370 (.327-.416)	.582 (.543-.677)	.932 (.725-1.15)	818
Non-Hispanic whites	13-14	.150 (.137-.163)	.141 (.126-.165)	.290 (.256-.322)	.571 (.453-.650)	.807 (.673-.957)	984
Non-Hispanic whites	15-16	.147 (.135-.159)	.144 (.127-.163)	.300 (.264-.337)	.541 (.457-.634)	.821 (.644-.961)	924
All Hispanics	11-12	.149 (.143-.156)	.144 (.132-.163)	.281 (.244-.320)	.471 (.400-.519)	.686 (.516-.942)	573
All Hispanics	13-14	.113 (.100-.127)	.112 (.091-.127)	.216 (.186-.263)	.407 (.327-.498)	.569 (.494-.683)	701
All Hispanics	15-16	.122 (.110-.135)	.117 (.098-.132)	.238 (.195-.287)	.412 (.347-.528)	.639 (.503-.775)	981
Asians	11-12	.291 (.262-.323)	.286 (.223-.342)	.610 (.532-.732)	1.03 (.913-1.12)	1.36 (1.07-1.59)	353
Asians	13-14	.268 (.230-.313)	.264 (.219-.309)	.609 (.483-.676)	.934 (.838-1.09)	1.23 (.910-1.74)	292
Asians	15-16	.247 (.212-.287)	.250 (.208-.285)	.458 (.396-.577)	.860 (.702-1.05)	1.17 (.833-1.79)	332

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cadmium_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Cadmium_FactSheet.html

Urinary Cesium (2011 - 2016)†

CAS Number 7440-46-2

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.82 (3.58-4.08)	4.11 (3.90-4.42)	6.31 (5.96-6.63)	8.81 (8.39-9.21)	10.5 (9.76-11.1)	2503
Total population	13-14	3.94 (3.76-4.12)	4.21 (3.96-4.47)	6.63 (6.36-6.85)	9.31 (8.87-9.80)	11.3 (10.4-11.8)	2664
Total population	15-16	3.92 (3.65-4.21)	4.19 (3.83-4.56)	6.29 (5.86-6.79)	8.93 (8.17-9.61)	11.0 (9.76-12.6)	3061
Age 3-5 years	15-16	3.62 (3.23-4.05)	3.81 (3.22-4.44)	6.21 (5.57-7.02)	8.52 (7.50-9.10)	9.30 (8.90-12.5)	486
Age 6-11 years	11-12	3.91 (3.50-4.36)	4.52 (3.75-4.96)	6.71 (6.18-7.16)	8.61 (7.39-9.28)	10.2 (9.02-10.6)	399
Age 6-11 years	13-14	4.15 (3.80-4.52)	4.63 (4.05-5.12)	7.11 (6.58-7.54)	9.58 (8.49-10.0)	10.4 (9.92-11.1)	402
Age 6-11 years	15-16	3.96 (3.62-4.34)	4.31 (3.78-4.90)	6.36 (5.56-7.33)	8.73 (7.81-9.37)	9.89 (8.48-11.6)	379
Age 12-19 years	11-12	3.56 (3.08-4.13)	3.96 (3.45-4.56)	5.96 (5.19-6.73)	7.74 (7.17-8.99)	9.55 (7.81-10.6)	390
Age 12-19 years	13-14	4.14 (3.72-4.61)	4.55 (4.12-5.08)	6.62 (6.09-7.29)	8.93 (8.19-9.86)	10.9 (9.40-11.8)	451
Age 12-19 years	15-16	3.76 (3.40-4.16)	4.07 (3.67-4.53)	6.11 (5.45-6.72)	8.22 (6.91-9.99)	10.4 (8.22-12.4)	402
Age 20+ years	11-12	3.85 (3.61-4.10)	4.11 (3.85-4.43)	6.31 (5.94-6.67)	9.08 (8.51-9.44)	10.7 (9.81-11.2)	1714
Age 20+ years	13-14	3.89 (3.70-4.09)	4.09 (3.85-4.36)	6.57 (6.32-6.82)	9.30 (8.67-9.90)	11.3 (10.4-12.2)	1811
Age 20+ years	15-16	3.95 (3.66-4.26)	4.19 (3.80-4.63)	6.30 (5.88-6.81)	8.95 (8.48-9.70)	11.4 (10.2-12.8)	1794
Males	11-12	4.20 (3.94-4.47)	4.49 (4.21-4.98)	6.53 (6.15-6.95)	9.08 (8.43-9.55)	10.6 (9.80-11.1)	1261
Males	13-14	4.10 (3.84-4.38)	4.47 (4.10-4.88)	6.79 (6.42-7.22)	9.30 (8.56-10.1)	11.1 (9.81-13.1)	1318
Males	15-16	4.21 (3.99-4.45)	4.66 (4.26-4.95)	6.59 (6.09-7.05)	8.94 (8.03-9.78)	10.7 (9.58-12.1)	1524
Females	11-12	3.49 (3.16-3.85)	3.75 (3.48-3.99)	5.94 (5.38-6.55)	8.58 (7.58-9.33)	10.3 (9.44-11.2)	1242
Females	13-14	3.78 (3.57-4.02)	3.98 (3.60-4.28)	6.35 (5.98-6.75)	9.31 (8.50-9.88)	11.5 (10.1-12.4)	1346
Females	15-16	3.65 (3.33-4.01)	3.77 (3.32-4.30)	5.95 (5.30-6.59)	8.93 (8.07-9.68)	11.4 (9.69-12.8)	1537
Mexican Americans	11-12	3.76 (3.43-4.12)	4.12 (3.61-4.54)	5.50 (5.21-6.21)	7.77 (7.32-8.75)	9.68 (8.07-10.4)	317
Mexican Americans	13-14	3.99 (3.76-4.24)	4.25 (3.65-5.09)	6.53 (6.13-7.18)	9.01 (8.28-9.61)	10.2 (9.01-11.2)	453
Mexican Americans	15-16	3.90 (3.66-4.16)	4.37 (4.01-4.69)	6.38 (5.98-6.69)	8.39 (7.82-9.31)	9.68 (9.27-10.6)	585
Non-Hispanic blacks	11-12	3.97 (3.68-4.29)	4.49 (4.10-4.88)	6.49 (5.98-6.88)	8.12 (7.56-9.21)	9.59 (8.61-11.0)	669
Non-Hispanic blacks	13-14	4.41 (3.97-4.89)	4.83 (4.20-5.38)	6.82 (6.20-7.30)	8.93 (8.01-9.81)	10.7 (9.34-12.2)	581
Non-Hispanic blacks	15-16	4.15 (3.89-4.42)	4.58 (4.24-4.91)	6.88 (6.42-7.22)	9.12 (8.15-9.70)	10.3 (9.38-12.1)	671
Non-Hispanic whites	11-12	3.78 (3.50-4.07)	4.01 (3.75-4.30)	6.30 (5.85-6.85)	9.08 (8.53-9.48)	10.6 (9.88-11.1)	820
Non-Hispanic whites	13-14	3.81 (3.54-4.10)	4.09 (3.70-4.47)	6.62 (6.19-7.06)	9.38 (8.56-10.2)	11.5 (10.1-13.1)	985
Non-Hispanic whites	15-16	3.83 (3.46-4.23)	3.96 (3.59-4.48)	5.96 (5.47-6.85)	8.85 (7.53-10.1)	11.4 (9.17-13.6)	924
All Hispanics	11-12	3.80 (3.44-4.20)	4.13 (3.65-4.62)	5.87 (5.40-6.34)	7.77 (7.16-8.73)	9.52 (8.08-10.3)	573
All Hispanics	13-14	4.04 (3.79-4.30)	4.21 (3.70-4.77)	6.65 (6.29-7.17)	9.01 (8.43-9.61)	10.4 (9.30-11.6)	701
All Hispanics	15-16	3.87 (3.64-4.12)	4.38 (4.07-4.66)	6.38 (5.97-6.71)	8.47 (7.97-8.96)	9.68 (9.24-10.1)	982
Asians	11-12	4.22 (3.88-4.60)	4.43 (4.00-5.02)	7.42 (6.58-7.92)	10.7 (9.27-11.4)	12.4 (11.1-15.6)	352
Asians	13-14	3.92 (3.61-4.24)	4.10 (3.43-4.52)	6.41 (5.87-7.48)	9.81 (7.91-11.4)	11.4 (9.11-14.3)	292
Asians	15-16	4.32 (4.10-4.56)	4.68 (4.24-5.15)	7.27 (6.69-8.09)	10.3 (9.18-11.1)	11.6 (10.4-13.6)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.120, 0.086, and 0.086 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cesium_BiomonitoringSummary.html

Urinary Cesium (creatinine corrected) (2011 - 2016)†

CAS Number 7440-46-2

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.33 (4.13-4.53)	4.27 (4.08-4.50)	5.91 (5.63-6.33)	8.12 (7.43-8.63)	10.2 (8.93-10.7)	2501
Total population	13-14	4.55 (4.40-4.70)	4.42 (4.24-4.64)	6.37 (6.16-6.58)	8.61 (8.32-8.86)	10.3 (9.67-10.9)	2663
Total population	15-16	4.40 (4.21-4.59)	4.31 (4.10-4.57)	6.14 (5.79-6.50)	8.69 (7.95-9.41)	10.6 (9.62-11.1)	3058
Age 3-5 years	15-16	8.33 (7.81-8.88)	8.15 (7.60-8.88)	11.0 (10.2-12.1)	15.0 (12.6-17.0)	17.9 (15.8-20.3)	485
Age 6-11 years	11-12	5.56 (5.16-5.99)	5.47 (5.06-5.98)	7.15 (6.68-7.43)	9.42 (7.88-10.7)	10.7 (9.45-13.0)	398
Age 6-11 years	13-14	6.18 (5.90-6.48)	6.25 (5.82-6.83)	8.07 (7.58-8.75)	9.96 (9.24-11.1)	11.6 (9.88-13.4)	402
Age 6-11 years	15-16	5.62 (5.36-5.88)	5.70 (5.42-5.99)	7.13 (6.75-7.78)	9.09 (8.31-10.5)	10.8 (9.24-11.6)	379
Age 12-19 years	11-12	3.41 (3.16-3.67)	3.35 (3.05-3.82)	4.34 (3.95-4.93)	5.30 (5.07-6.17)	6.34 (5.66-6.64)	390
Age 12-19 years	13-14	3.75 (3.49-4.03)	3.69 (3.45-3.95)	4.79 (4.36-5.37)	6.79 (5.47-7.52)	7.52 (6.17-9.30)	451
Age 12-19 years	15-16	3.52 (3.32-3.72)	3.44 (3.23-3.61)	4.62 (4.26-5.12)	6.02 (5.08-7.33)	7.13 (5.88-8.54)	402
Age 20+ years	11-12	4.36 (4.15-4.59)	4.29 (4.10-4.54)	6.00 (5.65-6.45)	8.22 (7.64-8.78)	10.2 (9.47-11.2)	1713
Age 20+ years	13-14	4.53 (4.38-4.69)	4.40 (4.18-4.67)	6.29 (6.15-6.50)	8.61 (8.30-8.86)	10.3 (9.81-10.8)	1810
Age 20+ years	15-16	4.31 (4.08-4.55)	4.22 (3.97-4.52)	6.02 (5.50-6.43)	8.47 (7.69-9.29)	10.4 (9.41-11.0)	1792
Males	11-12	3.93 (3.73-4.14)	3.80 (3.63-4.10)	5.31 (4.87-5.91)	7.58 (6.78-8.26)	8.80 (8.28-10.2)	1260
Males	13-14	4.10 (3.92-4.29)	4.04 (3.79-4.29)	5.39 (5.10-5.77)	7.55 (6.83-8.11)	8.92 (8.18-10.1)	1317
Males	15-16	4.00 (3.80-4.21)	3.90 (3.57-4.17)	5.52 (5.16-5.88)	8.22 (7.13-8.68)	10.4 (8.91-11.3)	1524
Females	11-12	4.74 (4.52-4.97)	4.73 (4.55-4.93)	6.43 (5.91-6.82)	8.55 (8.05-9.48)	11.2 (9.48-12.5)	1241
Females	13-14	5.02 (4.86-5.19)	5.00 (4.71-5.23)	7.08 (6.80-7.39)	9.51 (8.67-10.1)	11.3 (10.5-12.3)	1346
Females	15-16	4.81 (4.58-5.06)	4.78 (4.47-5.08)	6.66 (6.17-7.09)	9.20 (8.40-9.82)	10.6 (10.0-11.2)	1534
Mexican Americans	11-12	4.23 (3.96-4.51)	4.14 (3.72-4.53)	5.63 (5.11-5.91)	7.06 (6.41-8.03)	8.78 (7.48-10.3)	317
Mexican Americans	13-14	4.56 (4.37-4.74)	4.40 (4.16-4.78)	6.02 (5.61-6.35)	7.58 (6.91-7.94)	8.92 (7.94-10.0)	453
Mexican Americans	15-16	4.28 (4.07-4.50)	4.22 (4.01-4.50)	5.82 (5.44-6.23)	7.82 (7.28-8.37)	9.39 (8.59-10.6)	584
Non-Hispanic blacks	11-12	3.09 (2.92-3.27)	3.12 (2.89-3.32)	4.13 (3.90-4.40)	5.31 (4.98-5.63)	6.29 (5.67-6.84)	669
Non-Hispanic blacks	13-14	3.35 (3.20-3.52)	3.34 (3.14-3.54)	4.37 (4.14-4.63)	5.82 (5.37-6.27)	7.18 (6.25-7.86)	581
Non-Hispanic blacks	15-16	3.29 (3.20-3.39)	3.26 (3.12-3.40)	4.57 (4.30-4.87)	6.12 (5.59-6.83)	7.48 (6.63-9.03)	669
Non-Hispanic whites	11-12	4.56 (4.29-4.85)	4.50 (4.19-4.80)	6.34 (5.74-6.88)	8.26 (7.86-9.36)	10.3 (9.27-11.5)	818
Non-Hispanic whites	13-14	4.70 (4.56-4.85)	4.56 (4.30-4.84)	6.63 (6.40-6.95)	8.91 (8.37-9.67)	10.5 (9.98-11.3)	984
Non-Hispanic whites	15-16	4.51 (4.21-4.85)	4.40 (4.10-4.72)	6.24 (5.75-6.91)	8.94 (7.74-9.94)	10.6 (9.62-11.3)	924
All Hispanics	11-12	4.25 (4.00-4.52)	4.25 (3.88-4.49)	5.69 (5.35-5.91)	7.43 (6.61-8.23)	8.67 (8.12-9.70)	573
All Hispanics	13-14	4.51 (4.34-4.69)	4.43 (4.25-4.64)	5.89 (5.61-6.21)	7.71 (7.12-8.15)	8.93 (8.29-9.52)	701
All Hispanics	15-16	4.39 (4.22-4.56)	4.27 (4.05-4.50)	5.97 (5.61-6.30)	8.14 (7.52-8.67)	10.1 (8.94-10.9)	981
Asians	11-12	5.65 (5.13-6.22)	5.40 (5.12-5.95)	7.88 (6.84-9.33)	12.0 (10.1-13.7)	14.7 (12.2-19.4)	352
Asians	13-14	6.14 (5.49-6.86)	6.12 (5.47-6.70)	8.31 (7.23-9.63)	11.5 (9.32-16.0)	16.0 (10.8-18.2)	292
Asians	15-16	5.91 (5.50-6.35)	5.83 (5.43-6.24)	8.07 (6.72-9.42)	10.6 (9.49-12.2)	12.5 (10.7-15.3)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cesium_BiomonitoringSummary.html

Blood Chromium (2015 - 2016)

CAS Number 7440-47-3

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	.700 (.540-.900)	1.08 (.750-1.49)	3442
Age 40-59 years	15-16	*	<LOD	<LOD	.650 (.470-.970)	1.07 (.710-1.57)	1719
Age 60 + years	15-16	*	<LOD	<LOD	.750 (.550-.940)	1.13 (.790-1.49)	1723
Males	15-16	*	<LOD	<LOD	.620 (.460-.880)	1.07 (.680-1.58)	1656
Females	15-16	*	<LOD	<LOD	.740 (.580-.940)	1.08 (.800-1.43)	1786
Mexican Americans	15-16	*	<LOD	<LOD	.570 (.460-.700)	.750 (.550-1.34)	589
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.490 (<LOD-.740)	.870 (.690-1.10)	714
Non-Hispanic whites	15-16	*	<LOD	<LOD	.750 (.550-1.07)	1.20 (.790-1.57)	1195
All Hispanics	15-16	*	<LOD	<LOD	.550 (.430-.690)	.760 (.630-1.06)	1062
Asians	15-16	*	<LOD	<LOD	.800 (.600-.980)	1.03 (.820-1.44)	368

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.410.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Cobalt (2015 - 2016)

CAS Number 7440-48-4

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	.151 (.146-.156)	.130 (.130-.140)	.170 (.170-.180)	.280 (.250-.300)	.400 (.370-.450)	3454
Age 40-59 years	15-16	.144 (.138-.150)	.130 (.120-.130)	.160 (.150-.170)	.260 (.220-.290)	.360 (.300-.440)	1726
Age 60 + years	15-16	.162 (.155-.168)	.140 (.140-.150)	.190 (.180-.200)	.300 (.270-.370)	.450 (.390-.520)	1728
Males	15-16	.135 (.129-.142)	.120 (.120-.130)	.150 (.140-.160)	.210 (.190-.240)	.360 (.250-.400)	1661
Females	15-16	.167 (.161-.173)	.150 (.140-.150)	.200 (.190-.210)	.320 (.280-.360)	.460 (.410-.550)	1793
Mexican Americans	15-16	.151 (.146-.157)	.130 (.120-.140)	.170 (.160-.190)	.300 (.240-.360)	.440 (.350-.610)	592
Non-Hispanic blacks	15-16	.148 (.138-.159)	.130 (.120-.140)	.180 (.160-.190)	.280 (.250-.340)	.440 (.390-.500)	718
Non-Hispanic whites	15-16	.151 (.145-.157)	.130 (.130-.140)	.170 (.160-.190)	.270 (.240-.290)	.390 (.330-.450)	1198
All Hispanics	15-16	.150 (.145-.154)	.130 (.120-.140)	.170 (.160-.180)	.300 (.240-.360)	.440 (.350-.560)	1067
Asians	15-16	.152 (.145-.160)	.140 (.130-.150)	.170 (.160-.180)	.290 (.210-.370)	.380 (.290-.620)	368

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.060.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cobalt_BiomonitoringSummary.html

Urinary Cobalt (2011 - 2016)†

CAS Number 7440-48-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.326 (.309-.344)	.323 (.306-.347)	.543 (.510-.577)	.860 (.800-.979)	1.27 (1.09-1.45)	2504
Total population	13-14	.391 (.373-.411)	.408 (.382-.435)	.687 (.662-.713)	1.04 (.976-1.09)	1.35 (1.23-1.48)	2664
Total population	15-16	.414 (.394-.435)	.434 (.415-.455)	.687 (.658-.725)	1.06 (.983-1.12)	1.53 (1.34-1.71)	3061
Age 3-5 years	15-16	.426 (.397-.456)	.466 (.410-.512)	.739 (.662-.833)	1.08 (.947-1.25)	1.55 (1.23-2.07)	486
Age 6-11 years	11-12	.397 (.356-.442)	.452 (.361-.510)	.704 (.616-.772)	1.00 (.846-1.38)	1.42 (1.00-1.78)	399
Age 6-11 years	13-14	.447 (.411-.487)	.479 (.408-.522)	.789 (.718-.877)	1.05 (.991-1.33)	1.55 (1.14-1.84)	402
Age 6-11 years	15-16	.534 (.494-.577)	.599 (.525-.636)	.886 (.773-.948)	1.20 (.992-1.40)	1.63 (1.20-2.05)	379
Age 12-19 years	11-12	.416 (.358-.484)	.429 (.341-.527)	.700 (.622-.806)	1.12 (.960-1.30)	1.56 (1.16-1.96)	390
Age 12-19 years	13-14	.549 (.462-.653)	.602 (.491-.701)	.936 (.783-1.05)	1.43 (1.08-1.75)	1.76 (1.49-3.07)	451
Age 12-19 years	15-16	.571 (.527-.620)	.604 (.535-.659)	.892 (.840-1.08)	1.48 (1.32-1.74)	1.92 (1.57-2.23)	402
Age 20+ years	11-12	.307 (.288-.327)	.308 (.289-.328)	.491 (.457-.534)	.800 (.695-.940)	1.16 (.984-1.36)	1715
Age 20+ years	13-14	.367 (.349-.386)	.382 (.357-.410)	.647 (.614-.673)	.930 (.882-1.04)	1.23 (1.17-1.34)	1811
Age 20+ years	15-16	.385 (.364-.408)	.403 (.379-.427)	.638 (.599-.666)	.949 (.877-1.06)	1.41 (1.21-1.66)	1794
Males	11-12	.317 (.299-.336)	.316 (.293-.339)	.496 (.452-.547)	.715 (.659-.798)	.963 (.858-1.03)	1262
Males	13-14	.380 (.355-.407)	.414 (.374-.452)	.641 (.604-.684)	.883 (.820-.951)	1.11 (1.04-1.26)	1318
Males	15-16	.397 (.376-.420)	.434 (.405-.466)	.651 (.609-.692)	.860 (.815-.954)	1.08 (.960-1.19)	1524
Females	11-12	.335 (.310-.361)	.340 (.308-.382)	.591 (.554-.643)	1.07 (.891-1.20)	1.49 (1.30-1.74)	1242
Females	13-14	.402 (.374-.432)	.398 (.366-.438)	.741 (.701-.789)	1.16 (1.06-1.23)	1.50 (1.36-1.75)	1346
Females	15-16	.432 (.397-.469)	.433 (.391-.489)	.752 (.675-.865)	1.33 (1.20-1.43)	1.82 (1.54-2.13)	1537
Mexican Americans	11-12	.350 (.322-.381)	.350 (.307-.377)	.550 (.490-.598)	.891 (.721-1.18)	1.41 (1.14-2.08)	317
Mexican Americans	13-14	.415 (.378-.456)	.439 (.400-.482)	.686 (.610-.766)	.918 (.866-1.09)	1.15 (1.06-1.56)	453
Mexican Americans	15-16	.469 (.431-.511)	.488 (.431-.558)	.777 (.688-.852)	1.21 (1.01-1.42)	1.81 (1.32-2.14)	585
Non-Hispanic blacks	11-12	.340 (.311-.373)	.333 (.304-.358)	.519 (.489-.576)	.909 (.790-.986)	1.44 (1.06-1.60)	669
Non-Hispanic blacks	13-14	.468 (.410-.535)	.471 (.402-.561)	.796 (.691-.877)	1.26 (1.03-1.39)	1.50 (1.35-1.67)	581
Non-Hispanic blacks	15-16	.461 (.422-.503)	.478 (.436-.513)	.740 (.660-.845)	1.20 (.956-1.40)	1.52 (1.34-1.85)	671
Non-Hispanic whites	11-12	.320 (.295-.348)	.320 (.296-.357)	.543 (.485-.591)	.858 (.750-.995)	1.20 (1.03-1.35)	820
Non-Hispanic whites	13-14	.374 (.349-.401)	.387 (.345-.429)	.681 (.638-.723)	1.02 (.930-1.10)	1.34 (1.21-1.56)	985
Non-Hispanic whites	15-16	.402 (.374-.432)	.422 (.386-.454)	.675 (.627-.734)	1.00 (.938-1.11)	1.49 (1.24-1.71)	924
All Hispanics	11-12	.338 (.321-.357)	.326 (.306-.350)	.530 (.490-.583)	.891 (.763-1.14)	1.41 (1.10-1.81)	573
All Hispanics	13-14	.412 (.384-.442)	.442 (.409-.481)	.674 (.631-.731)	.964 (.891-1.07)	1.20 (1.09-1.36)	701
All Hispanics	15-16	.440 (.417-.465)	.465 (.431-.514)	.718 (.662-.795)	1.16 (.991-1.34)	1.69 (1.34-2.03)	982
Asians	11-12	.317 (.282-.357)	.323 (.300-.355)	.519 (.445-.634)	.968 (.723-1.58)	1.78 (.980-2.31)	353
Asians	13-14	.362 (.315-.416)	.354 (.312-.434)	.653 (.578-.789)	1.05 (.854-1.25)	1.57 (1.09-2.26)	292
Asians	15-16	.376 (.334-.424)	.365 (.342-.438)	.610 (.533-.698)	.990 (.734-1.37)	1.44 (.990-2.31)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.048, 0.023, and 0.023 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cobalt_BiomonitoringSummary.html

Urinary Cobalt (creatinine corrected) (2011 - 2016)†

CAS Number 7440-48-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.370 (.349-.391)	.347 (.330-.371)	.557 (.513-.593)	.880 (.768-1.03)	1.29 (1.12-1.46)	2502
Total population	13-14	.452 (.437-.466)	.443 (.427-.454)	.656 (.625-.688)	.969 (.920-1.03)	1.31 (1.18-1.47)	2663
Total population	15-16	.465 (.447-.484)	.444 (.421-.464)	.682 (.636-.722)	1.07 (.999-1.16)	1.39 (1.24-1.52)	3058
Age 3-5 years	15-16	.980 (.919-1.05)	.952 (.875-1.01)	1.35 (1.22-1.48)	1.94 (1.65-2.10)	2.45 (2.03-2.98)	485
Age 6-11 years	11-12	.567 (.535-.602)	.571 (.526-.611)	.778 (.713-.834)	1.19 (.974-1.30)	1.38 (1.10-1.67)	398
Age 6-11 years	13-14	.667 (.614-.725)	.646 (.593-.704)	.914 (.853-.986)	1.26 (1.09-1.40)	1.57 (1.24-2.13)	402
Age 6-11 years	15-16	.757 (.701-.817)	.732 (.658-.785)	1.03 (.957-1.11)	1.37 (1.17-1.50)	1.70 (1.28-2.64)	379
Age 12-19 years	11-12	.398 (.349-.455)	.373 (.316-.441)	.585 (.454-.700)	.832 (.688-1.09)	1.26 (.830-2.77)	390
Age 12-19 years	13-14	.497 (.463-.534)	.480 (.446-.525)	.692 (.597-.769)	.920 (.819-1.10)	1.30 (1.09-1.61)	451
Age 12-19 years	15-16	.534 (.504-.565)	.508 (.455-.552)	.799 (.697-.939)	1.16 (1.05-1.42)	1.50 (1.33-1.78)	402
Age 20+ years	11-12	.349 (.330-.369)	.327 (.300-.341)	.508 (.467-.552)	.803 (.711-.982)	1.24 (1.10-1.50)	1714
Age 20+ years	13-14	.428 (.412-.444)	.417 (.390-.441)	.607 (.580-.643)	.929 (.853-.994)	1.27 (1.10-1.46)	1810
Age 20+ years	15-16	.420 (.402-.439)	.404 (.384-.426)	.582 (.551-.616)	.900 (.809-1.03)	1.20 (1.05-1.41)	1792
Males	11-12	.297 (.280-.315)	.276 (.254-.294)	.426 (.397-.456)	.637 (.564-.750)	.865 (.748-1.17)	1261
Males	13-14	.379 (.362-.398)	.368 (.344-.390)	.529 (.493-.560)	.758 (.689-.852)	1.02 (.871-1.29)	1317
Males	15-16	.377 (.360-.395)	.348 (.334-.379)	.526 (.483-.550)	.839 (.746-.913)	1.08 (.966-1.18)	1524
Females	11-12	.455 (.418-.496)	.433 (.407-.466)	.660 (.600-.729)	1.10 (.900-1.36)	1.54 (1.28-1.84)	1241
Females	13-14	.534 (.515-.553)	.532 (.502-.549)	.774 (.733-.816)	1.12 (.991-1.27)	1.48 (1.27-1.77)	1346
Females	15-16	.568 (.540-.598)	.533 (.511-.563)	.799 (.760-.869)	1.24 (1.16-1.40)	1.70 (1.48-1.98)	1534
Mexican Americans	11-12	.394 (.357-.435)	.374 (.322-.400)	.576 (.531-.637)	1.02 (.877-1.24)	1.50 (.988-2.02)	317
Mexican Americans	13-14	.474 (.449-.500)	.448 (.425-.473)	.669 (.610-.721)	.971 (.888-1.03)	1.28 (1.03-1.51)	453
Mexican Americans	15-16	.512 (.479-.548)	.488 (.464-.533)	.771 (.690-.850)	1.18 (1.01-1.40)	1.50 (1.37-1.79)	584
Non-Hispanic blacks	11-12	.265 (.248-.282)	.244 (.222-.267)	.401 (.342-.457)	.645 (.559-.816)	1.02 (.737-1.41)	669
Non-Hispanic blacks	13-14	.356 (.332-.382)	.337 (.315-.377)	.545 (.490-.624)	.841 (.754-.952)	1.08 (.930-1.22)	581
Non-Hispanic blacks	15-16	.366 (.347-.386)	.342 (.328-.377)	.556 (.504-.595)	.799 (.696-.972)	1.07 (.929-1.24)	669
Non-Hispanic whites	11-12	.387 (.360-.417)	.365 (.336-.400)	.574 (.513-.615)	.860 (.749-1.09)	1.29 (1.04-1.57)	818
Non-Hispanic whites	13-14	.461 (.442-.480)	.447 (.430-.469)	.669 (.613-.703)	.987 (.912-1.13)	1.32 (1.19-1.61)	984
Non-Hispanic whites	15-16	.475 (.453-.497)	.457 (.427-.471)	.686 (.629-.746)	1.07 (.972-1.20)	1.41 (1.19-1.63)	924
All Hispanics	11-12	.379 (.351-.409)	.361 (.322-.384)	.572 (.520-.626)	.944 (.809-1.15)	1.33 (1.13-1.91)	573
All Hispanics	13-14	.460 (.444-.475)	.448 (.429-.464)	.663 (.619-.703)	.952 (.888-1.00)	1.17 (1.03-1.35)	701
All Hispanics	15-16	.497 (.468-.527)	.465 (.436-.503)	.748 (.669-.837)	1.16 (1.04-1.28)	1.46 (1.35-1.70)	981
Asians	11-12	.424 (.378-.475)	.386 (.329-.457)	.659 (.531-.785)	1.18 (.907-1.51)	1.61 (1.14-2.72)	353
Asians	13-14	.567 (.516-.624)	.540 (.482-.567)	.814 (.670-.931)	1.38 (1.07-1.97)	2.09 (1.39-3.78)	292
Asians	15-16	.514 (.473-.559)	.475 (.421-.548)	.736 (.624-.885)	1.30 (1.11-1.57)	1.66 (1.44-2.12)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Cobalt_BiomonitoringSummary.html

Serum Copper (2011 - 2016)

CAS Number 7440-50-8

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	114 (111-116)	112 (109-114)	130 (127-134)	152 (145-162)	169 (161-183)	2329
Total population	13-14	115 (112-118)	114 (110-117)	132 (129-135)	155 (150-160)	171 (165-180)	2520
Total population	15-16	115 (112-117)	113 (111-116)	131 (127-135)	154 (148-158)	169 (164-177)	2436
Age 6-11 years	11-12	120 (117-124)	121 (115-126)	135 (130-140)	154 (141-161)	164 (154-175)	316
Age 6-11 years	13-14	119 (114-123)	119 (114-123)	132 (127-141)	148 (143-155)	157 (148-175)	339
Age 6-11 years	15-16	120 (116-123)	120 (117-125)	135 (128-140)	146 (141-153)	154 (150-162)	321
Age 12-19 years	11-12	106 (103-110)	103 (99.7-106)	120 (115-125)	143 (130-161)	169 (141-199)	366
Age 12-19 years	13-14	106 (103-108)	104 (101-106)	120 (116-125)	141 (132-147)	164 (146-181)	418
Age 12-19 years	15-16	106 (101-110)	103 (100-107)	123 (114-127)	141 (130-153)	153 (144-193)	371
Age 20+ years	11-12	114 (111-117)	112 (109-115)	131 (127-136)	153 (145-164)	171 (162-184)	1647
Age 20+ years	13-14	116 (113-119)	114 (111-118)	134 (131-136)	157 (150-164)	175 (165-183)	1763
Age 20+ years	15-16	115 (113-118)	113 (111-116)	132 (128-136)	156 (151-161)	172 (165-180)	1744
Males	11-12	103 (101-106)	103 (101-105)	116 (114-119)	132 (126-139)	143 (135-155)	1162
Males	13-14	103 (99.8-107)	103 (101-106)	117 (113-122)	131 (125-137)	141 (134-148)	1235
Males	15-16	104 (102-107)	104 (102-107)	117 (115-120)	133 (127-138)	142 (137-150)	1201
Females	11-12	124 (121-127)	123 (119-125)	142 (137-147)	165 (160-172)	187 (173-207)	1167
Females	13-14	127 (124-130)	124 (122-128)	145 (142-149)	168 (162-176)	191 (175-214)	1285
Females	15-16	125 (122-129)	124 (120-127)	143 (138-147)	167 (162-177)	190 (181-197)	1235
Mexican Americans	11-12	111 (107-116)	109 (105-115)	125 (122-131)	144 (137-152)	156 (148-164)	285
Mexican Americans	13-14	116 (113-120)	116 (110-119)	135 (128-142)	157 (147-164)	174 (162-182)	431
Mexican Americans	15-16	115 (112-118)	113 (111-116)	129 (126-133)	153 (143-166)	175 (153-205)	464
Non-Hispanic blacks	11-12	126 (122-130)	127 (121-130)	147 (142-151)	168 (161-180)	191 (176-214)	620
Non-Hispanic blacks	13-14	125 (121-129)	124 (120-128)	147 (143-151)	165 (159-170)	176 (169-188)	516
Non-Hispanic blacks	15-16	127 (122-132)	125 (122-129)	145 (141-154)	171 (161-190)	196 (183-222)	494
Non-Hispanic whites	11-12	113 (110-115)	111 (109-113)	128 (125-132)	150 (141-163)	169 (155-192)	780
Non-Hispanic whites	13-14	113 (110-116)	111 (109-114)	130 (125-133)	150 (144-158)	168 (158-188)	975
Non-Hispanic whites	15-16	113 (111-116)	112 (108-116)	130 (124-134)	148 (143-158)	165 (155-177)	764
All Hispanics	11-12	112 (108-115)	109 (106-115)	128 (124-132)	145 (139-152)	158 (151-164)	525
All Hispanics	13-14	117 (113-121)	116 (111-120)	136 (129-142)	157 (148-164)	171 (162-182)	666
All Hispanics	15-16	115 (113-117)	113 (111-115)	131 (127-133)	151 (147-157)	174 (157-185)	798
Asians	11-12	105 (102-109)	101 (96.2-107)	120 (114-125)	143 (132-151)	166 (150-198)	323
Asians	13-14	107 (104-111)	104 (99.8-108)	125 (116-130)	146 (132-162)	162 (145-186)	267
Asians	15-16	108 (103-114)	107 (100-111)	121 (114-133)	152 (138-164)	172 (152-202)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.50, 2.50, and 2.50 respectively.

Blood Lead (2011 - 2016)

CAS Number 7439-92-1

Geometric mean and selected percentiles of blood concentrations (in µg/dL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.973 (.916-1.04)	.930 (.880-.980)	1.52 (1.41-1.61)	2.38 (2.17-2.61)	3.16 (2.77-3.68)	7920
Total population	13-14	.858 (.813-.906)	.830 (.780-.870)	1.32 (1.24-1.42)	2.10 (1.96-2.30)	2.81 (2.49-3.14)	5215
Total population	15-16	.820 (.772-.872)	.780 (.740-.840)	1.32 (1.21-1.42)	2.14 (2.02-2.24)	2.75 (2.50-2.98)	4988
Age 1-5 years	11-12	.970 (.877-1.07)	.950 (.870-1.04)	1.34 (1.20-1.65)	2.26 (1.88-2.65)	2.91 (2.41-3.83)	713
Age 1-5 years	13-14	.782 (.705-.869)	.740 (.680-.800)	1.08 (.940-1.24)	1.58 (1.33-1.90)	2.24 (1.68-2.64)	818
Age 1-5 years	15-16	.758 (.675-.850)	.690 (.610-.790)	1.10 (.950-1.32)	1.86 (1.50-2.65)	2.76 (1.94-3.81)	790
Age 6-11 years	11-12	.681 (.623-.744)	.640 (.600-.700)	.930 (.820-1.05)	1.34 (1.14-1.60)	1.89 (1.36-2.94)	1048
Age 6-11 years	13-14	.567 (.529-.607)	.530 (.500-.570)	.760 (.700-.820)	1.13 (1.01-1.23)	1.42 (1.21-1.83)	1075
Age 6-11 years	15-16	.571 (.523-.623)	.550 (.510-.600)	.780 (.720-.830)	1.18 (.970-1.44)	1.59 (1.24-2.24)	1023
Age 12-19 years	11-12	.554 (.511-.601)	.530 (.490-.570)	.740 (.660-.830)	1.09 (.960-1.19)	1.31 (1.16-1.65)	1129
Age 12-19 years	13-14	.506 (.464-.551)	.460 (.420-.500)	.670 (.600-.750)	1.13 (.870-1.53)	1.69 (1.27-2.06)	627
Age 12-19 years	15-16	.467 (.433-.504)	.450 (.410-.490)	.680 (.610-.730)	.930 (.820-1.03)	1.17 (.990-1.36)	565
Age 20 + years	11-12	1.09 (1.03-1.16)	1.05 (1.00-1.12)	1.67 (1.56-1.79)	2.56 (2.33-2.77)	3.36 (2.98-3.93)	5030
Age 20 + years	13-14	.967 (.921-1.02)	.940 (.900-.980)	1.45 (1.37-1.55)	2.26 (2.09-2.49)	3.03 (2.65-3.55)	2695
Age 20 + years	15-16	.920 (.862-.982)	.880 (.810-.960)	1.46 (1.35-1.59)	2.30 (2.15-2.44)	2.89 (2.65-3.07)	2610
Males	11-12	1.13 (1.06-1.21)	1.07 (1.01-1.14)	1.74 (1.63-1.88)	2.73 (2.48-3.01)	3.68 (3.18-4.22)	3968
Males	13-14	.994 (.919-1.08)	.940 (.890-1.00)	1.48 (1.35-1.61)	2.41 (2.07-2.90)	3.47 (2.89-4.32)	2587
Males	15-16	.921 (.864-.981)	.860 (.800-.930)	1.46 (1.33-1.60)	2.41 (2.18-2.62)	2.93 (2.75-3.26)	2488
Females	11-12	.842 (.796-.890)	.820 (.780-.860)	1.30 (1.22-1.39)	1.98 (1.83-2.22)	2.59 (2.32-2.94)	3952
Females	13-14	.746 (.715-.777)	.730 (.700-.760)	1.19 (1.11-1.28)	1.86 (1.69-2.02)	2.33 (2.24-2.42)	2628
Females	15-16	.735 (.679-.795)	.720 (.650-.770)	1.16 (1.04-1.31)	1.88 (1.66-2.13)	2.39 (2.21-2.65)	2500
Mexican Americans	11-12	.838 (.767-.916)	.780 (.690-.880)	1.27 (1.15-1.40)	2.05 (1.81-2.36)	3.06 (2.34-3.59)	1077
Mexican Americans	13-14	.746 (.685-.813)	.690 (.650-.750)	1.17 (1.10-1.28)	1.88 (1.61-2.04)	2.38 (2.03-2.74)	969
Mexican Americans	15-16	.704 (.659-.752)	.680 (.610-.730)	1.10 (.970-1.22)	1.77 (1.67-1.96)	2.39 (2.01-3.10)	994
Non-Hispanic blacks	11-12	.998 (.947-1.05)	.910 (.850-.990)	1.53 (1.45-1.60)	2.58 (2.31-2.91)	3.72 (3.04-4.58)	2195
Non-Hispanic blacks	13-14	.871 (.787-.963)	.830 (.720-.940)	1.39 (1.27-1.48)	2.17 (2.00-2.38)	3.03 (2.48-4.00)	1119
Non-Hispanic blacks	15-16	.856 (.763-.962)	.790 (.700-.890)	1.32 (1.11-1.60)	2.19 (1.86-2.80)	3.11 (2.76-3.39)	1070
Non-Hispanic whites	11-12	.993 (.914-1.08)	.960 (.880-1.03)	1.56 (1.40-1.73)	2.43 (2.11-2.74)	3.14 (2.67-3.85)	2493
Non-Hispanic whites	13-14	.882 (.820-.950)	.870 (.800-.920)	1.34 (1.24-1.48)	2.20 (1.94-2.48)	2.97 (2.43-3.58)	1848
Non-Hispanic whites	15-16	.835 (.774-.900)	.790 (.750-.860)	1.35 (1.23-1.49)	2.21 (2.03-2.36)	2.72 (2.39-2.98)	1511
All Hispanics	11-12	.855 (.793-.922)	.820 (.750-.880)	1.27 (1.18-1.39)	2.00 (1.86-2.23)	2.84 (2.41-3.34)	1931
All Hispanics	13-14	.742 (.695-.793)	.690 (.660-.730)	1.14 (1.08-1.24)	1.80 (1.62-1.99)	2.36 (2.03-2.72)	1481
All Hispanics	15-16	.703 (.658-.750)	.670 (.620-.720)	1.10 (1.01-1.18)	1.73 (1.56-2.00)	2.39 (2.00-2.97)	1664
Asians	11-12	1.15 (1.06-1.24)	1.14 (1.02-1.26)	1.70 (1.56-1.86)	2.56 (2.36-2.72)	3.28 (2.80-3.65)	1005
Asians	13-14	1.01 (.923-1.11)	1.02 (.900-1.19)	1.48 (1.35-1.66)	2.25 (2.06-2.39)	2.67 (2.37-2.86)	510
Asians	15-16	1.07 (.976-1.18)	1.08 (.920-1.20)	1.65 (1.47-1.96)	2.62 (2.11-2.92)	3.07 (2.76-3.49)	479

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.250, 0.070, and 0.070 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Lead_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Lead_FactSheet.html

Urinary Lead (2011 - 2016)†

CAS Number 7439-92-1

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.360 (.328-.396)	.370 (.340-.400)	.650 (.580-.720)	1.05 (.980-1.17)	1.49 (1.26-1.75)	2504
Total population	13-14	.277 (.257-.298)	.290 (.270-.300)	.500 (.480-.530)	.840 (.780-.900)	1.17 (1.01-1.41)	2664
Total population	15-16	.284 (.261-.308)	.290 (.260-.320)	.520 (.470-.570)	.960 (.860-1.02)	1.26 (1.13-1.44)	3061
Age 3-5 years	15-16	.257 (.225-.292)	.230 (.210-.270)	.460 (.370-.560)	.870 (.710-1.09)	1.20 (.920-1.48)	486
Age 6-11 years	11-12	.346 (.292-.410)	.370 (.300-.440)	.610 (.540-.770)	1.12 (.830-1.51)	1.54 (1.28-1.85)	399
Age 6-11 years	13-14	.222 (.192-.258)	.240 (.200-.270)	.390 (.330-.450)	.630 (.560-.810)	.870 (.710-1.09)	402
Age 6-11 years	15-16	.257 (.238-.276)	.250 (.230-.270)	.410 (.360-.480)	.680 (.580-.790)	.870 (.730-1.36)	379
Age 12-19 years	11-12	.259 (.219-.305)	.260 (.220-.340)	.470 (.380-.530)	.720 (.540-.900)	.970 (.720-1.17)	390
Age 12-19 years	13-14	.201 (.166-.245)	.220 (.190-.260)	.360 (.290-.440)	.550 (.450-.700)	.750 (.570-.880)	451
Age 12-19 years	15-16	.196 (.183-.211)	.200 (.180-.220)	.340 (.300-.360)	.530 (.440-.650)	.730 (.580-1.12)	402
Age 20+ years	11-12	.381 (.348-.416)	.390 (.360-.420)	.680 (.640-.730)	1.11 (1.01-1.21)	1.58 (1.28-1.90)	1715
Age 20+ years	13-14	.297 (.280-.315)	.300 (.290-.320)	.540 (.510-.580)	.900 (.820-.980)	1.27 (1.08-1.55)	1811
Age 20+ years	15-16	.304 (.276-.334)	.320 (.270-.360)	.570 (.510-.630)	1.01 (.950-1.08)	1.38 (1.18-1.51)	1794
Males	11-12	.414 (.367-.466)	.420 (.380-.460)	.730 (.640-.800)	1.16 (.990-1.47)	1.73 (1.33-2.18)	1262
Males	13-14	.315 (.295-.337)	.320 (.290-.340)	.580 (.520-.620)	.940 (.840-1.08)	1.48 (1.15-1.92)	1318
Males	15-16	.313 (.285-.343)	.330 (.280-.380)	.590 (.540-.650)	1.02 (.900-1.08)	1.26 (1.11-1.49)	1524
Females	11-12	.316 (.282-.355)	.320 (.290-.360)	.580 (.500-.660)	.970 (.830-1.14)	1.31 (1.15-1.41)	1242
Females	13-14	.245 (.222-.269)	.260 (.240-.280)	.460 (.430-.480)	.720 (.670-.790)	1.00 (.870-1.16)	1346
Females	15-16	.259 (.233-.288)	.260 (.230-.290)	.450 (.400-.530)	.880 (.730-.990)	1.26 (1.00-1.45)	1537
Mexican Americans	11-12	.372 (.320-.431)	.380 (.320-.480)	.670 (.550-.780)	1.17 (.820-1.58)	1.67 (1.17-2.18)	317
Mexican Americans	13-14	.277 (.240-.319)	.290 (.250-.320)	.480 (.440-.580)	.890 (.690-1.15)	1.21 (.930-1.97)	453
Mexican Americans	15-16	.295 (.260-.335)	.290 (.260-.350)	.550 (.460-.590)	.960 (.810-1.16)	1.33 (1.10-1.99)	585
Non-Hispanic blacks	11-12	.431 (.385-.483)	.440 (.370-.520)	.730 (.660-.830)	1.15 (1.00-1.39)	1.64 (1.39-1.87)	669
Non-Hispanic blacks	13-14	.371 (.320-.429)	.380 (.310-.440)	.620 (.530-.730)	1.09 (.830-1.34)	1.45 (1.24-1.72)	581
Non-Hispanic blacks	15-16	.340 (.298-.388)	.340 (.300-.380)	.620 (.490-.720)	1.01 (.820-1.19)	1.38 (1.09-1.65)	671
Non-Hispanic whites	11-12	.346 (.311-.385)	.360 (.330-.390)	.610 (.540-.700)	1.02 (.920-1.16)	1.38 (1.14-1.85)	820
Non-Hispanic whites	13-14	.267 (.245-.290)	.280 (.260-.300)	.500 (.450-.540)	.820 (.730-.920)	1.16 (.950-1.60)	985
Non-Hispanic whites	15-16	.275 (.247-.305)	.270 (.230-.330)	.500 (.450-.570)	.930 (.790-1.03)	1.29 (1.08-1.52)	924
All Hispanics	11-12	.372 (.327-.423)	.370 (.320-.420)	.670 (.590-.750)	1.15 (.950-1.31)	1.51 (1.18-2.13)	573
All Hispanics	13-14	.270 (.239-.305)	.280 (.240-.320)	.480 (.440-.540)	.820 (.690-.930)	1.17 (.940-1.47)	701
All Hispanics	15-16	.284 (.258-.312)	.280 (.260-.310)	.530 (.480-.560)	.930 (.850-1.04)	1.31 (1.18-1.50)	982
Asians	11-12	.383 (.341-.429)	.380 (.350-.460)	.690 (.620-.790)	1.15 (.950-1.32)	1.38 (1.21-1.72)	353
Asians	13-14	.257 (.230-.287)	.290 (.240-.350)	.470 (.410-.510)	.710 (.560-.790)	.890 (.750-.980)	292
Asians	15-16	.292 (.264-.324)	.300 (.250-.360)	.570 (.460-.660)	.980 (.710-1.14)	1.14 (1.01-1.21)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.080, 0.030, and 0.030 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Lead_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Lead_FactSheet.html

Urinary Lead (creatinine corrected) (2011 - 2016)†

CAS Number 7439-92-1

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.409 (.380-.440)	.396 (.374-.418)	.634 (.583-.675)	1.00 (.878-1.16)	1.51 (1.24-1.71)	2502
Total population	13-14	.320 (.302-.339)	.313 (.294-.331)	.519 (.491-.554)	.823 (.756-.907)	1.16 (1.00-1.30)	2663
Total population	15-16	.319 (.294-.346)	.302 (.279-.325)	.525 (.477-.560)	.870 (.766-.981)	1.13 (1.04-1.27)	3058
Age 3-5 years	15-16	.590 (.532-.654)	.577 (.486-.658)	.897 (.783-1.07)	1.41 (1.13-1.89)	2.05 (1.50-2.69)	485
Age 6-11 years	11-12	.494 (.430-.567)	.459 (.414-.529)	.708 (.559-.930)	1.18 (.884-1.56)	1.56 (1.12-2.22)	398
Age 6-11 years	13-14	.331 (.297-.370)	.313 (.273-.370)	.500 (.452-.571)	.833 (.667-.938)	1.07 (.905-1.34)	402
Age 6-11 years	15-16	.364 (.326-.406)	.329 (.278-.400)	.538 (.455-.642)	.857 (.714-1.05)	1.14 (.859-1.49)	379
Age 12-19 years	11-12	.247 (.218-.281)	.224 (.206-.264)	.385 (.317-.429)	.541 (.440-.667)	.667 (.513-1.03)	390
Age 12-19 years	13-14	.182 (.160-.208)	.169 (.142-.194)	.276 (.225-.330)	.457 (.339-.640)	.640 (.438-.908)	451
Age 12-19 years	15-16	.183 (.166-.202)	.174 (.160-.194)	.260 (.226-.288)	.385 (.310-.521)	.538 (.392-.774)	402
Age 20+ years	11-12	.433 (.402-.466)	.414 (.389-.437)	.660 (.619-.712)	1.05 (.929-1.22)	1.61 (1.28-1.87)	1714
Age 20+ years	13-14	.346 (.331-.363)	.337 (.321-.353)	.554 (.505-.592)	.861 (.789-.935)	1.23 (1.04-1.46)	1810
Age 20+ years	15-16	.331 (.303-.363)	.315 (.288-.350)	.541 (.492-.581)	.900 (.754-1.02)	1.14 (1.03-1.28)	1792
Males	11-12	.388 (.346-.436)	.377 (.338-.418)	.590 (.524-.658)	.987 (.833-1.17)	1.51 (1.16-1.89)	1261
Males	13-14	.315 (.293-.339)	.303 (.278-.327)	.486 (.440-.541)	.758 (.692-.913)	1.16 (.956-1.58)	1317
Males	15-16	.297 (.269-.328)	.275 (.254-.309)	.500 (.422-.553)	.787 (.700-.923)	1.05 (.874-1.23)	1524
Females	11-12	.430 (.405-.457)	.416 (.385-.444)	.667 (.626-.709)	1.03 (.905-1.21)	1.49 (1.21-1.71)	1241
Females	13-14	.325 (.303-.348)	.325 (.308-.336)	.545 (.500-.580)	.864 (.785-.929)	1.18 (.970-1.33)	1346
Females	15-16	.341 (.311-.374)	.324 (.300-.360)	.542 (.490-.608)	.941 (.780-1.13)	1.22 (1.09-1.37)	1534
Mexican Americans	11-12	.418 (.370-.471)	.409 (.356-.462)	.667 (.598-.716)	1.05 (.822-1.25)	1.32 (1.16-1.54)	317
Mexican Americans	13-14	.316 (.283-.352)	.319 (.278-.336)	.500 (.450-.589)	.845 (.720-1.04)	1.16 (.908-1.36)	453
Mexican Americans	15-16	.323 (.288-.363)	.303 (.274-.331)	.510 (.423-.594)	.866 (.743-1.02)	1.21 (1.00-1.56)	584
Non-Hispanic blacks	11-12	.335 (.301-.374)	.316 (.269-.357)	.529 (.464-.598)	.906 (.770-1.07)	1.34 (1.06-1.55)	669
Non-Hispanic blacks	13-14	.282 (.251-.317)	.275 (.237-.316)	.455 (.398-.515)	.750 (.611-.920)	.977 (.836-1.21)	581
Non-Hispanic blacks	15-16	.270 (.236-.309)	.252 (.218-.286)	.413 (.335-.516)	.750 (.561-.933)	1.06 (.857-1.16)	669
Non-Hispanic whites	11-12	.419 (.378-.465)	.404 (.369-.439)	.642 (.559-.722)	.966 (.826-1.22)	1.62 (1.16-2.00)	818
Non-Hispanic whites	13-14	.329 (.306-.353)	.317 (.293-.344)	.541 (.486-.589)	.860 (.750-.933)	1.23 (.983-1.60)	984
Non-Hispanic whites	15-16	.324 (.293-.358)	.306 (.275-.348)	.538 (.484-.590)	.896 (.747-1.03)	1.14 (1.00-1.28)	924
All Hispanics	11-12	.416 (.377-.460)	.401 (.366-.442)	.641 (.561-.694)	1.02 (.851-1.24)	1.40 (1.16-1.65)	573
All Hispanics	13-14	.301 (.276-.328)	.307 (.269-.327)	.473 (.438-.508)	.795 (.667-.882)	1.07 (.882-1.24)	701
All Hispanics	15-16	.321 (.294-.351)	.303 (.280-.324)	.510 (.453-.573)	.857 (.752-.980)	1.13 (1.00-1.41)	981
Asians	11-12	.511 (.453-.577)	.512 (.440-.588)	.829 (.706-.980)	1.28 (1.05-1.57)	1.61 (1.40-2.22)	353
Asians	13-14	.403 (.360-.451)	.417 (.342-.503)	.619 (.549-.708)	.929 (.767-1.03)	1.12 (.955-1.33)	292
Asians	15-16	.399 (.353-.452)	.403 (.350-.464)	.647 (.524-.829)	.966 (.837-1.25)	1.34 (.935-1.69)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Lead_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Lead_FactSheet.html

Blood Manganese (2011 - 2016)

CAS Number 8075-39-6

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	9.35 (9.19-9.51)	9.22 (9.04-9.40)	11.5 (11.3-11.7)	14.4 (14.2-14.6)	16.7 (16.2-17.3)	7920
Total population	13-14	9.52 (9.35-9.70)	9.41 (9.23-9.62)	11.8 (11.5-12.1)	14.6 (14.2-15.0)	16.7 (15.9-17.3)	5215
Total population	15-16	9.59 (9.36-9.82)	9.52 (9.23-9.73)	12.0 (11.6-12.3)	14.8 (14.5-15.1)	16.4 (15.9-17.3)	4987
Age 1-5 years	11-12	10.7 (10.2-11.2)	10.6 (10.1-11.2)	13.2 (12.6-13.5)	15.3 (14.5-16.8)	18.2 (15.3-19.7)	713
Age 1-5 years	13-14	10.9 (10.6-11.1)	10.7 (10.5-11.0)	13.2 (12.6-13.6)	16.1 (14.8-16.9)	18.3 (16.9-19.0)	818
Age 1-5 years	15-16	10.8 (10.3-11.3)	10.8 (10.4-11.3)	12.9 (12.4-13.7)	15.6 (14.6-17.2)	18.3 (16.5-19.3)	790
Age 6-11 years	11-12	10.3 (9.98-10.6)	10.2 (9.83-10.4)	12.6 (12.2-12.8)	14.9 (14.2-15.5)	16.5 (16.0-17.6)	1048
Age 6-11 years	13-14	10.2 (9.87-10.6)	10.2 (9.95-10.6)	12.4 (12.0-13.0)	14.8 (14.2-15.6)	16.4 (15.5-17.1)	1075
Age 6-11 years	15-16	10.4 (10.1-10.7)	10.4 (10.1-10.6)	12.6 (12.3-13.1)	15.2 (14.3-16.2)	17.1 (15.6-18.3)	1023
Age 12-19 years	11-12	10.1 (9.67-10.5)	9.90 (9.42-10.8)	12.5 (11.7-13.2)	14.8 (14.1-15.4)	16.6 (15.3-17.9)	1129
Age 12-19 years	13-14	10.4 (10.0-10.8)	10.1 (9.55-10.6)	13.4 (12.5-13.9)	16.1 (15.0-17.4)	17.9 (16.1-20.3)	627
Age 12-19 years	15-16	10.5 (10.1-10.9)	10.4 (9.81-10.9)	13.1 (12.1-13.9)	15.6 (14.9-16.2)	17.3 (16.4-18.3)	565
Age 20 + years	11-12	9.09 (8.94-9.24)	8.96 (8.83-9.11)	11.1 (10.9-11.3)	14.1 (13.7-14.5)	16.7 (16.1-17.3)	5030
Age 20 + years	13-14	9.27 (9.11-9.43)	9.22 (9.01-9.39)	11.4 (11.2-11.7)	14.1 (13.9-14.6)	16.2 (15.5-17.0)	2695
Age 20 + years	15-16	9.34 (9.11-9.58)	9.20 (8.92-9.51)	11.6 (11.4-11.8)	14.7 (14.1-15.1)	16.1 (15.6-16.9)	2609
Males	11-12	8.74 (8.58-8.91)	8.78 (8.65-8.91)	10.6 (10.3-10.9)	13.0 (12.7-13.4)	14.9 (14.4-15.3)	3968
Males	13-14	8.92 (8.76-9.09)	8.96 (8.70-9.19)	10.9 (10.6-11.1)	13.3 (12.9-13.6)	14.7 (14.2-15.2)	2587
Males	15-16	8.99 (8.74-9.25)	8.82 (8.59-9.17)	11.2 (10.8-11.6)	13.4 (13.1-14.0)	15.1 (14.5-15.5)	2488
Females	11-12	9.96 (9.75-10.2)	9.72 (9.52-10.0)	12.4 (12.0-12.9)	15.5 (15.2-15.9)	17.8 (17.4-18.4)	3952
Females	13-14	10.1 (9.86-10.4)	9.93 (9.57-10.4)	12.6 (12.3-13.0)	15.7 (15.1-16.4)	17.9 (17.0-19.2)	2628
Females	15-16	10.2 (9.95-10.4)	10.1 (9.83-10.3)	12.7 (12.3-13.2)	15.7 (15.2-16.2)	17.9 (17.0-18.4)	2499
Mexican Americans	11-12	10.7 (10.4-11.0)	10.7 (10.3-11.0)	13.2 (12.9-13.5)	16.4 (15.2-17.1)	19.1 (17.7-20.3)	1077
Mexican Americans	13-14	10.9 (10.6-11.3)	11.0 (10.6-11.3)	13.6 (13.1-14.0)	16.4 (15.2-17.4)	18.0 (17.1-19.9)	969
Mexican Americans	15-16	11.1 (10.8-11.4)	11.1 (10.7-11.4)	13.6 (13.2-14.1)	16.7 (15.9-17.2)	18.6 (17.9-19.8)	994
Non-Hispanic blacks	11-12	8.34 (8.19-8.49)	8.18 (8.04-8.33)	10.1 (9.81-10.4)	12.7 (12.0-13.3)	15.5 (14.5-16.5)	2195
Non-Hispanic blacks	13-14	8.23 (8.04-8.43)	8.17 (7.87-8.47)	10.0 (9.72-10.4)	12.5 (12.1-12.8)	14.0 (13.4-15.1)	1119
Non-Hispanic blacks	15-16	8.46 (8.18-8.75)	8.53 (8.17-8.81)	10.2 (9.84-10.6)	12.5 (12.0-13.4)	14.5 (13.2-16.1)	1070
Non-Hispanic whites	11-12	9.08 (8.91-9.26)	9.01 (8.79-9.21)	11.1 (10.9-11.3)	13.7 (13.3-14.2)	15.9 (15.2-16.4)	2493
Non-Hispanic whites	13-14	9.27 (9.07-9.48)	9.18 (8.96-9.38)	11.2 (10.9-11.5)	14.0 (13.0-14.5)	15.7 (14.7-17.0)	1848
Non-Hispanic whites	15-16	9.37 (9.08-9.67)	9.26 (8.91-9.65)	11.6 (11.2-11.9)	14.5 (13.4-14.9)	15.7 (15.1-16.4)	1510
All Hispanics	11-12	10.4 (10.1-10.8)	10.3 (9.95-10.7)	12.8 (12.3-13.3)	15.7 (14.9-16.7)	18.3 (17.3-19.2)	1931
All Hispanics	13-14	10.6 (10.3-10.9)	10.6 (10.4-10.8)	13.2 (12.9-13.5)	16.1 (15.2-16.7)	17.8 (17.1-18.7)	1481
All Hispanics	15-16	10.8 (10.5-11.1)	10.7 (10.4-11.1)	13.4 (12.9-13.8)	16.3 (15.6-16.9)	18.1 (17.5-18.7)	1664
Asians	11-12	11.9 (11.5-12.4)	11.8 (11.4-12.3)	14.7 (14.1-15.3)	17.6 (16.8-18.4)	19.8 (19.0-21.1)	1005
Asians	13-14	12.4 (12.0-12.8)	12.6 (12.0-13.0)	15.0 (14.7-15.5)	17.5 (16.8-18.4)	19.4 (18.4-20.4)	510
Asians	15-16	12.1 (11.5-12.8)	12.0 (11.3-13.0)	14.9 (14.1-15.6)	17.9 (16.3-19.2)	19.8 (18.3-21.3)	479

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.06, 0.990, and 0.990 respectively.

Urinary Manganese (2011 - 2016)†

CAS Number 8075-39-6

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.123 (.112-.136)	.120 (.100-.140)	.200 (.180-.230)	.300 (.270-.310)	.370 (.320-.450)	2504
Total population	13-14	*	<LOD	.130 (<LOD-.150)	.220 (.200-.230)	.300 (.260-.330)	2664
Total population	15-16	*	<LOD	.140 (.130-.150)	.220 (.200-.230)	.300 (.270-.360)	3061
Age 3-5 years	15-16	*	<LOD	.150 (.140-.170)	.260 (.230-.330)	.370 (.290-.530)	486
Age 6-11 years	11-12	.143 (.126-.162)	.150 (.120-.180)	.250 (.210-.300)	.340 (.310-.450)	.460 (.350-.540)	399
Age 6-11 years	13-14	*	<LOD	.150 (<LOD-.190)	.220 (.180-.320)	.310 (.220-.460)	402
Age 6-11 years	15-16	*	<LOD	.150 (.130-.180)	.290 (.240-.350)	.460 (.320-.560)	379
Age 12-19 years	11-12	.128 (.107-.153)	.120 (.090-.160)	.220 (.160-.280)	.310 (.250-.420)	.430 (.310-.570)	390
Age 12-19 years	13-14	*	<LOD	.140 (.130-.170)	.250 (.220-.330)	.380 (.300-.520)	451
Age 12-19 years	15-16	*	<LOD	.150 (.130-.190)	.250 (.210-.310)	.470 (.250-.690)	402
Age 20+ years	11-12	.121 (.109-.134)	.120 (.100-.140)	.190 (.180-.220)	.280 (.250-.300)	.350 (.300-.440)	1715
Age 20+ years	13-14	*	<LOD	.130 (<LOD-.140)	.210 (.190-.220)	.280 (.240-.320)	1811
Age 20+ years	15-16	*	<LOD	.130 (<LOD-.140)	.200 (.180-.220)	.280 (.240-.320)	1794
Males	11-12	.121 (.108-.136)	.120 (.100-.140)	.190 (.170-.220)	.280 (.250-.310)	.350 (.300-.390)	1262
Males	13-14	*	<LOD	<LOD	.190 (.160-.210)	.240 (.210-.260)	1318
Males	15-16	*	<LOD	<LOD	.190 (.170-.200)	.270 (.220-.310)	1524
Females	11-12	.126 (.114-.138)	.120 (.100-.140)	.210 (.190-.240)	.300 (.270-.350)	.410 (.340-.520)	1242
Females	13-14	*	<LOD	.150 (.130-.160)	.240 (.210-.290)	.350 (.300-.400)	1346
Females	15-16	*	<LOD	.150 (.130-.170)	.240 (.220-.270)	.350 (.280-.500)	1537
Mexican Americans	11-12	.129 (.116-.144)	.130 (.110-.150)	.220 (.190-.250)	.300 (.260-.360)	.360 (.300-.440)	317
Mexican Americans	13-14	*	<LOD	.150 (<LOD-.180)	.220 (.180-.250)	.250 (.220-.410)	453
Mexican Americans	15-16	*	<LOD	.160 (.140-.180)	.220 (.210-.250)	.300 (.270-.390)	585
Non-Hispanic blacks	11-12	.132 (.116-.150)	.140 (.100-.170)	.220 (.200-.240)	.310 (.280-.360)	.380 (.320-.480)	669
Non-Hispanic blacks	13-14	*	<LOD	.150 (.140-.180)	.250 (.200-.310)	.350 (.290-.410)	581
Non-Hispanic blacks	15-16	*	<LOD	.150 (.130-.170)	.250 (.210-.270)	.310 (.260-.390)	671
Non-Hispanic whites	11-12	.123 (.109-.138)	.120 (.100-.140)	.200 (.170-.230)	.300 (.250-.340)	.390 (.300-.510)	820
Non-Hispanic whites	13-14	*	<LOD	.130 (<LOD-.140)	.210 (.180-.240)	.290 (.240-.340)	985
Non-Hispanic whites	15-16	*	<LOD	.130 (<LOD-.140)	.200 (.170-.240)	.300 (.220-.480)	924
All Hispanics	11-12	.120 (.110-.132)	.120 (.100-.150)	.200 (.180-.230)	.290 (.260-.300)	.330 (.300-.380)	573
All Hispanics	13-14	*	<LOD	.140 (<LOD-.160)	.210 (.190-.240)	.250 (.220-.380)	701
All Hispanics	15-16	*	<LOD	.150 (.130-.160)	.230 (.210-.250)	.290 (.270-.350)	982
Asians	11-12	.125 (.108-.143)	.120 (.090-.160)	.220 (.180-.250)	.300 (.270-.360)	.410 (.300-.490)	353
Asians	13-14	*	<LOD	<LOD	.190 (.150-.250)	.260 (.200-.300)	292
Asians	15-16	*	<LOD	<LOD	.200 (.150-.240)	.250 (.210-.320)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.080, 0.130, and 0.130 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Manganese (creatinine corrected) (2011 - 2016)†

CAS Number 8075-39-6

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.140 (.126-.155)	.139 (.119-.154)	.233 (.206-.273)	.389 (.354-.444)	.548 (.500-.625)	2502
Total population	13-14	*	<LOD	.219 (<LOD-.240)	.368 (.329-.418)	.541 (.438-.657)	2663
Total population	15-16	*	<LOD	.219 (.200-.242)	.375 (.338-.438)	.531 (.476-.600)	3058
Age 3-5 years	15-16	*	<LOD	.438 (.400-.511)	.813 (.655-1.02)	1.27 (.920-2.04)	485
Age 6-11 years	11-12	.201 (.175-.231)	.197 (.173-.238)	.308 (.285-.358)	.486 (.388-.600)	.633 (.511-.750)	398
Age 6-11 years	13-14	*	<LOD	.297 (<LOD-.400)	.495 (.383-.657)	.708 (.532-.844)	402
Age 6-11 years	15-16	*	<LOD	.271 (.242-.306)	.484 (.359-.571)	.724 (.511-1.20)	379
Age 12-19 years	11-12	.122 (.105-.143)	.125 (.099-.150)	.200 (.174-.213)	.297 (.220-.429)	.490 (.271-.814)	390
Age 12-19 years	13-14	*	<LOD	.180 (.148-.204)	.279 (.228-.354)	.396 (.288-.460)	451
Age 12-19 years	15-16	*	<LOD	.179 (.148-.219)	.280 (.236-.444)	.600 (.288-1.02)	402
Age 20+ years	11-12	.137 (.124-.151)	.133 (.117-.148)	.232 (.197-.276)	.389 (.347-.455)	.545 (.487-.600)	1714
Age 20+ years	13-14	*	<LOD	.217 (<LOD-.237)	.355 (.329-.400)	.541 (.434-.657)	1810
Age 20+ years	15-16	*	<LOD	.209 (<LOD-.226)	.368 (.307-.418)	.487 (.438-.575)	1792
Males	11-12	.113 (.101-.127)	.111 (.098-.127)	.182 (.165-.197)	.318 (.248-.357)	.388 (.349-.487)	1261
Males	13-14	*	<LOD	<LOD	.279 (.263-.297)	.383 (.317-.460)	1317
Males	15-16	*	<LOD	<LOD	.288 (.249-.329)	.438 (.341-.511)	1524
Females	11-12	.171 (.153-.191)	.161 (.145-.194)	.286 (.250-.324)	.500 (.406-.571)	.635 (.571-.980)	1241
Females	13-14	*	<LOD	.271 (.237-.307)	.438 (.368-.511)	.613 (.511-.836)	1346
Females	15-16	*	<LOD	.270 (.249-.297)	.438 (.383-.511)	.636 (.535-.708)	1534
Mexican Americans	11-12	.145 (.125-.169)	.139 (.119-.172)	.237 (.196-.277)	.359 (.300-.419)	.439 (.375-.600)	317
Mexican Americans	13-14	*	<LOD	.212 (<LOD-.233)	.341 (.288-.368)	.405 (.341-.651)	453
Mexican Americans	15-16	*	<LOD	.219 (.188-.242)	.356 (.283-.460)	.575 (.436-.708)	584
Non-Hispanic blacks	11-12	.102 (.090-.117)	.102 (.085-.117)	.172 (.149-.200)	.272 (.231-.351)	.406 (.351-.547)	669
Non-Hispanic blacks	13-14	*	<LOD	.146 (.133-.155)	.242 (.219-.271)	.333 (.283-.540)	581
Non-Hispanic blacks	15-16	*	<LOD	.142 (.133-.152)	.270 (.235-.283)	.368 (.327-.431)	669
Non-Hispanic whites	11-12	.148 (.132-.166)	.145 (.127-.162)	.248 (.212-.300)	.410 (.375-.490)	.550 (.512-.633)	818
Non-Hispanic whites	13-14	*	<LOD	.237 (<LOD-.271)	.402 (.329-.483)	.541 (.484-.700)	984
Non-Hispanic whites	15-16	*	<LOD	.230 (<LOD-.263)	.397 (.341-.449)	.520 (.460-.614)	924
All Hispanics	11-12	.135 (.121-.150)	.129 (.114-.146)	.221 (.190-.250)	.356 (.317-.380)	.469 (.386-.574)	573
All Hispanics	13-14	*	<LOD	.200 (<LOD-.219)	.329 (.271-.368)	.400 (.345-.541)	701
All Hispanics	15-16	*	<LOD	.219 (.188-.243)	.368 (.317-.460)	.600 (.484-.659)	981
Asians	11-12	.167 (.138-.201)	.164 (.133-.198)	.271 (.219-.360)	.462 (.406-.577)	.641 (.500-.980)	353
Asians	13-14	*	<LOD	<LOD	.383 (.341-.484)	.514 (.418-.769)	292
Asians	15-16	*	<LOD	<LOD	.419 (.329-.541)	.575 (.400-.708)	332

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Blood Total Mercury (2011 - 2016)

CAS Number 92786-62-4

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.703 (.617-.801)	.640 (.580-.730)	1.38 (1.14-1.72)	2.87 (2.39-3.62)	4.40 (3.50-5.71)	7920
Total population	13-14	.683 (.621-.751)	.620 (.540-.690)	1.29 (1.14-1.46)	2.65 (2.32-3.08)	4.36 (3.65-4.97)	5215
Total population	15-16	.678 (.619-.743)	.600 (.540-.690)	1.26 (1.07-1.47)	2.55 (2.17-3.10)	4.25 (3.44-4.94)	4988
Age 1-5 years	11-12	.262 (.237-.291)	.250 (.220-.270)	.390 (.340-.450)	.680 (.540-.880)	.990 (.790-1.21)	713
Age 1-5 years	13-14	*	<LOD	.410 (.370-.450)	.810 (.710-.990)	1.21 (1.05-1.48)	818
Age 1-5 years	15-16	*	<LOD	.380 (.340-.430)	.690 (.540-.830)	1.06 (.840-1.36)	790
Age 6-11 years	11-12	.330 (.287-.379)	.320 (.280-.360)	.530 (.480-.600)	.930 (.780-1.20)	1.40 (1.02-2.17)	1048
Age 6-11 years	13-14	*	.300 (<LOD-.360)	.570 (.470-.680)	1.12 (.980-1.36)	1.62 (1.38-2.19)	1075
Age 6-11 years	15-16	*	.310 (.290-.340)	.480 (.430-.570)	.920 (.750-1.13)	1.33 (1.01-2.28)	1023
Age 12-19 years	11-12	.411 (.355-.476)	.370 (.320-.450)	.680 (.590-.800)	1.32 (1.08-1.75)	2.25 (1.46-2.87)	1129
Age 12-19 years	13-14	.412 (.367-.463)	.350 (.310-.420)	.630 (.530-.750)	1.20 (.900-1.67)	1.87 (1.30-2.38)	627
Age 12-19 years	15-16	.395 (.356-.439)	.340 (.300-.370)	.590 (.470-.750)	1.00 (.850-1.35)	1.89 (1.02-3.34)	565
Age 20 + years	11-12	.863 (.753-.990)	.790 (.690-.940)	1.68 (1.36-2.12)	3.35 (2.71-4.31)	5.02 (3.94-6.96)	5030
Age 20 + years	13-14	.814 (.736-.900)	.740 (.650-.850)	1.54 (1.36-1.71)	3.08 (2.73-3.56)	4.88 (4.36-5.21)	2695
Age 20 + years	15-16	.810 (.740-.886)	.740 (.660-.830)	1.47 (1.28-1.75)	2.86 (2.50-3.44)	4.66 (3.91-5.96)	2610
Males	11-12	.712 (.623-.815)	.650 (.570-.730)	1.40 (1.17-1.72)	3.00 (2.44-3.91)	4.94 (3.50-6.79)	3968
Males	13-14	.688 (.617-.767)	.620 (.530-.720)	1.30 (1.12-1.54)	2.76 (2.36-3.34)	4.52 (3.65-5.23)	2587
Males	15-16	.679 (.621-.743)	.610 (.530-.700)	1.29 (1.06-1.60)	2.45 (2.06-3.31)	4.67 (3.77-5.39)	2488
Females	11-12	.694 (.609-.791)	.640 (.580-.740)	1.36 (1.09-1.75)	2.81 (2.28-3.50)	4.03 (3.29-5.08)	3952
Females	13-14	.678 (.617-.745)	.610 (.530-.700)	1.27 (1.14-1.42)	2.56 (2.17-3.08)	4.15 (3.37-4.93)	2628
Females	15-16	.677 (.608-.754)	.600 (.530-.700)	1.23 (1.02-1.42)	2.57 (2.20-3.10)	3.95 (3.10-4.55)	2500
Mexican Americans	11-12	.483 (.424-.550)	.480 (.400-.560)	.810 (.720-.900)	1.44 (1.16-1.63)	1.90 (1.57-2.19)	1077
Mexican Americans	13-14	.487 (.433-.547)	.430 (.390-.510)	.760 (.690-.870)	1.41 (1.14-1.69)	1.98 (1.70-2.38)	969
Mexican Americans	15-16	.540 (.522-.559)	.530 (.470-.570)	.840 (.790-.920)	1.41 (1.19-1.60)	1.81 (1.54-2.33)	994
Non-Hispanic blacks	11-12	.679 (.542-.852)	.630 (.500-.790)	1.24 (.880-1.72)	2.45 (1.84-3.14)	3.80 (2.70-5.37)	2195
Non-Hispanic blacks	13-14	.699 (.614-.796)	.650 (.570-.750)	1.20 (1.08-1.40)	2.30 (1.65-2.96)	3.34 (2.35-5.93)	1119
Non-Hispanic blacks	15-16	.698 (.587-.829)	.630 (.510-.760)	1.21 (1.04-1.47)	2.49 (2.01-3.51)	4.51 (2.74-5.87)	1070
Non-Hispanic whites	11-12	.688 (.582-.813)	.630 (.550-.750)	1.38 (1.09-1.82)	2.83 (2.18-3.82)	4.25 (3.02-6.24)	2493
Non-Hispanic whites	13-14	.672 (.598-.755)	.620 (.520-.720)	1.30 (1.12-1.51)	2.61 (2.18-3.08)	4.15 (3.35-4.98)	1848
Non-Hispanic whites	15-16	.638 (.563-.723)	.570 (.500-.670)	1.22 (.940-1.47)	2.29 (1.82-2.72)	3.95 (2.56-4.55)	1511
All Hispanics	11-12	.612 (.527-.710)	.590 (.490-.700)	1.08 (.890-1.33)	1.96 (1.60-2.68)	3.03 (2.37-3.86)	1931
All Hispanics	13-14	.551 (.486-.624)	.490 (.420-.580)	.910 (.820-1.10)	1.76 (1.44-2.12)	2.59 (2.06-3.14)	1481
All Hispanics	15-16	.607 (.546-.675)	.570 (.520-.640)	1.00 (.870-1.17)	1.75 (1.38-2.33)	2.60 (1.85-3.25)	1664
Asians	11-12	1.86 (1.58-2.19)	2.30 (1.84-2.64)	4.32 (3.71-5.21)	7.71 (6.38-8.79)	10.3 (8.85-12.0)	1005
Asians	13-14	1.72 (1.46-2.03)	1.77 (1.42-2.26)	3.92 (3.35-4.55)	7.78 (6.39-9.16)	9.99 (9.16-13.7)	510
Asians	15-16	1.73 (1.41-2.12)	2.03 (1.40-2.70)	4.21 (3.31-5.50)	7.66 (6.17-9.91)	11.3 (9.12-13.8)	479

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.160, 0.280, and 0.280 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Mercury_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html

Blood Inorganic Mercury (2011 - 2016)

CAS Number 92786-62-4

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.440 (.390-.480)	.600 (.520-.680)	7841
Total population	13-14	*	<LOD	<LOD	.410 (.380-.440)	.530 (.490-.570)	5175
Total population	15-16	*	<LOD	<LOD	.350 (.300-.400)	.480 (.430-.530)	4938
Age 1-5 years	11-12	*	<LOD	<LOD	<LOD	.280 (<LOD-.360)	657
Age 1-5 years	13-14	*	<LOD	<LOD	<LOD	<LOD	779
Age 1-5 years	15-16	*	<LOD	<LOD	<LOD	.270 (<LOD-.340)	749
Age 6-11 years	11-12	*	<LOD	<LOD	.280 (<LOD-.320)	.360 (.290-.450)	1044
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.340 (<LOD-.420)	1074
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	.330 (<LOD-.450)	1022
Age 12-19 years	11-12	*	<LOD	<LOD	.280 (<LOD-.350)	.400 (.300-.540)	1121
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.360 (.290-.420)	627
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	.400 (<LOD-.510)	565
Age 20 + years	11-12	*	<LOD	.290 (.270-.310)	.470 (.420-.530)	.630 (.550-.760)	5019
Age 20 + years	13-14	*	<LOD	.270 (<LOD-.300)	.440 (.410-.470)	.560 (.510-.660)	2695
Age 20 + years	15-16	*	<LOD	<LOD	.380 (.330-.430)	.500 (.450-.560)	2602
Males	11-12	*	<LOD	<LOD	.420 (.370-.480)	.600 (.490-.680)	3925
Males	13-14	*	<LOD	<LOD	.400 (.340-.430)	.510 (.450-.560)	2570
Males	15-16	*	<LOD	<LOD	.330 (.280-.400)	.430 (.400-.490)	2460
Females	11-12	*	<LOD	.280 (<LOD-.300)	.450 (.390-.490)	.610 (.520-.700)	3916
Females	13-14	*	<LOD	<LOD	.420 (.390-.450)	.550 (.510-.590)	2605
Females	15-16	*	<LOD	<LOD	.370 (.320-.450)	.530 (.450-.620)	2478
Mexican Americans	11-12	*	<LOD	<LOD	.390 (.330-.460)	.580 (.460-.710)	1058
Mexican Americans	13-14	*	<LOD	<LOD	.380 (.330-.410)	.540 (.420-.640)	958
Mexican Americans	15-16	*	<LOD	<LOD	.420 (.290-.600)	.560 (.430-.820)	988
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.410 (.370-.470)	.570 (.480-.670)	2170
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.380 (.330-.430)	.530 (.440-.630)	1110
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.330 (.270-.380)	.430 (.370-.490)	1058
Non-Hispanic whites	11-12	*	<LOD	.270 (<LOD-.300)	.430 (.370-.490)	.590 (.480-.690)	2477
Non-Hispanic whites	13-14	*	<LOD	<LOD	.420 (.360-.450)	.510 (.460-.570)	1835
Non-Hispanic whites	15-16	*	<LOD	<LOD	.320 (.280-.400)	.460 (.400-.540)	1500
All Hispanics	11-12	*	<LOD	<LOD	.430 (.370-.490)	.630 (.540-.760)	1902
All Hispanics	13-14	*	<LOD	<LOD	.380 (.330-.410)	.540 (.440-.650)	1467
All Hispanics	15-16	*	<LOD	<LOD	.380 (.300-.490)	.510 (.430-.650)	1648
Asians	11-12	*	<LOD	.350 (.310-.390)	.550 (.500-.590)	.700 (.630-.760)	997
Asians	13-14	*	<LOD	.330 (.270-.390)	.570 (.420-.680)	.750 (.580-1.10)	508
Asians	15-16	*	<LOD	<LOD	.430 (.360-.540)	.600 (.470-.730)	473

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.270, 0.270, and 0.270 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Mercury_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html

Blood Ethyl Mercury (2011 - 2016)

CAS Number 92786-62-4

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	7841
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	5175
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	4936
Age 1-5 years	11-12	*	<LOD	<LOD	<LOD	<LOD	657
Age 1-5 years	13-14	*	<LOD	<LOD	<LOD	<LOD	779
Age 1-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	749
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	1044
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	1074
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	1022
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	1121
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	627
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	565
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	5019
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2695
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2600
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	3925
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	2570
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	2458
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	3916
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	2605
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	2478
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	1058
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	958
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	988
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	2170
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	1110
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	1057
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	2477
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1835
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	1500
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	1902
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	1467
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	1647
Asians	11-12	*	<LOD	<LOD	<LOD	.160 (<LOD-.280)	997
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	508
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	473

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.160, 0.160, and 0.160 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Mercury_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html

Blood Methyl Mercury (2011 - 2016)

CAS Number 92786-62-4

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.498 (.423-.587)	.480 (.400-.570)	1.25 (.950-1.61)	2.81 (2.29-3.55)	4.43 (3.46-5.49)	7841
Total population	13-14	.434 (.381-.495)	.420 (.340-.510)	1.09 (.940-1.27)	2.62 (2.18-3.04)	4.28 (3.74-4.93)	5175
Total population	15-16	.413 (.361-.472)	.380 (.320-.490)	1.02 (.860-1.22)	2.30 (1.92-2.78)	3.92 (3.35-4.81)	4938
Age 1-5 years	11-12	*	.140 (.120-.170)	.270 (.220-.350)	.540 (.420-.780)	.970 (.590-1.14)	657
Age 1-5 years	13-14	*	<LOD	.260 (.230-.310)	.660 (.550-.810)	1.11 (.960-1.48)	779
Age 1-5 years	15-16	*	<LOD	.200 (.170-.240)	.470 (.350-.630)	.830 (.590-1.21)	749
Age 6-11 years	11-12	.209 (.182-.241)	.180 (.150-.220)	.400 (.330-.490)	.820 (.630-1.06)	1.34 (.940-1.84)	1044
Age 6-11 years	13-14	*	.150 (<LOD-.200)	.380 (.280-.530)	.960 (.700-1.26)	1.58 (1.26-2.11)	1074
Age 6-11 years	15-16	*	.140 (<LOD-.180)	.290 (.260-.340)	.730 (.530-.950)	1.11 (.870-1.91)	1022
Age 12-19 years	11-12	.276 (.237-.322)	.270 (.210-.310)	.570 (.460-.670)	1.27 (.870-1.67)	2.15 (1.40-2.81)	1121
Age 12-19 years	13-14	.233 (.202-.269)	.190 (.140-.260)	.480 (.380-.560)	1.02 (.730-1.60)	1.84 (1.20-2.57)	627
Age 12-19 years	15-16	.212 (.180-.249)	.160 (.120-.220)	.420 (.310-.620)	.800 (.690-1.23)	1.81 (.800-3.14)	565
Age 20 + years	11-12	.624 (.523-.746)	.610 (.500-.760)	1.53 (1.18-2.00)	3.28 (2.56-4.31)	4.97 (3.91-6.89)	5019
Age 20 + years	13-14	.541 (.473-.618)	.540 (.450-.630)	1.32 (1.17-1.54)	3.05 (2.64-3.60)	4.92 (4.34-5.41)	2695
Age 20 + years	15-16	.518 (.456-.588)	.530 (.420-.630)	1.23 (1.05-1.46)	2.59 (2.25-3.36)	4.42 (3.66-5.58)	2602
Males	11-12	.509 (.433-.598)	.490 (.400-.590)	1.30 (.990-1.62)	2.84 (2.29-3.68)	4.77 (3.44-6.74)	3925
Males	13-14	.448 (.390-.515)	.430 (.350-.530)	1.10 (.940-1.37)	2.67 (2.22-3.33)	4.44 (3.88-5.40)	2570
Males	15-16	.429 (.379-.486)	.400 (.330-.520)	1.11 (.900-1.33)	2.24 (1.85-2.86)	4.42 (3.60-5.05)	2460
Females	11-12	.489 (.413-.580)	.470 (.380-.560)	1.19 (.900-1.61)	2.72 (2.18-3.46)	3.99 (3.28-4.99)	3916
Females	13-14	.422 (.367-.485)	.400 (.330-.490)	1.08 (.900-1.22)	2.46 (2.03-2.92)	3.91 (3.32-4.93)	2605
Females	15-16	.399 (.338-.470)	.370 (.300-.470)	.950 (.760-1.18)	2.36 (1.91-2.81)	3.58 (2.92-4.24)	2478
Mexican Americans	11-12	.320 (.264-.387)	.330 (.260-.410)	.610 (.500-.770)	1.23 (.920-1.40)	1.66 (1.33-2.06)	1058
Mexican Americans	13-14	.276 (.239-.318)	.260 (.210-.310)	.540 (.440-.650)	1.06 (.770-1.43)	1.72 (1.27-2.34)	958
Mexican Americans	15-16	.292 (.276-.309)	.290 (.260-.330)	.610 (.550-.690)	1.13 (.870-1.47)	1.54 (1.34-2.02)	988
Non-Hispanic blacks	11-12	.517 (.392-.681)	.510 (.380-.660)	1.13 (.750-1.61)	2.37 (1.66-3.08)	3.63 (2.57-5.16)	2170
Non-Hispanic blacks	13-14	.481 (.407-.569)	.460 (.370-.580)	1.03 (.900-1.22)	2.08 (1.55-2.72)	3.33 (2.15-5.12)	1110
Non-Hispanic blacks	15-16	.461 (.376-.565)	.430 (.330-.580)	1.05 (.830-1.25)	2.34 (1.71-3.31)	4.08 (2.80-5.58)	1058
Non-Hispanic whites	11-12	.478 (.392-.583)	.470 (.360-.580)	1.25 (.870-1.69)	2.76 (2.06-3.69)	4.24 (2.92-6.38)	2477
Non-Hispanic whites	13-14	.420 (.357-.495)	.420 (.310-.530)	1.10 (.910-1.32)	2.62 (2.07-3.12)	4.01 (3.46-5.00)	1835
Non-Hispanic whites	15-16	.380 (.319-.451)	.350 (.270-.490)	.960 (.750-1.22)	2.04 (1.55-2.51)	3.50 (2.32-4.49)	1500
All Hispanics	11-12	.429 (.350-.525)	.420 (.340-.520)	.890 (.700-1.17)	1.81 (1.39-2.46)	2.94 (2.19-3.71)	1902
All Hispanics	13-14	.326 (.278-.382)	.310 (.250-.350)	.680 (.580-.790)	1.50 (1.15-1.89)	2.34 (1.79-3.00)	1467
All Hispanics	15-16	.353 (.305-.409)	.350 (.300-.390)	.760 (.630-.930)	1.53 (1.14-1.98)	2.26 (1.60-3.03)	1648
Asians	11-12	1.58 (1.29-1.94)	2.16 (1.68-2.55)	4.35 (3.64-5.13)	7.57 (6.21-8.61)	10.5 (8.48-12.5)	997
Asians	13-14	1.42 (1.16-1.74)	1.71 (1.17-2.07)	3.90 (3.31-4.54)	7.93 (6.42-9.21)	10.8 (9.57-13.6)	508
Asians	15-16	1.37 (1.08-1.73)	1.85 (1.18-2.51)	3.80 (3.11-4.83)	7.52 (5.60-9.63)	11.0 (8.65-12.4)	473

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.120, 0.120, and 0.120 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Mercury_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html

Urinary Mercury (2011 - 2016)†

CAS Number 92786-62-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.324 (.285-.368)	.320 (.280-.370)	.660 (.580-.770)	1.37 (1.15-1.59)	1.83 (1.62-2.14)	2507
Total population	13-14	.246 (.221-.273)	.200 (.170-.240)	.470 (.400-.570)	1.07 (.900-1.22)	1.64 (1.35-1.96)	2666
Total population	15-16	*	<LOD	.280 (.250-.320)	.680 (.570-.780)	1.18 (.920-1.29)	3080
Age 3-5 years	15-16	*	<LOD	<LOD	.160 (<LOD-.240)	.280 (.190-.510)	496
Age 6-11 years	11-12	.241 (.206-.283)	.220 (.190-.270)	.450 (.390-.530)	.930 (.680-1.36)	1.37 (.990-2.03)	401
Age 6-11 years	13-14	*	<LOD	.220 (.150-.310)	.560 (.340-.840)	.890 (.640-1.10)	401
Age 6-11 years	15-16	*	<LOD	<LOD	.300 (.200-.380)	.520 (.360-.700)	380
Age 12-19 years	11-12	.257 (.212-.312)	.270 (.220-.340)	.490 (.390-.600)	.840 (.650-1.24)	1.31 (.920-1.75)	390
Age 12-19 years	13-14	*	<LOD	.240 (.200-.310)	.560 (.400-.860)	1.02 (.610-1.81)	452
Age 12-19 years	15-16	*	<LOD	.130 (<LOD-.160)	.350 (.200-.470)	.610 (.380-1.14)	402
Age 20+ years	11-12	.346 (.303-.396)	.340 (.290-.400)	.720 (.620-.850)	1.49 (1.20-1.67)	1.93 (1.67-2.29)	1716
Age 20+ years	13-14	.274 (.246-.305)	.240 (.200-.280)	.540 (.450-.630)	1.16 (1.00-1.33)	1.76 (1.44-2.04)	1813
Age 20+ years	15-16	*	.140 (.130-.150)	.340 (.310-.380)	.740 (.650-.890)	1.22 (.970-1.43)	1802
Males	11-12	.342 (.293-.399)	.330 (.290-.380)	.670 (.580-.810)	1.34 (1.03-1.67)	1.91 (1.54-2.51)	1260
Males	13-14	.243 (.219-.268)	.200 (.170-.220)	.480 (.390-.600)	1.07 (.840-1.33)	1.55 (1.28-1.96)	1319
Males	15-16	*	<LOD	.280 (.230-.330)	.620 (.540-.710)	.900 (.760-1.18)	1533
Females	11-12	.307 (.262-.360)	.300 (.250-.360)	.660 (.540-.770)	1.37 (1.17-1.54)	1.82 (1.54-2.14)	1247
Females	13-14	.249 (.218-.284)	.210 (.170-.260)	.470 (.390-.570)	1.07 (.820-1.27)	1.75 (1.25-2.26)	1347
Females	15-16	*	<LOD	.290 (.250-.350)	.730 (.570-.980)	1.27 (.940-1.88)	1547
Mexican Americans	11-12	.301 (.261-.348)	.300 (.200-.400)	.620 (.510-.680)	1.25 (.910-1.53)	1.75 (1.32-2.25)	317
Mexican Americans	13-14	.229 (.198-.265)	.160 (.150-.210)	.450 (.300-.620)	1.12 (.780-1.35)	1.47 (.970-2.38)	454
Mexican Americans	15-16	*	<LOD	.230 (.170-.280)	.530 (.440-.640)	.900 (.650-1.22)	586
Non-Hispanic blacks	11-12	.360 (.316-.410)	.360 (.320-.400)	.670 (.570-.800)	1.33 (1.06-1.60)	1.99 (1.48-3.06)	671
Non-Hispanic blacks	13-14	.279 (.228-.340)	.250 (.190-.320)	.530 (.400-.690)	1.10 (.900-1.49)	1.82 (1.11-2.48)	580
Non-Hispanic blacks	15-16	*	.140 (<LOD-.180)	.370 (.270-.510)	.800 (.620-1.19)	1.38 (.870-1.72)	676
Non-Hispanic whites	11-12	.308 (.260-.365)	.290 (.260-.360)	.630 (.510-.810)	1.37 (1.09-1.64)	1.77 (1.49-2.14)	819
Non-Hispanic whites	13-14	.240 (.211-.271)	.200 (.160-.230)	.460 (.370-.580)	1.06 (.840-1.24)	1.64 (1.24-2.04)	988
Non-Hispanic whites	15-16	*	<LOD	.260 (.210-.330)	.700 (.480-.870)	1.18 (.860-1.40)	932
All Hispanics	11-12	.330 (.299-.364)	.330 (.270-.390)	.680 (.610-.760)	1.30 (1.15-1.53)	1.98 (1.61-2.42)	574
All Hispanics	13-14	.239 (.207-.276)	.180 (.150-.240)	.460 (.360-.620)	1.14 (.800-1.35)	1.57 (1.24-2.15)	702
All Hispanics	15-16	*	<LOD	.260 (.210-.330)	.600 (.470-.740)	1.03 (.730-1.37)	986
Asians	11-12	.430 (.351-.527)	.450 (.330-.580)	.910 (.750-1.12)	1.69 (1.31-2.06)	2.41 (1.77-3.53)	355
Asians	13-14	.313 (.269-.363)	.270 (.220-.340)	.620 (.520-.710)	1.18 (.890-1.66)	1.78 (1.20-3.10)	291
Asians	15-16	*	.180 (<LOD-.250)	.390 (.330-.510)	.720 (.610-.820)	.960 (.790-1.49)	333

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.050, 0.130, and 0.130 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Mercury_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html

Urinary Mercury (creatinine corrected) (2011 - 2016)†

CAS Number 92786-62-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.367 (.333-.405)	.353 (.306-.394)	.676 (.623-.754)	1.33 (1.13-1.50)	1.75 (1.49-2.32)	2505
Total population	13-14	.283 (.260-.309)	.270 (.250-.290)	.571 (.511-.644)	1.20 (1.05-1.36)	1.61 (1.47-1.81)	2665
Total population	15-16	*	<LOD	.356 (.318-.391)	.708 (.628-.817)	1.10 (.912-1.25)	3077
Age 3-5 years	15-16	*	<LOD	<LOD	.667 (<LOD-.818)	.994 (.818-1.13)	495
Age 6-11 years	11-12	.345 (.298-.398)	.306 (.276-.344)	.537 (.441-.613)	1.08 (.884-1.43)	1.62 (1.07-2.34)	400
Age 6-11 years	13-14	*	<LOD	.429 (.310-.529)	.750 (.563-.897)	1.11 (.713-1.72)	401
Age 6-11 years	15-16	*	<LOD	<LOD	.474 (.409-.529)	.643 (.500-1.00)	380
Age 12-19 years	11-12	.246 (.219-.277)	.221 (.190-.269)	.405 (.368-.453)	.735 (.571-1.11)	1.21 (.742-1.49)	390
Age 12-19 years	13-14	*	<LOD	.257 (.200-.281)	.580 (.391-.735)	.846 (.580-1.07)	452
Age 12-19 years	15-16	*	<LOD	.194 (<LOD-.220)	.320 (.246-.568)	.650 (.385-.967)	402
Age 20+ years	11-12	.393 (.351-.439)	.383 (.330-.437)	.750 (.673-.805)	1.38 (1.17-1.63)	1.95 (1.50-2.48)	1715
Age 20+ years	13-14	.318 (.291-.349)	.304 (.281-.333)	.644 (.561-.741)	1.32 (1.13-1.47)	1.76 (1.50-1.88)	1812
Age 20+ years	15-16	*	.198 (.184-.210)	.391 (.349-.449)	.776 (.692-.886)	1.15 (1.00-1.32)	1800
Males	11-12	.320 (.278-.368)	.294 (.267-.358)	.558 (.478-.667)	1.11 (.791-1.44)	1.57 (1.21-2.00)	1259
Males	13-14	.242 (.223-.263)	.231 (.206-.259)	.476 (.429-.542)	.902 (.779-1.11)	1.31 (1.13-1.49)	1318
Males	15-16	*	<LOD	.274 (.246-.300)	.563 (.490-.628)	.818 (.705-.994)	1533
Females	11-12	.418 (.374-.466)	.409 (.355-.453)	.800 (.706-.900)	1.46 (1.29-1.65)	2.00 (1.63-2.60)	1246
Females	13-14	.330 (.297-.367)	.315 (.273-.356)	.692 (.600-.822)	1.44 (1.18-1.68)	1.83 (1.60-2.12)	1347
Females	15-16	*	<LOD	.415 (.375-.473)	.875 (.750-1.00)	1.30 (1.06-1.86)	1544
Mexican Americans	11-12	.339 (.288-.399)	.286 (.225-.393)	.641 (.433-.789)	1.17 (1.00-1.42)	1.70 (1.31-2.24)	317
Mexican Americans	13-14	.261 (.231-.295)	.237 (.209-.273)	.516 (.409-.709)	1.04 (.810-1.48)	1.62 (1.11-2.55)	454
Mexican Americans	15-16	*	<LOD	.283 (.236-.360)	.692 (.530-.810)	1.04 (.791-1.30)	585
Non-Hispanic blacks	11-12	.280 (.245-.320)	.261 (.224-.294)	.467 (.411-.529)	.896 (.638-1.14)	1.43 (1.10-1.57)	671
Non-Hispanic blacks	13-14	.211 (.169-.264)	.202 (.152-.269)	.409 (.333-.516)	.794 (.643-1.10)	1.34 (.880-1.52)	580
Non-Hispanic blacks	15-16	*	.136 (<LOD-.163)	.303 (.237-.367)	.642 (.450-.848)	.901 (.695-1.18)	674
Non-Hispanic whites	11-12	.372 (.323-.428)	.364 (.294-.433)	.700 (.619-.805)	1.35 (1.05-1.63)	1.75 (1.41-2.48)	817
Non-Hispanic whites	13-14	.295 (.269-.323)	.278 (.257-.310)	.602 (.516-.689)	1.27 (1.08-1.45)	1.64 (1.46-1.82)	987
Non-Hispanic whites	15-16	*	<LOD	.349 (.300-.400)	.708 (.563-.886)	1.10 (.827-1.32)	932
All Hispanics	11-12	.369 (.342-.399)	.331 (.283-.384)	.674 (.612-.772)	1.24 (1.13-1.44)	1.86 (1.47-2.92)	574
All Hispanics	13-14	.267 (.237-.300)	.237 (.214-.273)	.541 (.448-.634)	1.07 (.837-1.36)	1.61 (1.24-1.86)	702
All Hispanics	15-16	*	<LOD	.348 (.284-.408)	.717 (.574-.917)	1.15 (.948-1.36)	985
Asians	11-12	.577 (.473-.705)	.562 (.467-.700)	1.16 (.872-1.44)	1.82 (1.54-2.00)	2.29 (1.90-3.12)	355
Asians	13-14	.488 (.422-.565)	.475 (.373-.600)	.917 (.779-1.06)	1.88 (1.35-2.19)	2.57 (1.88-4.24)	291
Asians	15-16	*	.290 (<LOD-.375)	.594 (.457-.706)	1.02 (.808-1.22)	1.38 (1.11-1.80)	333

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Mercury_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html

Urinary Molybdenum (2011 - 2016)†

CAS Number 7439-98-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	37.1 (35.1-39.1)	40.0 (37.6-42.2)	69.1 (64.9-74.8)	111 (102-123)	146 (140-160)	2504
Total population	13-14	33.9 (31.6-36.4)	36.0 (32.1-40.3)	68.0 (63.2-72.9)	105 (98.7-112)	139 (128-156)	2664
Total population	15-16	35.4 (33.4-37.6)	38.6 (36.5-41.8)	68.6 (64.7-73.5)	107 (103-112)	137 (127-149)	3060
Age 3-5 years	15-16	47.3 (43.9-50.8)	51.6 (45.8-61.1)	87.2 (81.7-94.8)	137 (114-155)	191 (146-218)	486
Age 6-11 years	11-12	58.4 (51.5-66.2)	65.1 (52.8-74.5)	116 (95.6-129)	168 (145-199)	211 (187-283)	399
Age 6-11 years	13-14	51.7 (47.1-56.6)	54.7 (49.3-61.9)	98.2 (82.2-105)	144 (130-164)	182 (159-210)	402
Age 6-11 years	15-16	56.2 (51.3-61.5)	57.5 (50.2-69.1)	109 (93.2-117)	157 (132-167)	173 (165-224)	379
Age 12-19 years	11-12	46.4 (40.2-53.7)	51.0 (44.2-61.8)	83.6 (70.1-97.7)	141 (106-153)	163 (145-173)	390
Age 12-19 years	13-14	48.2 (41.5-55.8)	55.9 (49.0-64.8)	89.3 (80.1-97.2)	128 (105-150)	156 (136-180)	451
Age 12-19 years	15-16	47.7 (43.3-52.6)	53.0 (45.9-57.0)	86.1 (74.2-97.7)	127 (109-143)	149 (135-166)	402
Age 20+ years	11-12	34.1 (31.8-36.5)	37.3 (33.6-39.8)	63.6 (59.2-69.2)	101 (92.9-109)	136 (120-146)	1715
Age 20+ years	13-14	30.8 (28.5-33.3)	32.7 (28.3-36.0)	61.6 (55.9-67.4)	95.4 (89.3-99.4)	129 (116-137)	1811
Age 20+ years	15-16	32.0 (29.9-34.1)	35.9 (33.1-37.8)	61.9 (57.6-66.7)	99.3 (92.9-105)	124 (112-136)	1793
Males	11-12	42.5 (38.6-46.9)	45.9 (39.7-52.6)	77.1 (71.2-84.0)	122 (105-135)	146 (136-173)	1262
Males	13-14	37.9 (35.2-40.9)	41.3 (38.0-45.9)	73.9 (68.4-79.2)	113 (104-127)	152 (134-173)	1318
Males	15-16	39.7 (37.1-42.4)	43.6 (39.8-47.3)	77.6 (70.5-82.5)	115 (106-125)	144 (130-157)	1524
Females	11-12	32.5 (30.0-35.2)	33.7 (30.5-38.7)	61.5 (57.7-66.9)	102 (92.9-117)	148 (121-170)	1242
Females	13-14	30.4 (28.2-32.8)	31.7 (26.8-36.0)	62.6 (56.0-67.2)	96.3 (87.1-105)	129 (115-142)	1346
Females	15-16	31.8 (28.8-35.1)	34.9 (29.9-39.1)	60.4 (55.8-66.7)	102 (90.6-109)	128 (112-156)	1536
Mexican Americans	11-12	44.1 (39.8-49.0)	49.4 (41.6-52.9)	78.8 (72.1-87.0)	117 (102-146)	167 (136-214)	317
Mexican Americans	13-14	40.9 (34.4-48.7)	43.7 (34.8-55.7)	79.3 (64.6-90.8)	119 (96.6-149)	161 (133-205)	453
Mexican Americans	15-16	43.4 (40.0-47.1)	47.5 (42.5-55.4)	78.2 (70.4-94.4)	123 (103-136)	149 (123-188)	585
Non-Hispanic blacks	11-12	44.4 (41.3-47.7)	48.6 (44.6-51.8)	78.5 (70.8-89.4)	125 (110-139)	158 (138-177)	669
Non-Hispanic blacks	13-14	43.8 (39.0-49.2)	49.3 (40.6-55.9)	79.6 (70.0-89.3)	116 (105-132)	150 (124-182)	581
Non-Hispanic blacks	15-16	43.8 (39.6-48.3)	48.4 (42.7-54.5)	77.2 (67.0-92.9)	123 (110-146)	162 (131-217)	671
Non-Hispanic whites	11-12	33.8 (31.4-36.4)	36.9 (32.0-40.2)	64.4 (59.4-69.4)	103 (94.2-117)	141 (125-146)	820
Non-Hispanic whites	13-14	30.5 (27.5-33.8)	32.1 (26.5-37.4)	63.0 (54.7-68.4)	96.7 (88.9-105)	129 (113-143)	985
Non-Hispanic whites	15-16	32.3 (29.8-35.0)	35.8 (32.2-38.1)	61.1 (56.4-67.5)	100 (93.2-107)	125 (114-137)	924
All Hispanics	11-12	43.3 (38.9-48.2)	47.6 (40.2-53.7)	81.4 (70.5-90.3)	123 (113-141)	167 (145-184)	573
All Hispanics	13-14	39.8 (34.7-45.7)	42.5 (34.3-52.5)	78.2 (68.4-86.4)	115 (98.0-134)	150 (134-183)	701
All Hispanics	15-16	41.5 (38.9-44.2)	44.8 (40.7-49.6)	76.9 (72.2-84.2)	116 (107-128)	149 (133-165)	982
Asians	11-12	44.2 (38.8-50.4)	49.7 (44.0-55.2)	83.0 (72.0-95.9)	124 (106-157)	166 (126-227)	353
Asians	13-14	36.0 (31.3-41.4)	34.9 (31.2-40.5)	70.0 (56.1-77.6)	127 (99.4-166)	196 (133-259)	292
Asians	15-16	37.4 (33.6-41.7)	41.3 (35.1-46.6)	76.7 (67.9-87.0)	121 (98.5-136)	145 (129-169)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.990, 0.800, and 0.800 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Molybdenum_BiomonitoringSummary.html

Urinary Molybdenum (creatinine corrected) (2011 - 2016)†

CAS Number 7439-98-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	42.0 (40.4-43.6)	41.0 (38.6-44.4)	62.9 (61.2-65.5)	95.1 (90.9-101)	130 (118-148)	2502
Total population	13-14	39.1 (37.3-41.1)	39.4 (37.5-41.0)	59.3 (57.1-62.2)	86.9 (83.7-92.5)	117 (108-125)	2663
Total population	15-16	39.8 (38.1-41.5)	40.0 (37.6-42.3)	60.0 (57.4-63.3)	92.2 (86.1-98.4)	123 (114-126)	3057
Age 3-5 years	15-16	109 (102-116)	107 (98.4-117)	148 (137-176)	227 (212-250)	275 (239-329)	485
Age 6-11 years	11-12	83.5 (76.1-91.6)	81.7 (74.3-91.2)	120 (110-129)	178 (146-240)	259 (185-300)	398
Age 6-11 years	13-14	77.0 (73.5-80.8)	73.5 (70.0-81.4)	106 (98.4-117)	153 (129-172)	184 (164-225)	402
Age 6-11 years	15-16	79.7 (75.5-84.1)	79.6 (69.9-86.7)	112 (101-124)	156 (132-190)	200 (171-229)	379
Age 12-19 years	11-12	44.4 (40.8-48.4)	43.7 (39.1-48.0)	62.0 (57.8-65.9)	90.4 (76.5-94.8)	109 (92.4-131)	390
Age 12-19 years	13-14	43.6 (40.3-47.2)	44.0 (39.1-47.3)	63.2 (59.9-70.8)	90.2 (74.7-107)	113 (95.9-140)	451
Age 12-19 years	15-16	44.6 (41.9-47.5)	45.0 (41.8-48.7)	61.6 (58.1-65.7)	86.6 (74.6-103)	107 (89.3-133)	402
Age 20+ years	11-12	38.6 (37.1-40.2)	38.5 (36.1-41.0)	57.9 (53.9-61.2)	85.0 (79.5-89.3)	112 (102-123)	1714
Age 20+ years	13-14	35.9 (33.7-38.2)	36.9 (35.1-38.4)	53.4 (50.4-57.1)	79.7 (73.4-83.7)	97.8 (88.5-111)	1810
Age 20+ years	15-16	34.9 (33.3-36.6)	36.3 (34.4-38.1)	52.1 (49.3-55.5)	76.0 (70.3-79.7)	94.7 (85.8-102)	1791
Males	11-12	39.8 (37.5-42.2)	40.0 (36.0-43.6)	59.5 (56.1-62.9)	88.2 (84.7-96.7)	118 (108-131)	1261
Males	13-14	37.9 (35.4-40.6)	38.0 (35.7-40.3)	58.7 (54.5-62.5)	87.7 (82.3-96.4)	119 (104-128)	1317
Males	15-16	37.7 (35.2-40.3)	37.2 (35.7-38.9)	57.1 (53.9-61.6)	88.5 (82.1-97.6)	116 (104-126)	1524
Females	11-12	44.2 (41.5-47.0)	43.3 (39.2-45.5)	67.1 (62.8-69.7)	102 (92.4-111)	149 (118-157)	1241
Females	13-14	40.4 (38.3-42.6)	40.5 (38.4-43.3)	60.6 (57.1-64.6)	86.8 (82.1-94.4)	116 (104-125)	1346
Females	15-16	41.9 (39.4-44.5)	42.3 (38.7-46.2)	63.0 (58.4-69.1)	95.3 (86.2-106)	126 (114-133)	1533
Mexican Americans	11-12	49.6 (43.1-57.1)	48.9 (43.0-56.0)	72.8 (63.6-85.3)	114 (85.7-149)	164 (114-224)	317
Mexican Americans	13-14	46.7 (41.1-53.1)	45.7 (39.0-52.4)	66.9 (60.3-73.0)	103 (83.6-123)	136 (111-205)	453
Mexican Americans	15-16	47.4 (44.2-50.9)	47.8 (43.7-52.2)	68.0 (62.6-76.3)	107 (91.0-118)	130 (118-145)	584
Non-Hispanic blacks	11-12	34.5 (32.1-37.1)	34.0 (32.0-36.1)	52.4 (48.0-58.3)	80.7 (70.7-91.7)	104 (87.4-120)	669
Non-Hispanic blacks	13-14	33.4 (32.1-34.7)	33.7 (31.4-36.6)	50.1 (46.7-52.9)	74.1 (64.2-81.3)	89.1 (80.9-110)	581
Non-Hispanic blacks	15-16	34.8 (31.9-37.9)	34.5 (31.3-38.6)	53.5 (47.6-58.8)	83.3 (70.7-96.7)	113 (93.3-134)	669
Non-Hispanic whites	11-12	40.8 (38.4-43.4)	40.0 (37.0-44.6)	61.3 (57.2-64.6)	91.6 (84.9-101)	118 (109-148)	818
Non-Hispanic whites	13-14	37.5 (35.0-40.2)	38.2 (36.1-40.7)	58.2 (53.4-62.8)	84.9 (79.7-91.9)	108 (97.2-119)	984
Non-Hispanic whites	15-16	38.0 (35.8-40.5)	38.1 (36.1-41.3)	57.4 (53.8-61.7)	85.8 (80.8-91.7)	111 (99.0-124)	924
All Hispanics	11-12	48.5 (44.5-52.8)	48.7 (44.4-51.9)	71.5 (65.5-76.8)	105 (90.4-122)	146 (112-181)	573
All Hispanics	13-14	44.4 (40.7-48.6)	44.1 (38.8-48.1)	64.6 (60.3-69.7)	98.0 (85.4-108)	128 (112-160)	701
All Hispanics	15-16	46.9 (44.7-49.3)	47.8 (44.5-50.3)	67.7 (63.9-73.2)	105 (95.0-115)	131 (123-142)	981
Asians	11-12	59.1 (54.2-64.5)	59.5 (51.6-65.2)	91.5 (81.6-102)	158 (137-174)	202 (163-248)	353
Asians	13-14	56.4 (50.3-63.2)	51.8 (46.6-56.8)	85.1 (69.2-109)	165 (122-184)	197 (166-292)	292
Asians	15-16	51.1 (46.0-56.8)	49.6 (43.6-56.4)	73.4 (67.3-85.6)	120 (105-142)	165 (132-199)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Molybdenum_BiomonitoringSummary.html

Blood Selenium (2011 - 2016)

CAS Number 7782-49-2

Geometric mean and selected percentiles of blood concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	190 (187-193)	190 (187-193)	206 (203-210)	223 (219-228)	236 (231-241)	7920
Total population	13-14	193 (191-195)	193 (190-195)	208 (205-210)	223 (220-228)	235 (232-239)	5215
Total population	15-16	191 (187-195)	191 (187-195)	206 (202-210)	223 (218-226)	233 (227-242)	4987
Age 1-5 years	11-12	167 (164-171)	167 (163-172)	181 (175-187)	196 (187-201)	201 (197-207)	713
Age 1-5 years	13-14	168 (166-171)	169 (166-172)	180 (177-183)	192 (187-197)	201 (196-205)	818
Age 1-5 years	15-16	167 (163-170)	167 (164-170)	179 (175-183)	190 (186-194)	198 (191-206)	790
Age 6-11 years	11-12	176 (172-180)	177 (172-181)	189 (185-193)	201 (197-206)	208 (205-215)	1048
Age 6-11 years	13-14	180 (177-183)	180 (176-183)	191 (187-195)	204 (198-210)	212 (205-218)	1075
Age 6-11 years	15-16	177 (174-180)	177 (174-181)	190 (186-194)	201 (196-205)	209 (201-213)	1023
Age 12-19 years	11-12	189 (184-193)	189 (182-194)	206 (198-211)	220 (212-231)	232 (221-245)	1129
Age 12-19 years	13-14	191 (188-194)	192 (188-194)	204 (200-208)	218 (212-222)	224 (220-231)	627
Age 12-19 years	15-16	192 (188-196)	192 (188-195)	207 (202-210)	221 (215-227)	228 (221-235)	565
Age 20 + years	11-12	193 (190-196)	193 (190-196)	209 (205-213)	227 (222-231)	238 (233-243)	5030
Age 20 + years	13-14	196 (194-198)	196 (193-198)	210 (207-213)	227 (222-232)	238 (235-242)	2695
Age 20 + years	15-16	194 (190-198)	193 (189-198)	208 (203-212)	224 (219-230)	237 (230-243)	2609
Males	11-12	192 (189-195)	192 (188-195)	208 (204-213)	227 (221-232)	238 (232-243)	3968
Males	13-14	195 (192-197)	195 (193-197)	209 (206-213)	225 (220-231)	235 (230-242)	2587
Males	15-16	193 (189-196)	193 (190-196)	207 (203-211)	224 (218-229)	235 (227-244)	2488
Females	11-12	188 (185-191)	188 (186-191)	204 (201-207)	220 (218-224)	233 (227-240)	3952
Females	13-14	191 (189-193)	190 (187-193)	205 (202-208)	222 (218-225)	235 (231-238)	2628
Females	15-16	189 (185-193)	189 (184-194)	205 (201-209)	221 (214-226)	232 (225-240)	2499
Mexican Americans	11-12	189 (184-194)	189 (183-195)	205 (200-209)	220 (217-223)	229 (224-233)	1077
Mexican Americans	13-14	191 (188-195)	192 (186-197)	206 (201-210)	221 (214-228)	232 (223-234)	969
Mexican Americans	15-16	189 (183-195)	189 (183-197)	204 (198-213)	219 (213-225)	228 (220-237)	994
Non-Hispanic blacks	11-12	184 (181-187)	183 (180-187)	199 (196-202)	216 (211-220)	226 (220-233)	2195
Non-Hispanic blacks	13-14	190 (187-193)	190 (187-193)	204 (201-209)	222 (219-225)	232 (225-238)	1119
Non-Hispanic blacks	15-16	187 (183-190)	185 (181-190)	201 (196-205)	217 (212-221)	228 (221-235)	1070
Non-Hispanic whites	11-12	192 (188-196)	192 (188-196)	208 (204-213)	227 (220-232)	238 (231-245)	2493
Non-Hispanic whites	13-14	194 (191-196)	194 (191-196)	208 (204-211)	224 (219-230)	236 (232-240)	1848
Non-Hispanic whites	15-16	193 (189-197)	193 (189-198)	207 (203-211)	224 (218-228)	234 (227-242)	1510
All Hispanics	11-12	187 (183-191)	188 (183-192)	203 (198-208)	218 (214-222)	228 (223-234)	1931
All Hispanics	13-14	191 (189-194)	192 (187-196)	206 (203-209)	222 (217-225)	231 (227-234)	1481
All Hispanics	15-16	187 (182-191)	187 (183-192)	202 (197-209)	217 (211-222)	227 (220-234)	1664
Asians	11-12	193 (189-197)	192 (188-196)	210 (204-215)	227 (223-235)	243 (233-253)	1005
Asians	13-14	196 (192-201)	194 (189-200)	212 (206-221)	234 (224-245)	251 (237-264)	510
Asians	15-16	194 (188-200)	194 (188-199)	210 (201-217)	229 (219-242)	246 (234-269)	479

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 30.0, 24.5, and 24.5 respectively.

Serum Selenium (2011 - 2016)

CAS Number 7782-49-2

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	127 (125-130)	127 (124-130)	139 (136-142)	151 (148-155)	161 (156-164)	2329
Total population	13-14	128 (126-130)	127 (126-130)	139 (137-142)	151 (149-153)	159 (156-161)	2519
Total population	15-16	127 (125-129)	127 (125-128)	137 (135-139)	149 (146-151)	155 (152-157)	2436
Age 6-11 years	11-12	117 (115-119)	118 (115-120)	128 (124-130)	133 (132-136)	138 (135-140)	316
Age 6-11 years	13-14	118 (115-120)	117 (114-121)	127 (123-131)	135 (130-142)	142 (136-144)	339
Age 6-11 years	15-16	117 (115-119)	118 (116-120)	126 (123-127)	131 (129-135)	139 (132-143)	321
Age 12-19 years	11-12	125 (122-128)	124 (121-127)	136 (130-139)	145 (139-153)	154 (143-178)	366
Age 12-19 years	13-14	124 (121-127)	123 (120-126)	134 (128-141)	146 (139-151)	151 (144-157)	418
Age 12-19 years	15-16	124 (121-126)	123 (120-127)	134 (130-137)	144 (139-149)	151 (144-154)	371
Age 20+ years	11-12	129 (126-132)	129 (125-132)	141 (138-144)	153 (149-157)	163 (158-166)	1647
Age 20+ years	13-14	129 (127-131)	129 (127-131)	141 (138-144)	153 (151-154)	161 (157-162)	1762
Age 20+ years	15-16	128 (126-130)	128 (127-130)	138 (136-140)	150 (148-152)	156 (153-158)	1744
Males	11-12	129 (127-132)	129 (126-132)	142 (138-145)	153 (147-162)	163 (155-167)	1162
Males	13-14	130 (128-132)	130 (127-132)	144 (141-146)	153 (151-156)	161 (157-162)	1235
Males	15-16	130 (128-132)	129 (127-131)	139 (136-143)	152 (148-154)	157 (154-164)	1201
Females	11-12	125 (123-128)	125 (122-129)	137 (134-141)	149 (145-154)	158 (151-166)	1167
Females	13-14	125 (124-127)	126 (123-128)	136 (134-139)	147 (145-149)	154 (152-159)	1284
Females	15-16	124 (122-127)	124 (122-127)	135 (133-137)	145 (141-149)	152 (148-156)	1235
Mexican Americans	11-12	126 (124-128)	124 (122-127)	137 (134-140)	151 (142-157)	157 (153-163)	285
Mexican Americans	13-14	129 (125-134)	128 (124-135)	140 (136-146)	153 (147-159)	159 (152-165)	431
Mexican Americans	15-16	126 (123-129)	127 (124-130)	137 (133-140)	148 (142-151)	153 (149-160)	464
Non-Hispanic blacks	11-12	122 (120-124)	122 (119-124)	132 (130-134)	143 (139-145)	149 (145-157)	620
Non-Hispanic blacks	13-14	124 (122-127)	124 (122-127)	135 (131-138)	147 (140-152)	153 (150-160)	516
Non-Hispanic blacks	15-16	124 (121-127)	124 (120-128)	134 (132-137)	145 (140-149)	150 (147-157)	494
Non-Hispanic whites	11-12	129 (126-133)	129 (125-133)	142 (138-145)	154 (149-158)	163 (158-167)	780
Non-Hispanic whites	13-14	128 (125-130)	128 (125-130)	140 (136-143)	151 (148-153)	158 (154-161)	975
Non-Hispanic whites	15-16	128 (126-130)	128 (126-130)	138 (136-141)	151 (147-152)	155 (152-157)	764
All Hispanics	11-12	125 (123-126)	123 (122-125)	135 (131-140)	149 (144-153)	157 (151-163)	525
All Hispanics	13-14	129 (126-132)	129 (125-134)	141 (138-145)	153 (148-156)	159 (155-163)	666
All Hispanics	15-16	125 (123-128)	126 (123-127)	135 (133-138)	146 (142-150)	153 (149-159)	798
Asians	11-12	126 (123-129)	124 (120-128)	137 (135-140)	152 (143-158)	158 (152-171)	323
Asians	13-14	130 (126-134)	129 (124-133)	142 (137-147)	159 (151-170)	172 (159-182)	267
Asians	15-16	126 (123-129)	125 (122-127)	136 (133-138)	150 (142-159)	162 (152-176)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 4.50, 4.50, and 4.50 respectively.

Urinary Strontium (2011 - 2016)†

CAS Number 7440-24-6

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	85.8 (80.8-91.1)	90.5 (82.6-98.2)	167 (156-176)	249 (229-269)	321 (288-352)	2503
Total population	13-14	81.2 (77.6-85.1)	88.1 (83.3-92.7)	151 (142-157)	231 (216-244)	299 (267-342)	2664
Total population	15-16	85.5 (79.8-91.6)	96.3 (89.3-104)	161 (151-172)	235 (222-259)	299 (282-328)	3061
Age 3-5 years	15-16	53.7 (49.0-58.9)	61.4 (53.8-71.6)	122 (112-132)	190 (151-209)	218 (200-264)	486
Age 6-11 years	11-12	81.9 (69.7-96.2)	91.7 (72.8-106)	179 (135-226)	285 (236-319)	349 (265-466)	399
Age 6-11 years	13-14	66.6 (58.6-75.6)	77.8 (67.4-89.2)	133 (119-150)	195 (156-230)	232 (198-255)	402
Age 6-11 years	15-16	74.5 (66.4-83.5)	87.3 (66.1-104)	144 (128-168)	207 (185-233)	253 (207-333)	379
Age 12-19 years	11-12	96.8 (82.3-114)	101 (86.4-128)	185 (160-215)	296 (226-348)	350 (274-426)	390
Age 12-19 years	13-14	98.1 (85.0-113)	117 (96.6-138)	184 (173-199)	285 (245-311)	369 (294-383)	451
Age 12-19 years	15-16	89.2 (77.3-103)	99.5 (81.4-118)	192 (146-223)	277 (241-333)	349 (304-378)	402
Age 20+ years	11-12	84.6 (79.5-90.1)	87.8 (79.9-95.5)	160 (154-171)	239 (222-262)	307 (271-346)	1714
Age 20+ years	13-14	80.7 (76.3-85.3)	86.0 (81.3-90.6)	145 (134-154)	226 (209-244)	298 (260-348)	1811
Age 20+ years	15-16	87.9 (81.6-94.8)	97.5 (90.4-108)	162 (151-174)	234 (220-259)	299 (280-339)	1794
Males	11-12	95.8 (88.7-103)	102 (95.6-114)	172 (157-189)	255 (215-291)	307 (277-358)	1262
Males	13-14	87.8 (82.5-93.4)	94.8 (88.0-102)	158 (147-176)	235 (219-256)	312 (273-344)	1318
Males	15-16	94.7 (88.7-101)	107 (95.3-121)	172 (162-177)	250 (228-278)	311 (285-347)	1524
Females	11-12	77.2 (71.5-83.4)	78.3 (72.4-85.2)	156 (140-173)	243 (221-270)	331 (276-355)	1241
Females	13-14	75.4 (71.0-80.1)	79.2 (75.8-84.5)	141 (130-151)	221 (190-251)	286 (253-368)	1346
Females	15-16	77.6 (70.5-85.4)	86.5 (76.5-96.2)	149 (142-161)	226 (214-245)	283 (249-344)	1537
Mexican Americans	11-12	85.8 (76.0-96.8)	89.4 (76.1-103)	189 (165-200)	258 (228-266)	302 (260-345)	317
Mexican Americans	13-14	93.0 (80.8-107)	97.0 (83.7-111)	165 (144-201)	248 (209-328)	339 (254-443)	453
Mexican Americans	15-16	83.5 (73.3-95.1)	92.6 (78.4-109)	167 (145-184)	260 (218-312)	329 (270-431)	585
Non-Hispanic blacks	11-12	74.9 (68.0-82.4)	82.8 (75.8-91.3)	143 (132-160)	221 (194-239)	269 (239-298)	669
Non-Hispanic blacks	13-14	73.8 (68.7-79.2)	82.0 (77.1-92.4)	132 (123-147)	213 (178-235)	255 (232-292)	581
Non-Hispanic blacks	15-16	76.2 (67.7-85.8)	87.3 (80.4-92.5)	147 (135-168)	225 (201-261)	294 (261-339)	671
Non-Hispanic whites	11-12	87.2 (80.4-94.6)	91.1 (81.0-100)	169 (154-180)	256 (214-296)	343 (278-391)	819
Non-Hispanic whites	13-14	79.8 (75.0-84.8)	85.6 (79.9-92.3)	149 (137-157)	223 (206-251)	298 (254-363)	985
Non-Hispanic whites	15-16	88.1 (79.3-97.8)	97.8 (87.9-111)	160 (146-176)	232 (210-262)	287 (262-354)	924
All Hispanics	11-12	85.6 (74.8-98.0)	89.4 (77.8-108)	170 (151-198)	246 (221-262)	289 (260-325)	573
All Hispanics	13-14	90.3 (80.5-101)	97.0 (87.0-106)	164 (149-189)	246 (223-278)	326 (255-390)	701
All Hispanics	15-16	81.9 (73.2-91.7)	94.3 (78.2-110)	164 (147-180)	250 (217-286)	312 (274-356)	982
Asians	11-12	97.0 (85.7-110)	98.4 (84.8-121)	187 (161-206)	280 (239-303)	343 (288-384)	353
Asians	13-14	85.5 (72.5-101)	93.0 (80.1-105)	159 (132-189)	290 (189-383)	372 (241-534)	292
Asians	15-16	87.6 (80.7-95.2)	94.5 (86.1-104)	165 (144-180)	268 (191-301)	302 (270-398)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.50, 2.34, and 2.34 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Strontium (creatinine corrected) (2011 - 2016)†

CAS Number 7440-24-6

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	97.2 (90.1-105)	99.7 (91.4-110)	156 (143-174)	240 (221-258)	320 (287-341)	2501
Total population	13-14	93.9 (88.6-99.5)	100 (93.2-105)	150 (142-158)	225 (194-254)	287 (255-324)	2663
Total population	15-16	96.0 (91.8-100)	102 (97.0-107)	153 (147-159)	214 (204-232)	278 (256-295)	3058
Age 3-5 years	15-16	124 (111-137)	135 (120-160)	232 (199-264)	344 (302-368)	424 (346-487)	485
Age 6-11 years	11-12	118 (104-133)	124 (105-150)	222 (185-245)	288 (271-338)	354 (299-507)	398
Age 6-11 years	13-14	99.3 (84.0-117)	113 (87.2-136)	181 (151-224)	254 (224-303)	303 (255-316)	402
Age 6-11 years	15-16	106 (95.5-117)	117 (104-129)	170 (149-217)	256 (194-319)	296 (247-359)	379
Age 12-19 years	11-12	92.6 (79.6-108)	95.3 (73.9-119)	150 (122-172)	221 (175-248)	279 (228-320)	390
Age 12-19 years	13-14	88.8 (83.7-94.2)	94.9 (88.0-104)	141 (129-151)	203 (181-227)	232 (207-270)	451
Age 12-19 years	15-16	83.4 (75.3-92.3)	89.5 (83.2-103)	133 (117-146)	177 (162-203)	239 (193-263)	402
Age 20+ years	11-12	95.9 (89.0-103)	98.6 (91.0-109)	155 (140-171)	233 (213-255)	315 (278-346)	1713
Age 20+ years	13-14	94.1 (88.5-100)	100 (92.4-105)	148 (140-157)	223 (193-256)	294 (255-339)	1810
Age 20+ years	15-16	96.0 (91.9-100)	101 (95.7-105)	152 (146-159)	210 (197-221)	266 (243-295)	1792
Males	11-12	89.5 (82.2-97.5)	91.8 (86.2-101)	142 (130-159)	210 (190-237)	275 (239-314)	1261
Males	13-14	87.9 (83.7-92.2)	93.4 (87.8-100)	139 (130-150)	199 (181-228)	253 (207-294)	1317
Males	15-16	89.9 (86.0-94.0)	93.6 (89.2-98.7)	146 (138-153)	201 (193-210)	256 (235-285)	1524
Females	11-12	105 (96.6-114)	110 (98.5-117)	178 (152-203)	261 (237-313)	346 (315-371)	1240
Females	13-14	100 (92.5-108)	105 (95.4-113)	159 (150-171)	244 (216-288)	325 (278-390)	1346
Females	15-16	102 (95.5-109)	109 (105-117)	160 (149-170)	232 (213-249)	291 (266-338)	1534
Mexican Americans	11-12	96.5 (88.0-106)	103 (90.3-113)	152 (137-181)	233 (200-274)	283 (258-316)	317
Mexican Americans	13-14	106 (90.8-124)	106 (93.0-125)	173 (140-209)	255 (198-303)	295 (249-402)	453
Mexican Americans	15-16	91.4 (81.4-103)	97.4 (86.0-114)	156 (128-186)	230 (196-269)	284 (236-346)	584
Non-Hispanic blacks	11-12	58.2 (53.8-63.0)	64.7 (60.3-68.3)	97.8 (89.3-108)	143 (130-160)	172 (149-216)	669
Non-Hispanic blacks	13-14	56.1 (51.9-60.7)	60.4 (55.3-65.1)	91.7 (82.6-104)	135 (125-160)	187 (150-220)	581
Non-Hispanic blacks	15-16	60.4 (55.9-65.3)	65.2 (56.8-70.9)	105 (93.9-119)	153 (141-177)	203 (172-228)	669
Non-Hispanic whites	11-12	105 (94.3-118)	109 (95.1-118)	168 (148-200)	255 (235-295)	341 (313-367)	817
Non-Hispanic whites	13-14	98.5 (93.0-104)	104 (97.7-110)	150 (142-159)	223 (193-255)	286 (251-314)	984
Non-Hispanic whites	15-16	104 (96.8-111)	108 (100-114)	157 (147-168)	213 (195-238)	277 (247-311)	924
All Hispanics	11-12	95.8 (87.5-105)	102 (92.4-112)	150 (136-172)	213 (195-240)	274 (222-315)	573
All Hispanics	13-14	101 (86.9-117)	103 (89.4-122)	163 (136-198)	248 (195-291)	293 (237-402)	701
All Hispanics	15-16	92.8 (83.7-103)	98.7 (88.2-110)	153 (132-176)	238 (201-274)	295 (251-345)	981
Asians	11-12	130 (120-141)	132 (117-142)	197 (179-217)	295 (246-336)	405 (314-474)	353
Asians	13-14	134 (121-148)	141 (120-156)	216 (182-265)	349 (274-395)	431 (359-457)	292
Asians	15-16	120 (107-135)	126 (111-136)	198 (171-222)	301 (247-376)	388 (328-459)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Thallium (2011 - 2016)†

CAS Number 7440-28-0

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.149 (.138-.160)	.157 (.144-.169)	.255 (.232-.278)	.361 (.334-.377)	.434 (.379-.521)	2504
Total population	13-14	.141 (.132-.150)	.154 (.139-.163)	.248 (.228-.266)	.349 (.338-.370)	.421 (.414-.438)	2664
Total population	15-16	.153 (.143-.163)	.161 (.149-.177)	.255 (.234-.275)	.362 (.330-.385)	.435 (.403-.466)	3061
Age 3-5 years	15-16	.150 (.137-.163)	.159 (.142-.178)	.251 (.218-.275)	.347 (.315-.388)	.432 (.353-.500)	486
Age 6-11 years	11-12	.157 (.143-.172)	.157 (.136-.195)	.272 (.232-.308)	.365 (.330-.474)	.509 (.372-.629)	399
Age 6-11 years	13-14	.149 (.131-.170)	.163 (.146-.173)	.259 (.221-.282)	.364 (.331-.400)	.438 (.367-.577)	402
Age 6-11 years	15-16	.168 (.151-.186)	.172 (.150-.209)	.276 (.234-.306)	.363 (.314-.420)	.452 (.369-.574)	379
Age 12-19 years	11-12	.155 (.131-.184)	.169 (.141-.196)	.288 (.240-.301)	.376 (.320-.403)	.447 (.387-.545)	390
Age 12-19 years	13-14	.160 (.136-.188)	.170 (.154-.191)	.274 (.224-.334)	.400 (.324-.507)	.495 (.384-.562)	451
Age 12-19 years	15-16	.168 (.150-.187)	.186 (.163-.203)	.248 (.221-.300)	.368 (.295-.428)	.437 (.368-.515)	402
Age 20+ years	11-12	.147 (.136-.159)	.155 (.142-.167)	.247 (.223-.274)	.356 (.324-.377)	.431 (.375-.520)	1715
Age 20+ years	13-14	.137 (.129-.146)	.150 (.136-.161)	.241 (.222-.262)	.340 (.326-.364)	.417 (.398-.426)	1811
Age 20+ years	15-16	.149 (.140-.160)	.157 (.144-.173)	.255 (.234-.268)	.358 (.328-.379)	.433 (.395-.464)	1794
Males	11-12	.165 (.150-.181)	.173 (.151-.195)	.272 (.239-.301)	.369 (.343-.387)	.431 (.381-.524)	1262
Males	13-14	.147 (.136-.159)	.161 (.151-.171)	.258 (.231-.274)	.356 (.325-.381)	.422 (.400-.455)	1318
Males	15-16	.163 (.155-.172)	.181 (.168-.195)	.267 (.248-.288)	.366 (.334-.394)	.440 (.394-.477)	1524
Females	11-12	.135 (.122-.148)	.141 (.131-.155)	.237 (.208-.260)	.348 (.304-.376)	.434 (.367-.522)	1242
Females	13-14	.135 (.125-.145)	.143 (.127-.160)	.241 (.214-.262)	.348 (.328-.373)	.421 (.398-.443)	1346
Females	15-16	.143 (.131-.156)	.146 (.132-.163)	.236 (.208-.262)	.352 (.311-.385)	.432 (.388-.470)	1537
Mexican Americans	11-12	.142 (.135-.150)	.162 (.143-.174)	.231 (.210-.248)	.298 (.268-.321)	.344 (.306-.381)	317
Mexican Americans	13-14	.139 (.127-.154)	.157 (.137-.175)	.247 (.206-.274)	.324 (.285-.387)	.414 (.324-.511)	453
Mexican Americans	15-16	.162 (.145-.181)	.180 (.150-.210)	.270 (.247-.288)	.349 (.309-.406)	.419 (.349-.492)	585
Non-Hispanic blacks	11-12	.176 (.150-.206)	.184 (.158-.214)	.294 (.244-.364)	.431 (.370-.503)	.524 (.429-.657)	669
Non-Hispanic blacks	13-14	.172 (.156-.189)	.190 (.170-.213)	.271 (.241-.301)	.356 (.325-.380)	.415 (.375-.433)	581
Non-Hispanic blacks	15-16	.170 (.156-.186)	.183 (.171-.197)	.279 (.260-.296)	.364 (.338-.393)	.443 (.414-.494)	671
Non-Hispanic whites	11-12	.143 (.133-.155)	.149 (.135-.166)	.245 (.218-.277)	.353 (.322-.372)	.412 (.367-.522)	820
Non-Hispanic whites	13-14	.132 (.120-.145)	.139 (.121-.161)	.235 (.203-.265)	.340 (.318-.370)	.419 (.392-.440)	985
Non-Hispanic whites	15-16	.143 (.132-.155)	.151 (.139-.166)	.236 (.209-.259)	.336 (.298-.379)	.414 (.369-.459)	924
All Hispanics	11-12	.145 (.134-.157)	.158 (.148-.169)	.237 (.219-.257)	.305 (.289-.340)	.381 (.326-.438)	573
All Hispanics	13-14	.144 (.130-.160)	.160 (.138-.178)	.251 (.220-.272)	.340 (.291-.382)	.417 (.365-.473)	701
All Hispanics	15-16	.159 (.148-.170)	.174 (.157-.197)	.263 (.248-.280)	.351 (.319-.394)	.419 (.388-.466)	982
Asians	11-12	.177 (.160-.197)	.183 (.163-.214)	.292 (.255-.319)	.417 (.372-.489)	.541 (.431-.664)	353
Asians	13-14	.154 (.140-.169)	.159 (.134-.184)	.268 (.239-.310)	.414 (.368-.438)	.502 (.421-.662)	292
Asians	15-16	.190 (.175-.206)	.213 (.189-.241)	.348 (.306-.371)	.483 (.413-.543)	.551 (.514-.595)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.020, 0.018, and 0.018 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Thallium_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Thallium_FactSheet.html

Urinary Thallium (creatinine corrected) (2011 - 2016)†

CAS Number 7440-28-0

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.168 (.157-.180)	.167 (.156-.178)	.235 (.216-.253)	.337 (.310-.365)	.425 (.369-.497)	2502
Total population	13-14	.162 (.155-.171)	.161 (.151-.169)	.236 (.228-.245)	.338 (.321-.351)	.429 (.405-.444)	2663
Total population	15-16	.171 (.163-.181)	.169 (.158-.180)	.243 (.226-.270)	.348 (.321-.384)	.432 (.402-.471)	3058
Age 3-5 years	15-16	.344 (.330-.358)	.342 (.328-.358)	.474 (.436-.507)	.643 (.587-.717)	.850 (.682-.972)	485
Age 6-11 years	11-12	.223 (.209-.238)	.216 (.200-.241)	.301 (.275-.336)	.395 (.371-.440)	.486 (.422-.568)	398
Age 6-11 years	13-14	.222 (.199-.249)	.227 (.215-.255)	.318 (.279-.360)	.429 (.386-.458)	.502 (.457-.537)	402
Age 6-11 years	15-16	.238 (.223-.253)	.232 (.216-.257)	.335 (.312-.359)	.450 (.418-.496)	.524 (.485-.593)	379
Age 12-19 years	11-12	.149 (.134-.165)	.147 (.130-.169)	.200 (.180-.218)	.276 (.235-.321)	.339 (.268-.500)	390
Age 12-19 years	13-14	.145 (.133-.158)	.141 (.131-.160)	.213 (.182-.231)	.276 (.237-.301)	.315 (.283-.361)	451
Age 12-19 years	15-16	.157 (.145-.169)	.161 (.144-.175)	.222 (.191-.244)	.290 (.262-.329)	.351 (.289-.410)	402
Age 20+ years	11-12	.166 (.155-.179)	.164 (.154-.175)	.233 (.212-.250)	.333 (.298-.367)	.436 (.365-.510)	1714
Age 20+ years	13-14	.160 (.153-.168)	.157 (.148-.165)	.229 (.222-.241)	.333 (.313-.352)	.429 (.394-.457)	1810
Age 20+ years	15-16	.163 (.153-.174)	.159 (.148-.173)	.231 (.207-.256)	.323 (.288-.362)	.400 (.358-.444)	1792
Males	11-12	.154 (.142-.167)	.155 (.144-.165)	.211 (.197-.233)	.292 (.258-.326)	.353 (.312-.385)	1261
Males	13-14	.147 (.137-.158)	.141 (.133-.150)	.206 (.194-.222)	.295 (.272-.315)	.368 (.341-.414)	1317
Males	15-16	.155 (.145-.166)	.150 (.138-.167)	.220 (.199-.247)	.322 (.298-.348)	.396 (.358-.449)	1524
Females	11-12	.183 (.172-.195)	.180 (.168-.193)	.261 (.240-.286)	.382 (.349-.420)	.480 (.422-.510)	1241
Females	13-14	.179 (.172-.187)	.180 (.171-.190)	.264 (.248-.274)	.374 (.352-.402)	.439 (.416-.482)	1346
Females	15-16	.188 (.179-.199)	.187 (.175-.199)	.265 (.243-.283)	.379 (.339-.408)	.458 (.418-.517)	1534
Mexican Americans	11-12	.160 (.150-.170)	.163 (.141-.175)	.222 (.198-.245)	.295 (.276-.326)	.359 (.302-.440)	317
Mexican Americans	13-14	.159 (.151-.168)	.151 (.142-.162)	.218 (.194-.230)	.313 (.282-.350)	.409 (.350-.457)	453
Mexican Americans	15-16	.178 (.165-.192)	.178 (.158-.199)	.241 (.217-.278)	.369 (.316-.403)	.455 (.406-.513)	584
Non-Hispanic blacks	11-12	.137 (.119-.157)	.137 (.113-.159)	.208 (.174-.244)	.284 (.248-.334)	.348 (.293-.406)	669
Non-Hispanic blacks	13-14	.131 (.125-.137)	.126 (.117-.138)	.181 (.171-.189)	.254 (.232-.276)	.324 (.265-.421)	581
Non-Hispanic blacks	15-16	.135 (.126-.145)	.130 (.119-.138)	.194 (.181-.212)	.304 (.270-.339)	.369 (.333-.412)	669
Non-Hispanic whites	11-12	.173 (.161-.186)	.171 (.161-.181)	.235 (.213-.261)	.337 (.309-.373)	.453 (.357-.521)	818
Non-Hispanic whites	13-14	.163 (.151-.176)	.163 (.149-.176)	.242 (.226-.255)	.338 (.309-.362)	.430 (.390-.482)	984
Non-Hispanic whites	15-16	.169 (.157-.182)	.168 (.154-.180)	.239 (.213-.276)	.336 (.300-.369)	.404 (.371-.450)	924
All Hispanics	11-12	.162 (.150-.176)	.158 (.142-.174)	.221 (.198-.250)	.304 (.278-.347)	.370 (.316-.440)	573
All Hispanics	13-14	.161 (.153-.170)	.154 (.145-.164)	.222 (.208-.238)	.318 (.294-.344)	.386 (.350-.432)	701
All Hispanics	15-16	.180 (.170-.190)	.178 (.167-.190)	.241 (.225-.266)	.366 (.332-.389)	.444 (.424-.509)	981
Asians	11-12	.237 (.219-.256)	.228 (.206-.250)	.337 (.297-.367)	.526 (.442-.586)	.663 (.557-.830)	353
Asians	13-14	.242 (.221-.264)	.237 (.216-.268)	.352 (.304-.382)	.456 (.417-.529)	.570 (.460-.857)	292
Asians	15-16	.259 (.242-.278)	.254 (.234-.279)	.368 (.333-.406)	.536 (.492-.603)	.663 (.572-.742)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Thallium_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Thallium_FactSheet.html

Urinary Tin (2011 - 2016)†

CAS Number 7440-31-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.621 (.569-.678)	.530 (.470-.590)	1.16 (.990-1.35)	2.94 (2.43-3.44)	4.74 (4.07-5.90)	2504
Total population	13-14	.433 (.374-.500)	.380 (.330-.440)	.930 (.790-1.16)	2.30 (2.02-2.67)	4.14 (3.12-5.46)	2664
Total population	15-16	.495 (.446-.549)	.470 (.400-.530)	1.05 (.950-1.19)	2.42 (2.10-2.58)	4.36 (3.62-4.93)	3060
Age 3-5 years	15-16	1.14 (1.01-1.28)	1.06 (.890-1.24)	2.93 (2.33-3.28)	5.96 (4.72-9.06)	11.3 (7.41-16.4)	486
Age 6-11 years	11-12	1.17 (.985-1.39)	1.12 (.820-1.43)	2.61 (2.24-2.95)	5.07 (3.44-7.29)	8.05 (5.07-12.7)	399
Age 6-11 years	13-14	.867 (.702-1.07)	.850 (.650-1.15)	2.16 (1.67-2.92)	5.16 (3.23-6.49)	7.25 (5.03-9.48)	402
Age 6-11 years	15-16	.873 (.748-1.02)	.850 (.660-1.07)	1.84 (1.57-2.17)	4.08 (2.70-5.02)	5.70 (4.40-9.77)	379
Age 12-19 years	11-12	.585 (.497-.688)	.470 (.380-.610)	1.21 (.880-1.60)	2.68 (1.92-3.65)	4.18 (3.19-4.93)	390
Age 12-19 years	13-14	.404 (.320-.511)	.370 (.290-.490)	.940 (.690-1.21)	2.02 (1.41-2.86)	3.19 (2.28-4.14)	451
Age 12-19 years	15-16	.485 (.447-.526)	.410 (.360-.480)	.980 (.810-1.15)	2.31 (1.72-2.79)	4.31 (2.52-5.17)	402
Age 20+ years	11-12	.585 (.521-.656)	.510 (.450-.580)	1.02 (.870-1.24)	2.58 (2.09-3.40)	4.46 (3.46-5.97)	1715
Age 20+ years	13-14	.406 (.352-.469)	.360 (.320-.410)	.830 (.730-1.00)	2.16 (1.73-2.38)	3.40 (2.80-4.84)	1811
Age 20+ years	15-16	.452 (.402-.508)	.430 (.360-.510)	.950 (.840-1.07)	2.09 (1.79-2.52)	3.62 (2.76-4.59)	1793
Males	11-12	.622 (.550-.704)	.530 (.470-.590)	1.11 (.930-1.28)	3.02 (2.27-3.84)	4.89 (3.65-6.72)	1262
Males	13-14	.414 (.360-.476)	.360 (.320-.420)	.840 (.720-1.01)	2.25 (1.70-2.81)	4.47 (3.15-5.57)	1318
Males	15-16	.479 (.414-.554)	.460 (.360-.540)	.970 (.820-1.19)	2.22 (1.76-2.70)	3.88 (2.82-4.92)	1524
Females	11-12	.620 (.558-.690)	.550 (.460-.620)	1.22 (.990-1.45)	2.77 (2.29-3.36)	4.59 (3.98-5.54)	1242
Females	13-14	.451 (.376-.541)	.410 (.350-.470)	1.05 (.830-1.34)	2.36 (1.97-2.92)	3.90 (2.99-5.21)	1346
Females	15-16	.511 (.457-.570)	.480 (.410-.540)	1.14 (.990-1.30)	2.52 (2.20-2.86)	4.76 (3.86-5.17)	1536
Mexican Americans	11-12	.644 (.527-.786)	.580 (.430-.700)	1.08 (.830-1.43)	2.66 (1.88-4.41)	5.54 (3.10-8.30)	317
Mexican Americans	13-14	.410 (.314-.536)	.360 (.270-.490)	.890 (.680-1.24)	2.25 (1.39-3.26)	4.40 (2.31-6.11)	453
Mexican Americans	15-16	.579 (.506-.663)	.550 (.450-.650)	1.21 (1.00-1.44)	2.52 (2.12-2.82)	3.65 (2.86-4.72)	585
Non-Hispanic blacks	11-12	.950 (.825-1.09)	.860 (.740-1.00)	1.86 (1.63-2.16)	4.22 (3.28-5.55)	7.73 (4.93-12.4)	669
Non-Hispanic blacks	13-14	.729 (.570-.932)	.720 (.520-.880)	1.50 (1.18-1.93)	3.60 (2.82-5.03)	6.79 (4.85-9.94)	581
Non-Hispanic blacks	15-16	.728 (.681-.779)	.680 (.590-.770)	1.36 (1.26-1.52)	3.36 (2.70-4.07)	5.89 (4.36-8.08)	671
Non-Hispanic whites	11-12	.579 (.513-.654)	.490 (.430-.570)	1.03 (.830-1.28)	2.72 (2.08-3.62)	4.53 (3.41-6.03)	820
Non-Hispanic whites	13-14	.402 (.341-.473)	.350 (.310-.410)	.840 (.700-1.06)	2.20 (1.84-2.39)	3.39 (2.67-5.18)	985
Non-Hispanic whites	15-16	.474 (.411-.547)	.440 (.360-.540)	1.00 (.850-1.30)	2.42 (2.00-2.70)	4.44 (3.08-5.23)	924
All Hispanics	11-12	.642 (.575-.717)	.570 (.460-.640)	1.23 (.990-1.41)	2.77 (2.12-3.29)	4.57 (3.56-6.54)	573
All Hispanics	13-14	.432 (.355-.526)	.410 (.330-.490)	.910 (.750-1.17)	2.25 (1.61-2.93)	4.22 (2.67-5.80)	701
All Hispanics	15-16	.520 (.465-.581)	.500 (.430-.570)	1.05 (.850-1.22)	2.17 (1.89-2.57)	3.59 (2.82-4.72)	982
Asians	11-12	.477 (.433-.526)	.400 (.350-.460)	.820 (.690-1.01)	2.00 (1.34-2.39)	2.58 (2.21-3.90)	353
Asians	13-14	.270 (.216-.337)	.230 (.170-.310)	.570 (.400-.750)	1.31 (.810-1.83)	2.02 (1.54-3.56)	292
Asians	15-16	.295 (.253-.345)	.270 (.220-.290)	.500 (.410-.560)	1.37 (.890-1.95)	3.11 (1.80-4.86)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.220, 0.090, and 0.090 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Tin (creatinine corrected) (2011 - 2016)†

CAS Number 7440-31-5

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.705 (.653-.761)	.624 (.567-.678)	1.24 (1.11-1.34)	2.54 (2.29-2.80)	4.50 (3.76-5.33)	2502
Total population	13-14	.499 (.436-.570)	.438 (.389-.510)	.995 (.826-1.14)	2.25 (1.99-2.64)	3.72 (3.17-4.48)	2663
Total population	15-16	.555 (.500-.617)	.463 (.420-.518)	1.04 (.912-1.17)	2.26 (1.93-2.69)	4.18 (3.59-4.79)	3057
Age 3-5 years	15-16	2.60 (2.30-2.95)	2.37 (1.93-2.78)	5.63 (4.42-6.66)	11.4 (9.24-14.3)	16.4 (12.3-21.9)	485
Age 6-11 years	11-12	1.67 (1.46-1.90)	1.60 (1.44-1.73)	2.83 (2.61-3.31)	5.61 (4.50-7.22)	7.91 (6.11-12.1)	398
Age 6-11 years	13-14	1.29 (1.07-1.57)	1.36 (1.00-1.64)	2.82 (2.22-3.25)	5.93 (3.80-7.26)	7.82 (6.17-13.4)	402
Age 6-11 years	15-16	1.24 (1.08-1.42)	1.22 (1.03-1.38)	2.24 (1.87-2.46)	4.21 (3.16-7.19)	8.52 (4.98-12.1)	379
Age 12-19 years	11-12	.559 (.475-.659)	.484 (.411-.543)	1.03 (.725-1.39)	1.97 (1.43-2.49)	2.80 (2.00-3.74)	390
Age 12-19 years	13-14	.366 (.304-.441)	.347 (.254-.455)	.735 (.600-.870)	1.45 (1.16-1.77)	2.21 (1.48-3.03)	451
Age 12-19 years	15-16	.453 (.404-.508)	.372 (.350-.412)	.805 (.670-.902)	1.86 (1.41-2.43)	2.74 (2.11-4.76)	402
Age 20+ years	11-12	.665 (.599-.737)	.593 (.537-.663)	1.11 (.956-1.30)	2.32 (1.94-2.67)	4.04 (3.00-5.09)	1714
Age 20+ years	13-14	.473 (.414-.539)	.417 (.372-.475)	.882 (.737-1.05)	1.96 (1.74-2.33)	3.32 (2.83-3.91)	1810
Age 20+ years	15-16	.493 (.441-.550)	.431 (.390-.478)	.885 (.778-1.01)	1.69 (1.47-2.07)	3.06 (2.46-4.17)	1791
Males	11-12	.584 (.524-.651)	.515 (.436-.576)	.966 (.875-1.12)	2.29 (1.86-2.80)	4.17 (2.80-5.55)	1261
Males	13-14	.412 (.356-.477)	.353 (.302-.406)	.740 (.606-.949)	1.96 (1.64-2.30)	3.30 (2.73-4.65)	1317
Males	15-16	.455 (.398-.520)	.387 (.326-.454)	.883 (.722-1.04)	1.85 (1.52-2.42)	3.33 (2.87-3.88)	1524
Females	11-12	.843 (.772-.920)	.764 (.676-.857)	1.42 (1.21-1.72)	2.70 (2.51-3.19)	4.81 (3.50-5.59)	1241
Females	13-14	.599 (.515-.697)	.557 (.491-.608)	1.19 (1.00-1.37)	2.58 (2.00-3.19)	4.00 (3.20-5.50)	1346
Females	15-16	.672 (.609-.742)	.567 (.507-.640)	1.20 (1.04-1.38)	2.50 (2.24-2.97)	5.75 (4.15-6.69)	1533
Mexican Americans	11-12	.724 (.599-.874)	.640 (.482-.785)	1.23 (1.00-1.72)	3.28 (2.27-4.17)	5.29 (3.28-7.22)	317
Mexican Americans	13-14	.468 (.372-.588)	.394 (.294-.554)	.833 (.712-1.27)	2.19 (1.73-3.01)	3.29 (2.24-7.09)	453
Mexican Americans	15-16	.636 (.534-.758)	.555 (.448-.647)	1.23 (.859-1.53)	3.04 (2.51-3.60)	5.02 (3.93-6.00)	584
Non-Hispanic blacks	11-12	.739 (.648-.842)	.684 (.553-.802)	1.52 (1.27-1.79)	3.19 (2.66-3.91)	5.28 (3.47-7.90)	669
Non-Hispanic blacks	13-14	.555 (.459-.670)	.495 (.401-.600)	1.10 (.989-1.40)	2.80 (2.04-3.62)	4.99 (3.31-7.26)	581
Non-Hispanic blacks	15-16	.576 (.538-.616)	.507 (.474-.550)	1.06 (.892-1.22)	2.41 (2.05-2.89)	4.56 (3.31-6.07)	669
Non-Hispanic whites	11-12	.701 (.636-.772)	.624 (.557-.683)	1.22 (1.06-1.39)	2.50 (2.06-2.79)	4.22 (2.94-5.35)	818
Non-Hispanic whites	13-14	.494 (.418-.584)	.438 (.380-.527)	.970 (.787-1.16)	2.09 (1.76-2.73)	3.63 (2.83-5.50)	984
Non-Hispanic whites	15-16	.559 (.488-.641)	.461 (.415-.556)	1.06 (.904-1.26)	2.19 (1.76-2.74)	4.18 (3.10-6.20)	924
All Hispanics	11-12	.719 (.638-.810)	.640 (.543-.739)	1.23 (1.06-1.41)	3.18 (2.32-3.74)	4.51 (3.63-6.13)	573
All Hispanics	13-14	.482 (.409-.568)	.401 (.337-.485)	.866 (.725-1.17)	2.31 (1.91-3.10)	4.04 (2.88-5.03)	701
All Hispanics	15-16	.590 (.514-.677)	.492 (.423-.594)	1.04 (.824-1.37)	2.65 (2.23-3.14)	4.56 (3.59-5.52)	981
Asians	11-12	.638 (.560-.727)	.543 (.503-.667)	1.00 (.867-1.17)	1.96 (1.49-2.36)	3.03 (2.23-3.58)	353
Asians	13-14	.423 (.354-.506)	.369 (.305-.411)	.745 (.529-1.12)	1.98 (1.08-2.54)	2.73 (1.82-6.78)	292
Asians	15-16	.403 (.359-.453)	.337 (.305-.373)	.643 (.569-.750)	1.37 (.935-1.98)	2.55 (1.69-5.77)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Tungsten (2011 - 2016)†

CAS Number 7440-33-7

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.074 (.067-.082)	.069 (.062-.076)	.143 (.127-.170)	.284 (.235-.361)	.434 (.354-.522)	2491
Total population	13-14	.059 (.052-.065)	.058 (.050-.068)	.129 (.113-.146)	.241 (.220-.264)	.380 (.337-.436)	2664
Total population	15-16	.068 (.061-.076)	.068 (.060-.078)	.136 (.118-.160)	.263 (.230-.306)	.390 (.321-.463)	3060
Age 3-5 years	15-16	.111 (.095-.129)	.117 (.096-.138)	.220 (.173-.259)	.381 (.280-.482)	.582 (.418-.813)	486
Age 6-11 years	11-12	.136 (.120-.155)	.138 (.123-.162)	.272 (.229-.301)	.448 (.391-.504)	.583 (.498-.691)	398
Age 6-11 years	13-14	.111 (.097-.127)	.114 (.098-.130)	.224 (.184-.245)	.367 (.322-.449)	.606 (.436-.758)	402
Age 6-11 years	15-16	.128 (.110-.148)	.137 (.109-.163)	.252 (.199-.328)	.415 (.335-.494)	.561 (.415-.769)	379
Age 12-19 years	11-12	.107 (.088-.130)	.112 (.083-.141)	.212 (.175-.269)	.371 (.308-.458)	.506 (.399-.647)	388
Age 12-19 years	13-14	.093 (.081-.106)	.094 (.082-.107)	.182 (.161-.207)	.364 (.316-.406)	.559 (.406-.774)	451
Age 12-19 years	15-16	.104 (.094-.114)	.111 (.099-.120)	.206 (.166-.244)	.323 (.274-.450)	.500 (.403-.669)	402
Age 20+ years	11-12	.066 (.058-.074)	.060 (.055-.067)	.121 (.104-.144)	.237 (.194-.315)	.374 (.274-.493)	1705
Age 20+ years	13-14	.051 (.045-.058)	.050 (.042-.059)	.111 (.092-.129)	.213 (.178-.238)	.320 (.264-.380)	1811
Age 20+ years	15-16	.059 (.052-.066)	.059 (.052-.068)	.115 (.100-.130)	.225 (.177-.260)	.321 (.260-.436)	1793
Males	11-12	.084 (.074-.095)	.080 (.068-.094)	.164 (.136-.200)	.343 (.260-.408)	.471 (.388-.537)	1254
Males	13-14	.065 (.057-.074)	.066 (.054-.076)	.141 (.121-.159)	.256 (.230-.295)	.380 (.321-.468)	1318
Males	15-16	.078 (.067-.090)	.077 (.067-.091)	.153 (.124-.186)	.284 (.241-.343)	.420 (.332-.548)	1524
Females	11-12	.066 (.060-.073)	.060 (.054-.067)	.131 (.115-.145)	.247 (.212-.294)	.361 (.284-.463)	1237
Females	13-14	.053 (.048-.059)	.053 (.043-.063)	.119 (.104-.129)	.226 (.197-.244)	.359 (.313-.441)	1346
Females	15-16	.060 (.054-.067)	.060 (.053-.068)	.124 (.105-.142)	.237 (.195-.293)	.342 (.301-.450)	1536
Mexican Americans	11-12	.097 (.082-.114)	.097 (.071-.115)	.198 (.150-.282)	.434 (.356-.534)	.691 (.473-.827)	314
Mexican Americans	13-14	.069 (.057-.083)	.072 (.054-.090)	.150 (.114-.207)	.280 (.216-.395)	.515 (.350-.648)	453
Mexican Americans	15-16	.086 (.069-.108)	.082 (.066-.104)	.166 (.128-.211)	.355 (.226-.578)	.572 (.331-.964)	585
Non-Hispanic blacks	11-12	.102 (.087-.119)	.096 (.082-.120)	.184 (.145-.245)	.387 (.282-.496)	.537 (.391-.808)	669
Non-Hispanic blacks	13-14	.085 (.073-.099)	.085 (.071-.096)	.166 (.151-.194)	.350 (.310-.422)	.493 (.424-.676)	581
Non-Hispanic blacks	15-16	.087 (.079-.095)	.087 (.080-.099)	.162 (.149-.177)	.290 (.252-.336)	.441 (.352-.508)	671
Non-Hispanic whites	11-12	.068 (.060-.076)	.063 (.056-.070)	.130 (.113-.153)	.260 (.212-.327)	.370 (.307-.463)	810
Non-Hispanic whites	13-14	.053 (.046-.062)	.054 (.043-.065)	.117 (.096-.139)	.215 (.172-.255)	.328 (.243-.468)	985
Non-Hispanic whites	15-16	.064 (.056-.073)	.065 (.054-.077)	.125 (.108-.154)	.244 (.214-.288)	.337 (.288-.463)	924
All Hispanics	11-12	.082 (.072-.092)	.072 (.061-.094)	.162 (.136-.197)	.371 (.294-.433)	.534 (.422-.692)	570
All Hispanics	13-14	.064 (.056-.073)	.065 (.054-.076)	.145 (.119-.169)	.264 (.217-.350)	.411 (.346-.585)	701
All Hispanics	15-16	.076 (.063-.092)	.073 (.061-.090)	.151 (.125-.188)	.297 (.211-.434)	.464 (.331-.703)	982
Asians	11-12	.067 (.058-.077)	.066 (.052-.078)	.135 (.115-.168)	.252 (.206-.319)	.401 (.260-.635)	353
Asians	13-14	.052 (.040-.069)	.047 (.030-.067)	.119 (.074-.188)	.290 (.168-.593)	.537 (.290-.700)	292
Asians	15-16	.055 (.046-.066)	.052 (.039-.067)	.115 (.085-.167)	.237 (.169-.311)	.361 (.255-.608)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.026, 0.018, and 0.018 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Tungsten_BiomonitoringSummary.html

Urinary Tungsten (creatinine corrected) (2011 - 2016)†

CAS Number 7440-33-7

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.084 (.076-.093)	.077 (.072-.085)	.140 (.123-.161)	.260 (.209-.323)	.402 (.294-.536)	2489
Total population	13-14	.068 (.061-.075)	.065 (.058-.072)	.124 (.111-.136)	.224 (.195-.251)	.332 (.303-.377)	2663
Total population	15-16	.076 (.068-.085)	.072 (.063-.080)	.129 (.115-.145)	.241 (.205-.289)	.363 (.289-.482)	3057
Age 3-5 years	15-16	.255 (.217-.300)	.236 (.205-.279)	.390 (.308-.513)	.637 (.513-.920)	.958 (.626-1.95)	485
Age 6-11 years	11-12	.194 (.174-.217)	.183 (.159-.214)	.312 (.256-.407)	.500 (.421-.652)	.687 (.515-.863)	397
Age 6-11 years	13-14	.166 (.152-.181)	.166 (.149-.176)	.249 (.229-.295)	.400 (.327-.518)	.673 (.457-.764)	402
Age 6-11 years	15-16	.181 (.165-.199)	.183 (.160-.197)	.280 (.242-.339)	.444 (.367-.531)	.556 (.444-.901)	379
Age 12-19 years	11-12	.103 (.091-.116)	.099 (.086-.111)	.164 (.144-.181)	.288 (.203-.324)	.381 (.286-.656)	388
Age 12-19 years	13-14	.084 (.073-.097)	.089 (.071-.101)	.144 (.127-.162)	.246 (.195-.293)	.327 (.293-.492)	451
Age 12-19 years	15-16	.097 (.087-.108)	.096 (.086-.103)	.146 (.130-.170)	.248 (.190-.375)	.375 (.253-.582)	402
Age 20+ years	11-12	.074 (.067-.083)	.069 (.064-.075)	.121 (.104-.138)	.215 (.170-.263)	.334 (.233-.458)	1704
Age 20+ years	13-14	.060 (.054-.066)	.057 (.051-.062)	.105 (.092-.117)	.186 (.163-.212)	.286 (.227-.357)	1810
Age 20+ years	15-16	.064 (.057-.071)	.061 (.054-.066)	.103 (.091-.118)	.177 (.149-.206)	.279 (.202-.340)	1791
Males	11-12	.079 (.068-.090)	.075 (.064-.085)	.131 (.112-.150)	.261 (.180-.327)	.400 (.276-.539)	1253
Males	13-14	.065 (.057-.073)	.065 (.054-.075)	.121 (.103-.135)	.199 (.179-.248)	.316 (.278-.377)	1317
Males	15-16	.074 (.063-.086)	.068 (.058-.082)	.126 (.105-.151)	.243 (.188-.340)	.408 (.272-.560)	1524
Females	11-12	.090 (.083-.097)	.079 (.075-.088)	.150 (.134-.165)	.257 (.223-.324)	.404 (.314-.544)	1236
Females	13-14	.071 (.065-.077)	.065 (.059-.072)	.127 (.116-.137)	.240 (.220-.261)	.342 (.311-.383)	1346
Females	15-16	.079 (.073-.085)	.074 (.068-.080)	.130 (.120-.143)	.241 (.206-.279)	.326 (.293-.377)	1533
Mexican Americans	11-12	.110 (.090-.134)	.102 (.071-.142)	.192 (.150-.270)	.381 (.263-.633)	.633 (.396-.729)	314
Mexican Americans	13-14	.079 (.067-.093)	.073 (.059-.093)	.146 (.115-.172)	.287 (.211-.369)	.471 (.338-.602)	453
Mexican Americans	15-16	.095 (.074-.121)	.083 (.062-.113)	.179 (.128-.259)	.332 (.259-.478)	.482 (.319-.856)	584
Non-Hispanic blacks	11-12	.079 (.068-.092)	.072 (.060-.083)	.129 (.102-.151)	.246 (.168-.411)	.440 (.253-.669)	669
Non-Hispanic blacks	13-14	.064 (.056-.074)	.059 (.050-.071)	.118 (.105-.127)	.233 (.193-.275)	.342 (.296-.430)	581
Non-Hispanic blacks	15-16	.069 (.063-.076)	.064 (.059-.073)	.117 (.099-.133)	.203 (.181-.221)	.296 (.225-.390)	669
Non-Hispanic whites	11-12	.082 (.072-.094)	.076 (.068-.088)	.135 (.113-.164)	.247 (.183-.324)	.353 (.250-.515)	808
Non-Hispanic whites	13-14	.066 (.058-.075)	.064 (.056-.072)	.118 (.100-.141)	.200 (.167-.257)	.307 (.227-.395)	984
Non-Hispanic whites	15-16	.076 (.066-.086)	.072 (.061-.083)	.126 (.109-.147)	.227 (.187-.280)	.331 (.256-.497)	924
All Hispanics	11-12	.092 (.078-.108)	.079 (.068-.100)	.164 (.134-.184)	.312 (.263-.404)	.473 (.367-.664)	570
All Hispanics	13-14	.072 (.064-.080)	.068 (.058-.079)	.133 (.115-.148)	.240 (.200-.320)	.391 (.319-.549)	701
All Hispanics	15-16	.086 (.070-.106)	.078 (.062-.099)	.153 (.122-.210)	.313 (.238-.413)	.464 (.321-.715)	981
Asians	11-12	.089 (.075-.107)	.082 (.073-.103)	.152 (.129-.181)	.296 (.207-.413)	.449 (.299-.824)	353
Asians	13-14	.082 (.064-.104)	.079 (.059-.101)	.157 (.119-.227)	.330 (.227-.480)	.503 (.316-.818)	292
Asians	15-16	.075 (.064-.089)	.074 (.056-.088)	.127 (.109-.150)	.238 (.173-.412)	.429 (.263-.599)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Tungsten_BiomonitoringSummary.html

Urinary Uranium (2011 - 2016)†

CAS Number 7440-61-1

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.006 (.005-.007)	.006 (.005-.007)	.011 (.008-.014)	.019 (.015-.025)	.031 (.023-.043)	2504
Total population	13-14	.005 (.004-.006)	.005 (.004-.005)	.010 (.008-.013)	.023 (.015-.038)	.039 (.023-.066)	2664
Total population	15-16	.005 (.004-.006)	.005 (.004-.005)	.010 (.008-.012)	.018 (.015-.025)	.031 (.023-.036)	3061
Age 3-5 years	15-16	.004 (.003-.005)	.004 (.003-.005)	.007 (.005-.009)	.015 (.010-.019)	.019 (.014-.027)	486
Age 6-11 years	11-12	.006 (.005-.007)	.006 (.005-.008)	.011 (.009-.013)	.019 (.013-.024)	.025 (.020-.037)	399
Age 6-11 years	13-14	.005 (.004-.007)	.005 (.004-.006)	.010 (.007-.017)	.023 (.015-.034)	.034 (.019-.061)	402
Age 6-11 years	15-16	.004 (.004-.005)	.004 (.004-.005)	.007 (.005-.010)	.014 (.011-.018)	.022 (.015-.033)	379
Age 12-19 years	11-12	.007 (.006-.009)	.007 (.005-.008)	.012 (.009-.017)	.021 (.014-.032)	.033 (.021-.052)	390
Age 12-19 years	13-14	.006 (.005-.007)	.005 (.004-.006)	.010 (.007-.016)	.023 (.013-.047)	.046 (.020-.096)	451
Age 12-19 years	15-16	.006 (.005-.007)	.005 (.004-.008)	.011 (.008-.014)	.018 (.014-.026)	.028 (.019-.053)	402
Age 20+ years	11-12	.006 (.005-.007)	.005 (.004-.007)	.011 (.008-.013)	.019 (.015-.025)	.031 (.023-.043)	1715
Age 20+ years	13-14	.005 (.004-.006)	.005 (.004-.005)	.010 (.008-.012)	.023 (.015-.035)	.038 (.023-.066)	1811
Age 20+ years	15-16	.005 (.004-.006)	.005 (.004-.005)	.010 (.008-.013)	.019 (.015-.027)	.031 (.023-.038)	1794
Males	11-12	.007 (.005-.008)	.006 (.005-.007)	.011 (.009-.014)	.020 (.014-.032)	.034 (.022-.045)	1262
Males	13-14	.005 (.004-.006)	.005 (.004-.005)	.010 (.008-.014)	.024 (.014-.041)	.040 (.023-.077)	1318
Males	15-16	.005 (.005-.006)	.005 (.004-.006)	.011 (.008-.013)	.018 (.014-.026)	.029 (.021-.035)	1524
Females	11-12	.006 (.005-.007)	.005 (.004-.006)	.010 (.008-.013)	.019 (.015-.025)	.029 (.024-.042)	1242
Females	13-14	.005 (.004-.006)	.005 (.004-.005)	.010 (.008-.012)	.022 (.015-.033)	.036 (.022-.065)	1346
Females	15-16	.005 (.004-.006)	.004 (.004-.005)	.009 (.007-.011)	.019 (.015-.025)	.031 (.023-.036)	1537
Mexican Americans	11-12	.007 (.006-.009)	.007 (.006-.009)	.013 (.010-.016)	.023 (.015-.033)	.031 (.017-.054)	317
Mexican Americans	13-14	.008 (.006-.009)	.008 (.006-.011)	.015 (.012-.020)	.028 (.022-.040)	.043 (.028-.058)	453
Mexican Americans	15-16	.006 (.005-.008)	.006 (.005-.007)	.011 (.008-.016)	.021 (.016-.030)	.032 (.022-.042)	585
Non-Hispanic blacks	11-12	.006 (.005-.008)	.006 (.005-.008)	.011 (.008-.014)	.019 (.014-.028)	.029 (.022-.042)	669
Non-Hispanic blacks	13-14	.005 (.005-.006)	.005 (.005-.006)	.009 (.008-.011)	.017 (.013-.023)	.025 (.016-.046)	581
Non-Hispanic blacks	15-16	.006 (.005-.007)	.005 (.005-.006)	.011 (.008-.014)	.020 (.015-.027)	.029 (.020-.051)	671
Non-Hispanic whites	11-12	.006 (.005-.007)	.006 (.004-.007)	.011 (.008-.014)	.021 (.015-.029)	.034 (.023-.045)	820
Non-Hispanic whites	13-14	.005 (.004-.006)	.004 (.003-.005)	.009 (.006-.016)	.023 (.011-.046)	.040 (.019-.098)	985
Non-Hispanic whites	15-16	.005 (.004-.006)	.005 (.004-.006)	.010 (.007-.013)	.019 (.014-.029)	.031 (.019-.041)	924
All Hispanics	11-12	.006 (.005-.007)	.005 (.005-.007)	.011 (.008-.014)	.018 (.013-.030)	.030 (.018-.047)	573
All Hispanics	13-14	.007 (.006-.008)	.007 (.005-.008)	.013 (.011-.018)	.026 (.019-.034)	.040 (.026-.057)	701
All Hispanics	15-16	.005 (.004-.006)	.005 (.004-.006)	.009 (.007-.013)	.018 (.012-.029)	.029 (.018-.042)	982
Asians	11-12	.005 (.005-.006)	.005 (.004-.005)	.009 (.007-.013)	.016 (.014-.020)	.021 (.016-.040)	353
Asians	13-14	.005 (.004-.008)	.005 (.003-.007)	.011 (.006-.025)	.031 (.011-.068)	.051 (.025-.101)	292
Asians	15-16	.004 (.003-.005)	.004 (.003-.004)	.007 (.006-.010)	.015 (.010-.020)	.022 (.016-.032)	332

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 3.00E-03, 2.00E-03, and 2.00E-03 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Uranium_BiomonitoringSummary.html

Urinary Uranium (creatinine corrected) (2011 - 2016)†

CAS Number 7440-61-1

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.007 (.006-.008)	.007 (.006-.008)	.011 (.009-.014)	.021 (.015-.026)	.029 (.023-.037)	2502
Total population	13-14	.006 (.005-.007)	.005 (.004-.006)	.010 (.008-.013)	.020 (.013-.038)	.039 (.021-.064)	2663
Total population	15-16	.006 (.005-.007)	.005 (.004-.006)	.009 (.007-.012)	.017 (.013-.023)	.028 (.019-.038)	3058
Age 3-5 years	15-16	.009 (.007-.011)	.008 (.007-.012)	.016 (.011-.020)	.023 (.018-.032)	.032 (.025-.039)	485
Age 6-11 years	11-12	.009 (.007-.011)	.008 (.007-.010)	.013 (.011-.017)	.023 (.014-.031)	.031 (.018-.080)	398
Age 6-11 years	13-14	.008 (.006-.010)	.006 (.005-.009)	.012 (.009-.019)	.028 (.018-.045)	.045 (.022-.081)	402
Age 6-11 years	15-16	.006 (.005-.008)	.006 (.005-.008)	.010 (.007-.014)	.016 (.012-.023)	.023 (.017-.038)	379
Age 12-19 years	11-12	.007 (.005-.009)	.006 (.005-.009)	.010 (.008-.013)	.016 (.013-.026)	.026 (.015-.059)	390
Age 12-19 years	13-14	.005 (.004-.007)	.004 (.004-.005)	.009 (.005-.015)	.021 (.011-.045)	.038 (.018-.051)	451
Age 12-19 years	15-16	.005 (.004-.007)	.005 (.003-.006)	.009 (.006-.015)	.021 (.011-.031)	.035 (.021-.051)	402
Age 20+ years	11-12	.007 (.006-.008)	.006 (.005-.008)	.011 (.009-.014)	.021 (.015-.027)	.029 (.022-.041)	1714
Age 20+ years	13-14	.006 (.005-.007)	.005 (.004-.006)	.010 (.008-.013)	.020 (.014-.036)	.039 (.020-.065)	1810
Age 20+ years	15-16	.006 (.005-.007)	.005 (.004-.006)	.009 (.007-.012)	.016 (.013-.022)	.026 (.018-.038)	1792
Males	11-12	.006 (.005-.007)	.006 (.005-.007)	.009 (.007-.013)	.017 (.012-.026)	.027 (.017-.052)	1261
Males	13-14	.005 (.004-.006)	.005 (.004-.005)	.009 (.006-.012)	.019 (.011-.039)	.034 (.018-.061)	1317
Males	15-16	.005 (.004-.006)	.005 (.004-.006)	.008 (.006-.011)	.016 (.010-.021)	.025 (.016-.039)	1524
Females	11-12	.008 (.007-.009)	.007 (.006-.009)	.013 (.010-.016)	.022 (.020-.026)	.030 (.026-.036)	1241
Females	13-14	.007 (.006-.008)	.006 (.005-.007)	.011 (.009-.013)	.024 (.016-.042)	.046 (.025-.067)	1346
Females	15-16	.006 (.005-.007)	.006 (.005-.007)	.010 (.008-.013)	.020 (.014-.025)	.028 (.021-.040)	1534
Mexican Americans	11-12	.008 (.006-.011)	.008 (.006-.011)	.013 (.010-.018)	.021 (.014-.030)	.027 (.019-.046)	317
Mexican Americans	13-14	.009 (.007-.011)	.008 (.007-.010)	.014 (.011-.020)	.025 (.020-.042)	.042 (.025-.061)	453
Mexican Americans	15-16	.007 (.005-.009)	.006 (.005-.008)	.010 (.008-.015)	.018 (.013-.028)	.028 (.019-.038)	584
Non-Hispanic blacks	11-12	.005 (.004-.006)	.005 (.004-.006)	.008 (.006-.009)	.013 (.009-.019)	.019 (.014-.030)	669
Non-Hispanic blacks	13-14	.004 (.004-.005)	.004 (.004-.004)	.006 (.005-.007)	.011 (.008-.016)	.017 (.011-.026)	581
Non-Hispanic blacks	15-16	.005 (.004-.005)	.004 (.004-.005)	.008 (.006-.009)	.013 (.010-.019)	.020 (.014-.028)	669
Non-Hispanic whites	11-12	.007 (.006-.009)	.007 (.006-.008)	.012 (.010-.016)	.022 (.018-.028)	.031 (.023-.057)	818
Non-Hispanic whites	13-14	.006 (.004-.008)	.005 (.004-.007)	.010 (.007-.015)	.021 (.011-.055)	.039 (.019-.082)	984
Non-Hispanic whites	15-16	.006 (.005-.007)	.005 (.004-.007)	.010 (.007-.013)	.019 (.014-.028)	.030 (.021-.040)	924
All Hispanics	11-12	.007 (.005-.008)	.007 (.005-.009)	.011 (.009-.014)	.018 (.013-.026)	.025 (.019-.034)	573
All Hispanics	13-14	.008 (.006-.009)	.007 (.006-.009)	.013 (.010-.018)	.023 (.019-.035)	.042 (.022-.061)	701
All Hispanics	15-16	.006 (.005-.007)	.006 (.004-.007)	.009 (.007-.012)	.017 (.011-.027)	.026 (.018-.043)	981
Asians	11-12	.007 (.006-.008)	.007 (.006-.008)	.012 (.010-.013)	.019 (.015-.032)	.033 (.018-.048)	353
Asians	13-14	.008 (.006-.012)	.007 (.005-.011)	.014 (.009-.032)	.043 (.015-.085)	.061 (.031-.142)	292
Asians	15-16	.005 (.005-.006)	.005 (.004-.005)	.008 (.007-.011)	.016 (.012-.024)	.031 (.020-.038)	332

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Uranium_BiomonitoringSummary.html

Serum Zinc (2011 - 2016)

CAS Number 7440-66-6

Geometric mean and selected percentiles of serum concentrations (in µg/dL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	81.9 (80.9-82.9)	81.8 (80.8-82.9)	91.5 (89.8-93.1)	101 (99.1-104)	109 (105-112)	2329
Total population	13-14	80.4 (78.2-82.6)	80.7 (78.4-82.9)	90.5 (88.0-93.1)	101 (97.7-104)	109 (104-113)	2519
Total population	15-16	80.0 (78.6-81.4)	80.9 (79.1-82.5)	90.8 (89.6-91.8)	99.4 (97.7-102)	106 (103-110)	2436
Age 6-11 years	11-12	81.3 (79.4-83.2)	82.0 (79.2-83.7)	90.3 (86.3-93.4)	101 (93.7-106)	106 (101-114)	316
Age 6-11 years	13-14	79.3 (77.4-81.3)	79.4 (77.7-81.0)	88.5 (84.5-91.5)	97.4 (91.4-103)	103 (96.2-114)	339
Age 6-11 years	15-16	79.6 (76.2-83.2)	80.7 (78.6-82.9)	89.1 (84.3-94.6)	99.9 (94.6-107)	107 (98.1-120)	321
Age 12-19 years	11-12	83.0 (81.5-84.5)	81.9 (79.4-85.0)	94.4 (89.6-96.0)	103 (99.1-105)	106 (103-115)	366
Age 12-19 years	13-14	82.8 (80.1-85.6)	84.1 (79.8-87.6)	94.8 (89.4-98.3)	103 (100-108)	110 (102-118)	418
Age 12-19 years	15-16	80.6 (78.6-82.7)	80.7 (78.3-82.4)	92.2 (89.2-94.2)	102 (99.4-105)	109 (103-113)	371
Age 20+ years	11-12	81.8 (80.7-83.0)	81.7 (80.6-82.9)	91.3 (89.3-93.4)	101 (98.6-104)	109 (105-114)	1647
Age 20+ years	13-14	80.1 (77.9-82.5)	80.5 (78.2-82.5)	90.2 (87.3-92.9)	101 (97.0-105)	109 (103-114)	1762
Age 20+ years	15-16	79.9 (78.7-81.2)	81.0 (79.1-82.7)	90.8 (89.3-91.8)	99.3 (96.9-102)	105 (102-110)	1744
Males	11-12	84.2 (82.7-85.8)	83.9 (82.4-85.4)	94.0 (91.9-96.4)	104 (101-109)	112 (108-117)	1162
Males	13-14	82.6 (80.2-85.0)	83.1 (80.6-85.6)	93.3 (90.4-96.3)	105 (100-109)	113 (107-119)	1235
Males	15-16	81.7 (80.0-83.5)	82.5 (79.7-84.7)	92.6 (90.8-94.0)	102 (99.4-106)	110 (106-113)	1201
Females	11-12	79.8 (78.7-81.0)	79.7 (78.2-81.1)	88.5 (87.3-90.2)	99.6 (95.5-103)	105 (103-108)	1167
Females	13-14	78.3 (76.1-80.6)	78.7 (76.0-81.3)	87.5 (84.9-90.1)	97.5 (93.0-102)	103 (101-108)	1284
Females	15-16	78.3 (77.1-79.6)	79.7 (77.8-81.0)	88.6 (87.5-90.2)	97.5 (95.4-98.6)	102 (101-103)	1235
Mexican Americans	11-12	81.4 (77.2-85.7)	81.8 (76.4-86.4)	89.6 (86.5-96.4)	101 (94.3-110)	110 (100-119)	285
Mexican Americans	13-14	81.0 (77.6-84.5)	80.8 (77.1-85.8)	92.1 (88.1-98.6)	102 (100-110)	113 (103-119)	431
Mexican Americans	15-16	79.0 (77.4-80.8)	80.2 (77.7-81.8)	89.9 (87.9-91.9)	98.0 (94.6-102)	105 (102-111)	464
Non-Hispanic blacks	11-12	79.7 (77.9-81.5)	79.4 (77.8-81.3)	90.9 (87.0-93.3)	101 (95.7-106)	108 (103-111)	620
Non-Hispanic blacks	13-14	79.1 (75.8-82.5)	78.4 (74.6-83.0)	88.4 (85.8-91.8)	102 (95.1-105)	109 (103-114)	516
Non-Hispanic blacks	15-16	79.6 (78.1-81.2)	81.1 (78.5-82.6)	90.2 (87.4-91.5)	98.3 (96.1-101)	104 (101-109)	494
Non-Hispanic whites	11-12	82.8 (81.3-84.2)	82.9 (81.1-84.5)	92.2 (89.8-94.5)	102 (98.0-105)	109 (103-117)	780
Non-Hispanic whites	13-14	80.5 (77.9-83.2)	81.2 (78.7-83.3)	90.4 (87.5-93.3)	101 (96.8-103)	109 (102-113)	975
Non-Hispanic whites	15-16	80.3 (78.5-82.2)	81.2 (79.0-83.2)	90.9 (89.1-92.7)	99.4 (96.0-103)	107 (102-111)	764
All Hispanics	11-12	80.4 (78.1-82.7)	80.1 (77.5-83.1)	88.8 (86.4-92.4)	100 (96.2-106)	109 (101-116)	525
All Hispanics	13-14	81.7 (78.3-85.2)	81.8 (78.4-85.6)	92.2 (87.3-99.5)	103 (99.9-109)	113 (104-123)	666
All Hispanics	15-16	79.0 (77.5-80.6)	80.2 (77.8-82.1)	90.4 (88.0-92.4)	99.6 (96.2-102)	105 (102-109)	798
Asians	11-12	81.2 (79.0-83.6)	81.0 (78.6-83.7)	91.3 (88.7-95.1)	101 (97.9-107)	110 (103-114)	323
Asians	13-14	78.4 (75.8-81.1)	78.0 (74.8-83.2)	89.7 (85.8-93.0)	100 (96.0-106)	109 (103-112)	266
Asians	15-16	78.8 (75.5-82.1)	78.6 (73.7-82.8)	89.8 (82.9-96.6)	100 (93.6-105)	105 (99.2-119)	275

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.90, 2.90, and 2.90 respectively.

Perchlorate and Other Anions

Urinary Nitrate (2011 - 2016)†

CAS Number 84145-82-4

Geometric mean and selected percentiles of urine concentrations (in mg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	41.8 (39.7-44.1)	44.5 (42.3-47.2)	71.5 (68.1-76.4)	108 (99.3-116)	133 (119-156)	2467
Total population	13-14	40.8 (38.8-42.9)	42.2 (39.6-45.7)	72.2 (67.8-78.7)	107 (101-112)	136 (123-151)	2644
Total population	15-16	44.5 (42.4-46.7)	48.6 (44.9-50.6)	73.0 (68.7-77.6)	107 (98.9-119)	140 (125-155)	3015
Age 3-5 years	15-16	46.6 (42.4-51.2)	48.1 (43.0-53.1)	76.7 (68.4-84.2)	113 (103-130)	147 (127-209)	459
Age 6-11 years	11-12	47.4 (43.3-52.0)	54.1 (49.2-61.3)	78.6 (74.3-84.0)	99.8 (93.2-113)	121 (104-141)	394
Age 6-11 years	13-14	44.7 (41.0-48.8)	47.3 (42.3-51.7)	79.2 (68.9-86.0)	119 (95.8-138)	151 (124-189)	398
Age 6-11 years	15-16	49.9 (47.3-52.7)	53.9 (48.8-55.8)	76.0 (70.3-82.0)	104 (98.9-111)	126 (109-151)	373
Age 12-19 years	11-12	43.3 (37.4-50.1)	50.4 (39.8-58.3)	71.5 (66.5-78.0)	107 (91.9-121)	135 (108-183)	384
Age 12-19 years	13-14	46.5 (40.8-53.0)	51.1 (42.5-59.3)	83.4 (72.9-89.6)	112 (92.5-120)	122 (115-134)	449
Age 12-19 years	15-16	49.8 (46.2-53.7)	52.6 (49.7-55.8)	79.4 (71.8-87.9)	115 (102-129)	141 (120-169)	395
Age 20+ years	11-12	41.0 (38.7-43.5)	43.4 (40.8-46.2)	70.1 (66.1-75.7)	110 (98.7-117)	135 (117-164)	1689
Age 20+ years	13-14	39.6 (37.6-41.8)	40.7 (38.2-44.1)	70.2 (64.2-76.1)	107 (101-111)	136 (120-153)	1797
Age 20+ years	15-16	43.2 (40.7-45.9)	46.8 (43.4-49.9)	72.2 (66.9-76.8)	106 (96.7-120)	139 (123-165)	1788
Males	11-12	46.9 (43.3-50.8)	48.4 (43.6-53.0)	76.2 (69.9-81.7)	114 (101-124)	150 (116-175)	1251
Males	13-14	43.6 (40.1-47.4)	45.3 (41.0-50.6)	73.1 (64.3-83.5)	108 (99.8-113)	141 (118-157)	1313
Males	15-16	48.7 (45.7-51.9)	52.2 (48.6-56.3)	74.7 (68.5-82.2)	115 (98.8-126)	145 (124-169)	1499
Females	11-12	37.4 (34.4-40.7)	41.2 (36.4-46.0)	67.9 (60.6-73.7)	101 (89.8-114)	120 (113-145)	1216
Females	13-14	38.2 (36.1-40.5)	39.2 (37.5-41.7)	71.4 (67.8-74.8)	107 (99.8-112)	134 (120-141)	1331
Females	15-16	40.8 (38.4-43.4)	43.3 (39.2-47.5)	71.5 (65.9-75.6)	102 (93.1-110)	129 (114-149)	1516
Mexican Americans	11-12	41.1 (36.9-45.8)	45.9 (40.4-51.3)	65.9 (61.8-70.9)	89.8 (78.4-108)	112 (89.8-159)	313
Mexican Americans	13-14	42.0 (36.0-49.0)	45.3 (35.4-56.6)	72.0 (61.7-83.4)	111 (93.0-134)	136 (111-163)	451
Mexican Americans	15-16	44.6 (41.0-48.4)	48.8 (43.8-54.1)	71.8 (66.3-78.2)	101 (89.3-118)	126 (103-163)	578
Non-Hispanic blacks	11-12	44.9 (41.5-48.6)	47.6 (41.6-52.3)	73.8 (67.8-79.8)	107 (97.1-117)	139 (116-150)	663
Non-Hispanic blacks	13-14	46.4 (42.4-50.9)	50.0 (44.9-54.4)	73.6 (66.4-80.6)	105 (92.1-119)	135 (107-172)	574
Non-Hispanic blacks	15-16	49.0 (46.0-52.1)	52.1 (47.3-55.4)	79.2 (73.6-84.6)	119 (100-130)	149 (126-169)	656
Non-Hispanic whites	11-12	41.0 (38.0-44.1)	43.6 (39.6-47.9)	71.9 (66.7-78.0)	110 (96.1-117)	132 (115-169)	810
Non-Hispanic whites	13-14	39.3 (36.6-42.3)	40.2 (37.6-43.9)	71.9 (64.5-80.9)	107 (95.9-111)	128 (114-145)	976
Non-Hispanic whites	15-16	43.5 (40.8-46.5)	47.7 (42.9-50.5)	70.6 (65.8-77.3)	102 (91.8-122)	137 (115-165)	912
All Hispanics	11-12	41.0 (36.7-45.7)	44.4 (40.2-48.9)	67.2 (60.9-73.9)	95.3 (82.9-113)	120 (97.0-159)	566
All Hispanics	13-14	41.1 (36.8-45.8)	44.4 (39.0-50.5)	70.0 (62.7-76.7)	107 (94.2-116)	138 (120-153)	699
All Hispanics	15-16	42.7 (39.6-46.0)	46.7 (43.2-51.0)	70.1 (65.9-75.6)	98.4 (93.2-104)	123 (109-140)	970
Asians	11-12	50.2 (43.7-57.6)	50.8 (45.8-57.5)	84.0 (72.1-91.9)	146 (121-171)	238 (142-380)	341
Asians	13-14	44.4 (38.9-50.7)	45.2 (36.6-53.0)	91.6 (76.2-99.5)	150 (114-183)	189 (139-282)	291
Asians	15-16	49.4 (45.2-53.9)	50.3 (46.9-57.4)	78.7 (72.8-90.3)	137 (111-176)	186 (154-216)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.700, 0.700, and 0.700 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Nitrate (creatinine corrected) (2011 - 2016)†

CAS Number 84145-82-4

Geometric mean and selected percentiles of urine concentrations (in mg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	47.8 (45.3-50.4)	46.0 (43.7-49.2)	67.4 (62.6-71.5)	103 (88.7-117)	137 (117-153)	2465
Total population	13-14	47.2 (45.2-49.4)	46.3 (43.2-49.4)	66.2 (62.9-70.2)	97.3 (91.0-104)	123 (116-133)	2643
Total population	15-16	50.3 (48.1-52.6)	48.7 (46.7-50.7)	70.2 (67.6-73.1)	102 (94.8-112)	138 (120-161)	3012
Age 3-5 years	15-16	112 (106-119)	106 (100-116)	140 (132-151)	194 (175-212)	245 (210-307)	458
Age 6-11 years	11-12	68 (63.3-73.1)	66.4 (60.9-68.7)	87.3 (81.2-95.6)	122 (110-132)	144 (124-156)	393
Age 6-11 years	13-14	67.1 (62.3-72.2)	63.2 (59.4-67.1)	83.6 (72.4-95.2)	118 (99.1-145)	159 (110-230)	398
Age 6-11 years	15-16	72.8 (68.5-77.4)	69.9 (65.9-75.2)	90.6 (82.9-100)	121 (111-147)	175 (133-222)	373
Age 12-19 years	11-12	42.2 (39.6-44.9)	41.5 (38.7-43.8)	54.0 (51.2-57.7)	69.1 (63.6-77.1)	86.9 (69.1-104)	384
Age 12-19 years	13-14	42.2 (39.7-44.8)	41.9 (37.2-44.7)	52.8 (47.9-58.1)	69.2 (61.0-82.0)	85.6 (72.6-107)	449
Age 12-19 years	15-16	47 (44.3-49.9)	46.4 (43.1-49.5)	56.7 (52.4-63.7)	79.9 (67.7-97.7)	104 (83.5-117)	395
Age 20+ years	11-12	46.8 (44.0-49.8)	44.9 (41.7-47.9)	66.8 (60.5-73.0)	105 (87.4-122)	142 (116-165)	1688
Age 20+ years	13-14	46.3 (44.2-48.5)	45.2 (42.5-48.2)	66.0 (62.8-70.2)	97.4 (90.5-105)	123 (113-136)	1796
Age 20+ years	15-16	47.3 (44.8-49.9)	45.6 (43.8-47.5)	67.2 (64.0-69.7)	95.3 (84.3-107)	127 (109-152)	1786
Males	11-12	44.1 (41.8-46.6)	43.8 (40.8-45.9)	59.8 (57.0-62.4)	87.1 (76.9-98.4)	109 (98.4-120)	1250
Males	13-14	43.7 (41.4-46.2)	42.5 (38.9-45.6)	59.8 (55.7-65.5)	84.0 (78.6-94.3)	110 (99.1-128)	1312
Males	15-16	46.4 (43.7-49.4)	43.2 (40.6-46.4)	64.2 (58.8-69.9)	96.3 (82.6-109)	122 (107-155)	1499
Females	11-12	51.6 (47.9-55.5)	50.0 (45.8-54.0)	76.5 (68.9-85.1)	120 (98.1-143)	151 (132-170)	1215
Females	13-14	50.9 (48.2-53.7)	50.5 (47.1-53.5)	71.6 (67.8-75.7)	107 (95.6-113)	135 (118-156)	1331
Females	15-16	54.2 (51.0-57.6)	53.2 (50.1-55.9)	74.1 (71.0-81.2)	109 (95.4-125)	147 (121-175)	1513
Mexican Americans	11-12	46.4 (41.0-52.6)	43.6 (38.9-49.7)	62.4 (52.7-78.0)	86.4 (72.1-124)	110 (84.0-203)	313
Mexican Americans	13-14	48.1 (43.4-53.2)	48.3 (46.0-50.9)	67.3 (62.1-72.0)	99.3 (83.0-116)	128 (100-169)	451
Mexican Americans	15-16	48.8 (46.3-51.4)	45.0 (42.6-49.0)	69.3 (63.0-75.5)	98.7 (88.5-109)	128 (109-153)	577
Non-Hispanic blacks	11-12	35 (33.2-36.9)	34.3 (32.1-36.3)	47.5 (44.0-51.3)	69.2 (62.2-78.1)	89.3 (77.1-102)	663
Non-Hispanic blacks	13-14	35.5 (33.4-37.8)	33.8 (32.0-35.9)	46.2 (43.5-49.7)	67.3 (60.4-75.0)	87.3 (76.6-95.6)	574
Non-Hispanic blacks	15-16	39.1 (36.9-41.4)	37.4 (36.4-39.2)	51.9 (48.0-59.5)	76.9 (71.4-85.2)	98.6 (87.7-104)	654
Non-Hispanic whites	11-12	50.1 (47.2-53.2)	49.0 (45.7-52.3)	68.9 (63.8-79.4)	107 (91.1-129)	144 (121-154)	808
Non-Hispanic whites	13-14	48.6 (46.3-50.9)	47.9 (44.8-51.4)	67.8 (62.9-72.5)	97.4 (89.5-105)	122 (109-136)	975
Non-Hispanic whites	15-16	51.7 (48.6-54.9)	51.4 (47.7-53.4)	71.3 (67.7-75.0)	103 (88.5-119)	143 (113-164)	912
All Hispanics	11-12	45.8 (42.4-49.5)	44.1 (41.7-46.2)	61.5 (55.4-69.3)	85.2 (78.5-95.6)	115 (86.4-159)	566
All Hispanics	13-14	45.9 (43.1-48.9)	46.1 (43.1-48.3)	65.5 (61.0-68.6)	95.4 (85.0-105)	126 (105-137)	699
All Hispanics	15-16	48.5 (46.0-51.2)	45.7 (43.4-49.3)	68.8 (62.4-72.5)	97.8 (88.5-107)	119 (107-140)	969
Asians	11-12	67.2 (61.9-72.9)	62.9 (56.3-68.8)	106 (93.3-118)	178 (153-216)	247 (203-318)	341
Asians	13-14	69.6 (62.2-78.0)	62.7 (52.5-76.8)	101 (85.2-132)	168 (140-194)	200 (173-261)	291
Asians	15-16	68.1 (64.3-72.2)	61.9 (57.3-68.2)	96.8 (87.9-109)	175 (128-207)	243 (180-322)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Perchlorate (2011 - 2016)†

CAS Number 14797-73-0

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.96 (2.79-3.14)	3.01 (2.82-3.24)	5.46 (5.11-5.71)	9.11 (8.46-9.78)	12.8 (11.4-14.2)	2467
Total population	13-14	2.63 (2.44-2.83)	2.62 (2.40-2.83)	4.76 (4.51-5.08)	7.92 (7.26-8.57)	10.6 (9.43-11.9)	2644
Total population	15-16	2.57 (2.43-2.73)	2.56 (2.37-2.72)	4.53 (4.20-5.01)	7.44 (6.57-8.33)	10.3 (9.21-11.5)	3014
Age 3-5 years	15-16	3.58 (3.16-4.06)	3.62 (2.92-4.32)	6.23 (5.38-7.32)	9.87 (8.06-12.6)	14.0 (11.3-27.6)	459
Age 6-11 years	11-12	3.89 (3.45-4.39)	4.31 (3.67-4.86)	6.41 (5.88-7.17)	10.6 (8.97-12.8)	14.9 (12.7-18.5)	394
Age 6-11 years	13-14	3.37 (2.96-3.84)	3.56 (2.95-4.14)	5.61 (4.95-7.08)	9.38 (7.52-10.6)	12.1 (9.70-21.2)	398
Age 6-11 years	15-16	3.39 (3.16-3.65)	3.39 (2.81-3.96)	6.13 (5.44-7.10)	9.59 (8.57-11.3)	11.8 (10.3-14.8)	373
Age 12-19 years	11-12	2.77 (2.33-3.30)	2.82 (2.39-3.60)	5.15 (4.28-5.71)	7.54 (6.40-8.68)	10.8 (7.54-13.3)	384
Age 12-19 years	13-14	2.86 (2.42-3.37)	2.91 (2.47-3.45)	5.11 (3.96-6.69)	9.43 (7.11-10.9)	13.9 (9.83-24.0)	449
Age 12-19 years	15-16	2.70 (2.39-3.05)	2.83 (2.50-3.25)	4.93 (4.23-5.51)	7.02 (6.18-7.82)	9.92 (7.02-15.9)	395
Age 20+ years	11-12	2.90 (2.71-3.10)	2.95 (2.75-3.14)	5.30 (4.94-5.73)	9.16 (8.46-10.3)	12.8 (11.2-14.6)	1689
Age 20+ years	13-14	2.53 (2.34-2.73)	2.44 (2.25-2.76)	4.57 (4.22-4.93)	7.67 (6.94-8.29)	10.2 (8.93-11.7)	1797
Age 20+ years	15-16	2.45 (2.30-2.62)	2.41 (2.25-2.61)	4.28 (4.00-4.69)	6.94 (6.24-8.14)	9.66 (8.43-11.5)	1787
Males	11-12	3.32 (3.05-3.61)	3.43 (3.22-3.67)	5.79 (5.45-6.58)	10.3 (8.70-10.8)	13.3 (11.7-14.6)	1251
Males	13-14	2.73 (2.47-3.03)	2.85 (2.58-3.13)	4.84 (4.53-5.33)	8.18 (6.97-9.43)	11.0 (9.87-13.4)	1313
Males	15-16	2.84 (2.63-3.07)	2.90 (2.64-3.16)	5.01 (4.44-5.36)	7.70 (6.59-8.80)	10.9 (8.43-13.8)	1498
Females	11-12	2.65 (2.44-2.87)	2.64 (2.40-2.96)	4.86 (4.20-5.52)	8.21 (7.78-8.86)	11.7 (10.6-13.2)	1216
Females	13-14	2.53 (2.36-2.70)	2.40 (2.21-2.62)	4.67 (4.14-5.21)	7.81 (7.00-8.45)	9.83 (8.73-11.7)	1331
Females	15-16	2.34 (2.20-2.49)	2.24 (2.10-2.43)	4.15 (3.77-4.52)	7.27 (6.24-8.09)	9.87 (8.76-11.1)	1516
Mexican Americans	11-12	3.46 (2.97-4.02)	3.47 (2.83-3.90)	6.06 (4.99-7.38)	10.5 (7.19-16.4)	15.3 (10.1-24.2)	313
Mexican Americans	13-14	3.02 (2.67-3.42)	3.08 (2.70-3.42)	4.95 (4.55-5.75)	8.69 (6.98-11.5)	12.6 (8.71-18.8)	451
Mexican Americans	15-16	2.62 (2.29-2.99)	2.79 (2.33-3.15)	4.91 (3.85-5.24)	7.09 (5.86-7.93)	8.57 (7.44-9.92)	577
Non-Hispanic blacks	11-12	2.92 (2.69-3.16)	2.91 (2.64-3.27)	5.48 (4.72-5.96)	9.02 (8.11-10.8)	12.2 (11.3-14.7)	663
Non-Hispanic blacks	13-14	2.75 (2.47-3.06)	2.81 (2.49-3.06)	4.76 (4.17-5.42)	7.78 (6.82-8.59)	11.9 (7.92-15.1)	574
Non-Hispanic blacks	15-16	2.52 (2.29-2.77)	2.53 (2.22-2.83)	4.41 (3.70-4.90)	6.94 (6.47-8.22)	9.85 (8.54-10.6)	656
Non-Hispanic whites	11-12	2.93 (2.75-3.13)	3.07 (2.81-3.31)	5.44 (5.04-5.73)	8.70 (8.05-10.4)	12.7 (10.8-14.2)	810
Non-Hispanic whites	13-14	2.57 (2.39-2.77)	2.52 (2.29-2.81)	4.73 (4.37-5.11)	7.70 (7.02-8.29)	9.54 (8.80-10.8)	976
Non-Hispanic whites	15-16	2.67 (2.47-2.88)	2.61 (2.34-2.84)	4.77 (4.21-5.33)	7.49 (6.41-8.57)	11.1 (9.28-12.3)	912
All Hispanics	11-12	3.15 (2.81-3.52)	2.99 (2.52-3.50)	5.49 (4.67-6.27)	9.51 (7.38-11.6)	13.2 (10.4-18.4)	566
All Hispanics	13-14	2.84 (2.51-3.21)	2.82 (2.56-3.16)	4.84 (4.39-5.72)	8.67 (7.00-11.0)	12.6 (9.82-18.8)	699
All Hispanics	15-16	2.40 (2.18-2.64)	2.50 (2.26-2.75)	4.27 (3.80-4.65)	6.89 (5.90-7.47)	8.99 (7.53-9.92)	969
Asians	11-12	2.81 (2.44-3.24)	2.82 (2.36-3.22)	5.48 (4.82-6.39)	9.48 (7.86-12.3)	15.1 (10.3-23.6)	341
Asians	13-14	2.42 (1.97-2.97)	2.36 (1.76-3.27)	5.02 (3.91-6.25)	9.29 (7.70-10.4)	12.1 (10.2-14.0)	291
Asians	15-16	2.14 (1.88-2.44)	2.18 (1.92-2.59)	3.72 (3.38-4.45)	6.24 (4.92-8.67)	8.80 (6.65-10.6)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.050, 0.050, and 0.050 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Perchlorate_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Perchlorate_FactSheet.html

Urinary Perchlorate (creatinine corrected) (2011 - 2016)†

CAS Number 14797-73-0

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.38 (3.17-3.60)	3.28 (2.99-3.60)	5.55 (5.21-5.92)	9.20 (8.31-10.1)	14.7 (11.1-17.4)	2465
Total population	13-14	3.04 (2.80-3.30)	2.98 (2.76-3.24)	4.89 (4.56-5.37)	7.96 (7.25-8.67)	10.7 (9.68-12.4)	2643
Total population	15-16	2.91 (2.70-3.13)	2.80 (2.60-3.01)	4.67 (4.25-5.11)	7.64 (6.84-8.39)	10.4 (9.32-11.8)	3011
Age 3-5 years	15-16	8.64 (7.59-9.83)	8.81 (7.15-9.95)	13.0 (11.6-14.6)	21.3 (17.5-22.9)	31.9 (22.1-44.7)	458
Age 6-11 years	11-12	5.56 (5.05-6.12)	5.25 (4.75-5.95)	8.57 (7.57-9.95)	14.3 (10.4-17.4)	18.0 (13.8-27.3)	393
Age 6-11 years	13-14	5.06 (4.43-5.76)	4.83 (3.90-5.66)	7.71 (6.31-9.13)	11.0 (9.14-15.4)	15.4 (11.5-28.3)	398
Age 6-11 years	15-16	4.95 (4.35-5.64)	4.77 (3.88-5.43)	8.13 (6.69-9.12)	11.7 (9.79-14.0)	18.9 (11.7-28.2)	373
Age 12-19 years	11-12	2.7 (2.50-2.91)	2.87 (2.46-3.22)	3.92 (3.80-4.14)	5.73 (4.55-7.76)	8.14 (5.97-8.43)	384
Age 12-19 years	13-14	2.59 (2.32-2.89)	2.41 (2.05-2.74)	4.06 (3.34-4.56)	6.33 (4.96-8.11)	8.66 (7.05-12.0)	449
Age 12-19 years	15-16	2.55 (2.33-2.78)	2.54 (2.25-2.81)	3.94 (3.44-4.71)	6.04 (5.25-6.59)	6.85 (5.94-10.3)	395
Age 20+ years	11-12	3.31 (3.07-3.56)	3.16 (2.85-3.54)	5.53 (5.16-5.88)	9.16 (8.03-10.2)	14.8 (10.1-18.8)	1688
Age 20+ years	13-14	2.95 (2.72-3.20)	2.92 (2.72-3.19)	4.71 (4.45-5.21)	7.59 (6.77-8.35)	10.4 (9.02-11.7)	1796
Age 20+ years	15-16	2.69 (2.49-2.89)	2.62 (2.44-2.86)	4.22 (3.95-4.59)	6.55 (6.04-7.13)	8.88 (7.96-9.95)	1785
Males	11-12	3.12 (2.84-3.42)	2.99 (2.64-3.34)	4.84 (4.41-5.41)	8.38 (7.08-9.92)	14.7 (9.56-20.0)	1250
Males	13-14	2.74 (2.51-2.99)	2.65 (2.32-2.91)	4.48 (4.00-4.81)	7.09 (6.32-8.25)	10.6 (8.16-13.1)	1312
Males	15-16	2.71 (2.49-2.95)	2.58 (2.38-2.76)	4.16 (3.71-4.81)	7.02 (6.08-8.25)	10.9 (8.77-13.5)	1498
Females	11-12	3.64 (3.41-3.89)	3.61 (3.18-3.96)	6.10 (5.66-6.45)	9.86 (8.80-10.9)	14.7 (11.6-17.7)	1215
Females	13-14	3.36 (3.08-3.67)	3.36 (3.06-3.60)	5.54 (4.86-5.92)	8.59 (7.75-9.45)	11.4 (10.0-13.1)	1331
Females	15-16	3.11 (2.89-3.35)	3.06 (2.86-3.28)	5.08 (4.60-5.51)	8.08 (6.93-8.88)	10.2 (9.25-11.9)	1513
Mexican Americans	11-12	3.9 (3.21-4.75)	3.67 (3.17-4.42)	6.31 (5.16-7.92)	10.9 (8.38-14.4)	17.8 (11.7-28.1)	313
Mexican Americans	13-14	3.46 (3.09-3.87)	3.24 (2.84-3.76)	5.57 (4.61-6.31)	9.16 (7.57-11.6)	12.4 (9.27-18.1)	451
Mexican Americans	15-16	2.86 (2.58-3.17)	2.75 (2.34-3.06)	4.53 (3.68-5.24)	7.69 (6.62-9.68)	10.8 (9.32-12.3)	576
Non-Hispanic blacks	11-12	2.28 (2.10-2.46)	2.12 (1.99-2.31)	3.74 (3.20-4.03)	6.79 (5.15-8.44)	9.35 (7.57-12.2)	663
Non-Hispanic blacks	13-14	2.1 (1.86-2.37)	1.92 (1.81-2.24)	3.39 (3.07-3.92)	5.42 (4.81-7.36)	9.21 (6.46-15.5)	574
Non-Hispanic blacks	15-16	2 (1.84-2.18)	1.94 (1.75-2.16)	3.13 (2.87-3.42)	5.78 (4.71-6.56)	8.83 (6.75-11.3)	654
Non-Hispanic whites	11-12	3.58 (3.36-3.81)	3.50 (3.16-3.82)	5.72 (5.28-6.10)	9.22 (8.19-10.3)	14.8 (10.2-17.7)	808
Non-Hispanic whites	13-14	3.17 (3.00-3.36)	3.13 (2.91-3.34)	4.94 (4.63-5.56)	7.88 (7.08-8.49)	10.4 (9.45-11.4)	975
Non-Hispanic whites	15-16	3.17 (2.94-3.41)	3.01 (2.81-3.32)	4.89 (4.54-5.32)	7.99 (6.84-8.77)	10.5 (9.25-13.0)	912
All Hispanics	11-12	3.52 (2.95-4.20)	3.31 (2.68-4.11)	5.83 (4.67-7.08)	9.91 (8.03-12.1)	15.2 (11.7-19.4)	566
All Hispanics	13-14	3.17 (2.88-3.49)	3.01 (2.78-3.29)	5.11 (4.55-5.66)	8.41 (7.35-9.46)	12.3 (9.18-15.6)	699
All Hispanics	15-16	2.72 (2.49-2.97)	2.55 (2.21-2.85)	4.28 (3.67-5.02)	7.54 (6.61-8.73)	10.7 (9.32-11.8)	968
Asians	11-12	3.76 (3.41-4.15)	3.84 (3.45-4.12)	6.00 (5.25-7.04)	11.2 (8.22-18.8)	21.2 (12.6-33.6)	341
Asians	13-14	3.79 (2.92-4.93)	3.84 (2.79-5.03)	6.42 (4.60-8.73)	10.8 (8.10-15.7)	17.9 (9.69-33.6)	291
Asians	15-16	2.96 (2.55-3.43)	2.84 (2.51-3.46)	4.87 (4.10-6.02)	7.86 (6.66-10.2)	10.9 (8.67-14.1)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Perchlorate_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Perchlorate_FactSheet.html

Urinary Thiocyanate (2011 - 2016)†

CAS Number 302-04-5

Geometric mean and selected percentiles of urine concentrations (in mg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.09 (1.01-1.17)	1.05 (.973-1.17)	2.23 (2.04-2.43)	4.69 (4.03-5.64)	7.16 (5.66-8.20)	2467
Total population	13-14	1.04 (.963-1.13)	1.00 (.884-1.12)	2.10 (1.84-2.40)	4.75 (3.82-5.42)	7.90 (6.56-8.66)	2643
Total population	15-16	1.02 (.942-1.10)	1.02 (.930-1.12)	2.04 (1.83-2.30)	4.25 (3.27-5.70)	7.43 (5.70-8.93)	3005
Age 3-5 years	15-16	.629 (.560-.707)	.646 (.548-.755)	1.24 (.984-1.42)	1.93 (1.58-2.38)	2.72 (2.05-3.64)	458
Age 6-11 years	11-12	.897 (.816-.987)	.982 (.847-1.11)	1.54 (1.35-1.74)	2.23 (1.93-3.02)	3.03 (2.34-4.45)	394
Age 6-11 years	13-14	.906 (.777-1.06)	.972 (.779-1.17)	1.57 (1.34-1.88)	2.44 (2.08-2.89)	3.31 (2.26-4.85)	398
Age 6-11 years	15-16	.818 (.745-.897)	.888 (.779-.996)	1.53 (1.31-1.87)	2.30 (2.04-2.41)	2.52 (2.34-2.86)	373
Age 12-19 years	11-12	.983 (.802-1.21)	.954 (.788-1.13)	1.73 (1.31-2.42)	3.48 (2.44-5.01)	5.86 (3.48-8.47)	384
Age 12-19 years	13-14	1.01 (.875-1.18)	.981 (.837-1.21)	1.86 (1.49-2.41)	3.20 (2.48-4.79)	5.37 (3.28-7.96)	449
Age 12-19 years	15-16	.987 (.869-1.12)	1.17 (.934-1.35)	1.78 (1.60-2.07)	2.89 (2.19-4.96)	4.96 (2.65-8.03)	394
Age 20+ years	11-12	1.13 (1.05-1.21)	1.10 (1.01-1.21)	2.42 (2.18-2.86)	5.35 (4.36-6.21)	7.38 (6.43-8.45)	1689
Age 20+ years	13-14	1.06 (.972-1.16)	1.00 (.877-1.13)	2.26 (1.95-2.62)	5.17 (4.44-5.93)	8.38 (7.16-9.76)	1796
Age 20+ years	15-16	1.07 (.967-1.18)	1.04 (.948-1.13)	2.25 (1.88-2.65)	4.95 (3.81-6.43)	8.36 (6.41-9.83)	1780
Males	11-12	1.27 (1.18-1.38)	1.24 (1.10-1.37)	2.43 (2.11-2.97)	4.91 (3.99-6.43)	7.30 (5.96-8.51)	1251
Males	13-14	1.16 (1.07-1.26)	1.13 (.991-1.26)	2.35 (2.00-2.74)	4.93 (4.33-5.80)	8.12 (6.35-10.8)	1313
Males	15-16	1.18 (1.06-1.31)	1.18 (1.04-1.33)	2.27 (1.91-2.78)	4.80 (3.69-6.52)	8.64 (5.74-12.0)	1495
Females	11-12	.931 (.815-1.07)	.924 (.797-1.07)	1.95 (1.61-2.27)	4.36 (3.63-5.37)	6.83 (5.51-8.20)	1216
Females	13-14	.938 (.849-1.04)	.903 (.771-1.04)	1.81 (1.53-2.10)	4.30 (3.40-5.36)	7.43 (5.52-8.43)	1330
Females	15-16	.885 (.811-.965)	.875 (.771-.982)	1.84 (1.60-2.08)	3.62 (2.78-4.77)	6.41 (4.66-8.30)	1510
Mexican Americans	11-12	.892 (.730-1.09)	.936 (.734-1.16)	1.66 (1.38-1.94)	3.03 (1.90-4.79)	4.24 (2.64-5.25)	313
Mexican Americans	13-14	.824 (.719-.944)	.877 (.749-.992)	1.51 (1.29-1.87)	2.51 (2.31-3.21)	3.96 (2.51-6.35)	451
Mexican Americans	15-16	.833 (.712-.974)	.848 (.716-1.06)	1.50 (1.38-1.71)	2.58 (2.18-3.23)	3.96 (2.82-6.49)	576
Non-Hispanic blacks	11-12	1.29 (1.12-1.48)	1.25 (1.14-1.40)	2.37 (2.01-2.92)	5.75 (4.50-7.28)	9.91 (7.40-12.7)	663
Non-Hispanic blacks	13-14	1.58 (1.42-1.76)	1.37 (1.30-1.54)	3.33 (2.81-3.93)	8.53 (6.12-9.87)	14.1 (9.87-15.2)	574
Non-Hispanic blacks	15-16	1.34 (1.16-1.54)	1.30 (1.06-1.59)	3.07 (2.47-3.74)	7.09 (5.51-8.88)	12.6 (6.33-20.5)	655
Non-Hispanic whites	11-12	1.16 (1.06-1.26)	1.12 (.996-1.28)	2.43 (2.16-2.92)	5.11 (4.03-6.43)	7.30 (5.87-8.45)	810
Non-Hispanic whites	13-14	1.06 (.949-1.19)	1.02 (.861-1.19)	2.20 (1.78-2.67)	4.53 (3.60-5.61)	7.91 (6.16-8.89)	975
Non-Hispanic whites	15-16	1.07 (.962-1.19)	1.10 (.972-1.22)	2.19 (1.83-2.54)	4.28 (3.13-5.78)	7.72 (5.33-9.58)	910
All Hispanics	11-12	.865 (.733-1.02)	.876 (.734-1.02)	1.57 (1.38-1.82)	3.42 (2.20-4.37)	4.84 (3.85-6.40)	566
All Hispanics	13-14	.849 (.753-.957)	.891 (.757-.993)	1.51 (1.31-1.84)	2.93 (2.32-4.55)	5.32 (3.09-6.84)	699
All Hispanics	15-16	.818 (.754-.887)	.822 (.738-.932)	1.50 (1.40-1.62)	2.58 (2.22-3.23)	4.77 (3.49-6.62)	965
Asians	11-12	.646 (.571-.731)	.715 (.624-.765)	1.19 (1.02-1.47)	2.51 (1.82-2.71)	3.19 (2.61-4.11)	341
Asians	13-14	.555 (.478-.644)	.567 (.503-.640)	.983 (.817-1.20)	1.99 (1.47-2.37)	3.17 (2.12-4.08)	291
Asians	15-16	.547 (.500-.598)	.587 (.512-.700)	1.17 (1.02-1.27)	1.83 (1.54-2.23)	2.63 (2.00-3.27)	327

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.020, 0.020, and 0.020 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Thiocyanate (creatinine corrected) (2011 - 2016)†

CAS Number 302-04-5

Geometric mean and selected percentiles of urine concentrations (in mg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.24 (1.18-1.31)	1.19 (1.11-1.28)	2.20 (2.12-2.37)	5.10 (4.05-5.98)	8.53 (6.73-10.9)	2465
Total population	13-14	1.21 (1.13-1.29)	1.15 (1.06-1.23)	2.19 (1.96-2.53)	4.66 (4.14-5.35)	8.07 (7.12-9.33)	2642
Total population	15-16	1.15 (1.08-1.22)	1.16 (1.05-1.28)	2.15 (1.96-2.41)	4.39 (3.61-5.26)	6.87 (5.86-7.62)	3002
Age 3-5 years	15-16	1.52 (1.35-1.70)	1.62 (1.46-1.76)	2.64 (2.44-3.02)	4.28 (3.35-5.33)	5.56 (4.73-6.17)	457
Age 6-11 years	11-12	1.28 (1.16-1.40)	1.27 (1.12-1.39)	2.11 (1.89-2.34)	3.11 (2.69-4.13)	4.73 (3.62-5.77)	393
Age 6-11 years	13-14	1.36 (1.18-1.57)	1.41 (1.19-1.62)	2.34 (1.92-2.62)	3.39 (2.69-4.29)	5.02 (3.23-7.47)	398
Age 6-11 years	15-16	1.19 (1.08-1.32)	1.19 (1.08-1.35)	2.13 (1.84-2.42)	3.33 (2.65-4.14)	4.17 (3.72-5.14)	373
Age 12-19 years	11-12	0.958 (.831-1.10)	.949 (.803-1.19)	1.49 (1.35-1.89)	2.82 (2.12-3.30)	3.77 (2.97-4.91)	384
Age 12-19 years	13-14	0.919 (.810-1.04)	.926 (.721-1.06)	1.45 (1.28-1.64)	2.70 (2.33-3.40)	4.33 (2.71-8.41)	449
Age 12-19 years	15-16	0.928 (.815-1.06)	.958 (.787-1.11)	1.69 (1.41-1.90)	2.77 (2.03-3.73)	4.37 (2.76-6.67)	394
Age 20+ years	11-12	1.29 (1.22-1.35)	1.21 (1.12-1.31)	2.41 (2.19-2.67)	5.70 (4.69-7.11)	9.90 (7.75-11.3)	1688
Age 20+ years	13-14	1.24 (1.15-1.34)	1.17 (1.08-1.27)	2.31 (2.03-2.75)	5.11 (4.54-6.09)	8.83 (7.82-10.2)	1795
Age 20+ years	15-16	1.17 (1.08-1.26)	1.17 (1.02-1.33)	2.23 (1.97-2.52)	4.79 (3.87-5.95)	7.34 (6.52-8.03)	1778
Males	11-12	1.2 (1.11-1.29)	1.16 (1.06-1.28)	2.16 (2.07-2.48)	5.00 (3.77-6.42)	7.75 (6.10-10.4)	1250
Males	13-14	1.17 (1.09-1.25)	1.14 (1.03-1.24)	2.10 (1.92-2.49)	5.08 (4.41-5.70)	8.07 (6.68-9.68)	1312
Males	15-16	1.12 (1.02-1.24)	1.13 (.952-1.32)	2.15 (1.86-2.46)	4.59 (3.24-5.70)	6.74 (5.67-7.52)	1495
Females	11-12	1.28 (1.17-1.40)	1.22 (1.11-1.38)	2.20 (2.01-2.59)	5.10 (3.89-6.02)	10.4 (6.32-14.0)	1215
Females	13-14	1.25 (1.14-1.38)	1.16 (1.06-1.25)	2.23 (1.89-2.60)	4.36 (3.83-5.14)	7.86 (6.32-9.96)	1330
Females	15-16	1.17 (1.09-1.26)	1.17 (1.06-1.30)	2.12 (1.96-2.41)	4.33 (3.60-5.32)	6.93 (5.63-7.98)	1507
Mexican Americans	11-12	1.01 (.831-1.22)	.935 (.790-1.20)	1.90 (1.45-2.32)	3.28 (2.53-3.73)	4.49 (3.46-6.12)	313
Mexican Americans	13-14	0.943 (.828-1.07)	.917 (.853-1.03)	1.58 (1.27-1.87)	2.94 (2.27-3.92)	4.62 (3.15-5.41)	451
Mexican Americans	15-16	0.914 (.805-1.04)	.887 (.776-1.05)	1.70 (1.50-1.89)	3.07 (2.41-3.70)	4.09 (3.56-4.92)	575
Non-Hispanic blacks	11-12	1 (.901-1.12)	.958 (.892-1.04)	1.96 (1.71-2.23)	3.72 (3.31-4.55)	6.36 (4.89-7.76)	663
Non-Hispanic blacks	13-14	1.21 (1.07-1.36)	1.04 (.979-1.19)	2.26 (2.01-3.17)	6.42 (5.00-7.69)	9.44 (7.73-10.7)	574
Non-Hispanic blacks	15-16	1.06 (.924-1.22)	1.03 (.876-1.16)	2.29 (1.74-3.23)	5.47 (4.04-6.96)	7.44 (5.35-10.6)	653
Non-Hispanic whites	11-12	1.41 (1.31-1.52)	1.35 (1.23-1.46)	2.66 (2.21-2.91)	5.78 (4.49-7.41)	10.4 (7.41-12.8)	808
Non-Hispanic whites	13-14	1.31 (1.20-1.43)	1.27 (1.17-1.38)	2.43 (2.03-2.86)	4.88 (4.20-6.30)	8.53 (7.38-10.4)	974
Non-Hispanic whites	15-16	1.27 (1.16-1.40)	1.30 (1.13-1.49)	2.30 (2.03-2.68)	4.79 (3.60-6.16)	7.28 (6.16-8.31)	910
All Hispanics	11-12	0.968 (.826-1.13)	.923 (.805-1.11)	1.76 (1.45-2.07)	3.26 (2.53-3.76)	5.10 (3.76-6.40)	566
All Hispanics	13-14	0.949 (.836-1.08)	.913 (.829-1.03)	1.64 (1.34-1.89)	3.11 (2.34-4.24)	4.98 (3.12-8.34)	699
All Hispanics	15-16	0.927 (.858-1.00)	.899 (.808-1.05)	1.72 (1.56-1.87)	3.18 (2.69-3.73)	4.36 (3.81-5.10)	964
Asians	11-12	0.864 (.775-.964)	.868 (.767-.993)	1.44 (1.30-1.63)	2.31 (1.96-2.81)	3.69 (2.60-5.35)	341
Asians	13-14	0.87 (.761-.995)	.828 (.749-.933)	1.47 (1.29-1.82)	3.12 (1.99-3.61)	3.77 (2.99-4.62)	291
Asians	15-16	0.747 (.683-.817)	.777 (.652-.907)	1.44 (1.24-1.55)	2.44 (1.93-2.81)	3.27 (2.73-4.34)	327

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Perfluoroalkyl and Polyfluoroalkyl Substances: Surfactants

Serum Perfluorobutane sulfonic acid (PFBS) (2011 - 2014)

CAS Number 375-73-5

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	1904
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2168
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	344
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	402
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	1560
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	1766
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	966
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1032
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	938
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1136
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	211
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	332
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	485
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	455
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	666
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	862
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	406
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	537
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	291
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	236

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorobutane sulfonic acid (PFBS) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 375-73-5

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	639
Age 3-5 years	13-14	*	<LOD	<LOD	<LOD	<LOD	181
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	.130 (<LOD-.140)	458
Males	13-14	*	<LOD	<LOD	<LOD	.130 (<LOD-.130)	343
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	296
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	220
Other	13-14	*	<LOD	<LOD	<LOD	.130 (<LOD-.140)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorodecanoic acid (PFDA) (2011 - 2016)

CAS Number 335-76-2

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.199 (.181-.220)	.190 (.170-.210)	.300 (.270-.340)	.480 (.420-.580)	.690 (.600-.770)	1904
Total population	13-14	.185 (.165-.208)	.200 (.200-.200)	.300 (.300-.300)	.500 (.400-.600)	.700 (.600-.900)	2168
Total population	15-16	.154 (.140-.169)	.100 (.100-.200)	.300 (.200-.300)	.400 (.400-.600)	.700 (.500-.900)	1993
Age 12-19 years	11-12	.146 (.126-.168)	.150 (.120-.170)	.200 (.180-.230)	.290 (.240-.340)	.360 (.290-.560)	344
Age 12-19 years	13-14	.136 (.122-.152)	.100 (.100-.200)	.200 (.200-.200)	.300 (.200-.400)	.400 (.300-.500)	402
Age 12-19 years	15-16	*	.100 (<LOD-.100)	.200 (.100-.200)	.200 (.200-.400)	.300 (.200-.500)	353
Age 20 + years	11-12	.209 (.189-.230)	.200 (.180-.230)	.320 (.280-.370)	.510 (.440-.590)	.730 (.630-.850)	1560
Age 20 + years	13-14	.193 (.171-.218)	.200 (.200-.200)	.300 (.300-.400)	.500 (.400-.600)	.800 (.600-.900)	1766
Age 20 + years	15-16	.160 (.144-.178)	.200 (.100-.200)	.300 (.200-.300)	.400 (.400-.600)	.700 (.500-1.00)	1640
Males	11-12	.206 (.184-.232)	.200 (.180-.230)	.310 (.260-.370)	.440 (.380-.550)	.620 (.480-.810)	966
Males	13-14	.198 (.175-.225)	.200 (.200-.200)	.300 (.300-.400)	.500 (.400-.700)	.800 (.600-1.00)	1032
Males	15-16	.153 (.137-.172)	.100 (.100-.200)	.300 (.200-.300)	.400 (.300-.600)	.700 (.400-1.00)	964
Females	11-12	.193 (.177-.211)	.190 (.170-.210)	.290 (.260-.340)	.530 (.410-.640)	.690 (.640-.830)	938
Females	13-14	.174 (.155-.195)	.200 (.100-.200)	.300 (.200-.300)	.500 (.400-.500)	.700 (.500-.900)	1136
Females	15-16	.154 (.141-.168)	.100 (.100-.200)	.200 (.200-.300)	.400 (.400-.600)	.800 (.500-1.10)	1029
Mexican Americans	11-12	.176 (.150-.205)	.170 (.150-.200)	.260 (.210-.300)	.380 (.300-.530)	.530 (.360-.600)	211
Mexican Americans	13-14	.145 (.125-.169)	.100 (.100-.200)	.200 (.200-.300)	.300 (.200-.500)	.400 (.300-1.40)	332
Mexican Americans	15-16	.124 (.111-.138)	.100 (<LOD-.100)	.200 (.200-.200)	.300 (.200-.300)	.400 (.300-.800)	370
Non-Hispanic blacks	11-12	.214 (.193-.237)	.200 (.180-.220)	.330 (.280-.380)	.590 (.420-.850)	.880 (.670-1.06)	485
Non-Hispanic blacks	13-14	.200 (.162-.246)	.200 (.200-.200)	.300 (.200-.500)	.600 (.400-.900)	.900 (.700-1.20)	455
Non-Hispanic blacks	15-16	.155 (.140-.171)	.100 (.100-.200)	.300 (.200-.300)	.500 (.400-.500)	.800 (.500-1.10)	439
Non-Hispanic whites	11-12	.193 (.171-.219)	.190 (.170-.220)	.290 (.260-.340)	.440 (.360-.590)	.620 (.480-.740)	666
Non-Hispanic whites	13-14	.184 (.158-.213)	.200 (.200-.200)	.300 (.200-.400)	.500 (.400-.500)	.700 (.500-.800)	862
Non-Hispanic whites	15-16	.150 (.136-.166)	.100 (.100-.200)	.200 (.200-.300)	.400 (.300-.500)	.600 (.400-.700)	619
All Hispanics	11-12	.182 (.156-.212)	.170 (.150-.200)	.270 (.210-.330)	.430 (.330-.530)	.540 (.440-.760)	406
All Hispanics	13-14	.150 (.135-.167)	.200 (.100-.200)	.200 (.200-.300)	.300 (.300-.400)	.400 (.300-1.00)	537
All Hispanics	15-16	*	.100 (<LOD-.100)	.200 (.200-.300)	.300 (.300-.400)	.500 (.400-.600)	629
Asians	11-12	.367 (.308-.438)	.350 (.280-.420)	.670 (.510-.870)	1.35 (.870-2.05)	2.05 (1.19-2.52)	291
Asians	13-14	.360 (.294-.439)	.400 (.300-.500)	.700 (.500-.900)	1.50 (1.00-2.10)	2.20 (1.60-3.30)	236
Asians	15-16	.308 (.254-.373)	.300 (.200-.400)	.700 (.400-.900)	1.30 (.800-1.90)	2.10 (1.00-4.60)	220

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.100, 0.100, and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorodecanoic acid (PFDA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 335-76-2

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.170 (.140-.220)	.300 (.240-.340)	.370 (.300-.420)	639
Age 3-5 years	13-14	*	.100 (<LOD-.130)	.170 (.130-.270)	.340 (.190-.440)	.370 (.230-.930)	181
Age 6-11 years	13-14	*	<LOD	.180 (.160-.200)	.290 (.240-.320)	.350 (.310-.390)	458
Males	13-14	*	<LOD	.170 (.120-.230)	.300 (.230-.340)	.370 (.260-.460)	343
Females	13-14	*	.100 (<LOD-.110)	.180 (.160-.230)	.290 (.240-.350)	.380 (.280-.470)	296
All Hispanics	13-14	*	<LOD	.170 (.140-.210)	.270 (.230-.340)	.400 (.270-.420)	220
Other	13-14	*	<LOD	.170 (.130-.230)	.300 (.240-.350)	.370 (.290-.460)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorododecanoic acid (PFDoDA) (2011 - 2016)

CAS Number 307-55-1

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	.140 (<LOD-.240)	1904
Total population	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	2168
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	1993
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	344
Age 12-19 years	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (<LOD-.300)	402
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	353
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	.150 (<LOD-.280)	1560
Age 20 + years	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	1766
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	1640
Males	11-12	*	<LOD	<LOD	<LOD	.140 (<LOD-.240)	966
Males	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	1032
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	964
Females	11-12	*	<LOD	<LOD	<LOD	.130 (<LOD-.280)	938
Females	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	1136
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1029
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.230)	211
Mexican Americans	13-14	*	<LOD	<LOD	.200 (<LOD-.300)	.300 (.200-.300)	332
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	370
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.160)	485
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	455
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	439
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	.130 (<LOD-.290)	666
Non-Hispanic whites	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (<LOD-.300)	862
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	619
All Hispanics	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.150)	406
All Hispanics	13-14	*	<LOD	<LOD	.200 (.100-.300)	.300 (.200-.300)	537
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	629
Asians	11-12	*	<LOD	<LOD	.180 (.130-.350)	.360 (.180-.440)	291
Asians	13-14	*	<LOD	.100 (<LOD-.200)	.200 (.200-.500)	.300 (.200-.500)	236
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	220

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.100, 0.100, and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorododecanoic acid (PFDoDA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 307-55-1

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	639
Age 3-5 years	13-14	*	<LOD	<LOD	<LOD	<LOD	181
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	458
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	343
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	296
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	220
Other	13-14	*	<LOD	<LOD	<LOD	<LOD	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluoroheptanoic acid (PFHpA) (2011 - 2014)

CAS Number 375-85-9

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.140 (.120-.170)	.220 (.180-.260)	1904
Total population	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.200 (.100-.200)	2168
Age 12-19 years	11-12	*	<LOD	.100 (<LOD-.130)	.160 (.130-.200)	.190 (.160-.270)	344
Age 12-19 years	13-14	*	<LOD	<LOD	.200 (.100-.200)	.200 (.100-.600)	402
Age 20 + years	11-12	*	<LOD	<LOD	.140 (.120-.180)	.220 (.160-.280)	1560
Age 20 + years	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.100 (.100-.200)	1766
Males	11-12	*	<LOD	<LOD	.140 (.120-.200)	.220 (.180-.270)	966
Males	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.100 (.100-.200)	1032
Females	11-12	*	<LOD	<LOD	.140 (.110-.180)	.200 (.140-.360)	938
Females	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.200 (.100-.300)	1136
Mexican Americans	11-12	*	<LOD	<LOD	.130 (<LOD-.180)	.170 (.120-.230)	211
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.100 (<LOD-.300)	332
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.130 (.100-.150)	.180 (.140-.230)	485
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.100 (<LOD-.200)	455
Non-Hispanic whites	11-12	*	<LOD	<LOD	.150 (.120-.190)	.230 (.160-.290)	666
Non-Hispanic whites	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.200 (.100-.200)	862
All Hispanics	11-12	*	<LOD	<LOD	.140 (.100-.180)	.190 (.160-.230)	406
All Hispanics	13-14	*	<LOD	<LOD	<LOD	.100 (<LOD-.300)	537
Asians	11-12	*	<LOD	<LOD	.160 (.120-.220)	.230 (.180-.310)	291
Asians	13-14	*	<LOD	<LOD	.100 (<LOD-.100)	.100 (.100-.200)	236

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluoroheptanoic acid (PFHpA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 375-85-9

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.150 (.110-.190)	.210 (.150-.300)	639
Age 3-5 years	13-14	*	<LOD	.110 (<LOD-.170)	.190 (.140-.310)	.310 (.180-.440)	181
Age 6-11 years	13-14	*	<LOD	<LOD	.130 (<LOD-.150)	.170 (.130-.240)	458
Males	13-14	*	<LOD	<LOD	.140 (.110-.180)	.190 (.140-.300)	343
Females	13-14	*	<LOD	<LOD	.150 (<LOD-.250)	.230 (.150-.390)	296
All Hispanics	13-14	*	<LOD	<LOD	.170 (.110-.230)	.230 (.170-.250)	220
Other	13-14	*	<LOD	<LOD	.150 (.100-.190)	.190 (.140-.390)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorohexane sulfonic acid (PFHxS) (2011 - 2016)

CAS Number 355-46-4

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.28 (1.15-1.43)	1.27 (1.11-1.45)	2.26 (2.01-2.61)	3.85 (3.28-4.61)	5.44 (4.61-6.82)	1904
Total population	13-14	1.35 (1.20-1.52)	1.40 (1.20-1.60)	2.40 (2.20-2.70)	4.10 (3.60-4.80)	5.60 (4.70-7.10)	2168
Total population	15-16	1.18 (1.08-1.30)	1.20 (1.10-1.40)	2.10 (1.80-2.30)	3.40 (3.00-3.90)	4.90 (4.10-5.80)	1993
Age 12-19 years	11-12	1.28 (1.08-1.51)	1.13 (.920-1.45)	2.17 (1.53-2.79)	4.53 (2.76-5.72)	6.45 (4.21-9.34)	344
Age 12-19 years	13-14	1.27 (1.06-1.53)	1.10 (.900-1.40)	2.10 (1.50-2.90)	4.10 (2.50-6.30)	6.30 (4.00-9.40)	402
Age 12-19 years	15-16	.918 (.778-1.08)	.900 (.700-1.20)	1.50 (1.20-1.70)	2.30 (1.80-2.60)	3.10 (2.30-5.80)	353
Age 20 + years	11-12	1.28 (1.14-1.43)	1.28 (1.13-1.47)	2.29 (2.02-2.62)	3.76 (3.17-4.61)	5.05 (4.61-6.44)	1560
Age 20 + years	13-14	1.36 (1.21-1.53)	1.40 (1.30-1.60)	2.50 (2.20-2.80)	4.10 (3.60-4.80)	5.50 (4.80-7.10)	1766
Age 20 + years	15-16	1.22 (1.11-1.34)	1.30 (1.20-1.40)	2.10 (1.80-2.50)	3.50 (3.00-4.20)	5.00 (4.10-6.20)	1640
Males	11-12	1.68 (1.50-1.89)	1.73 (1.46-2.03)	2.75 (2.37-3.28)	4.46 (3.76-5.09)	6.90 (4.99-8.59)	966
Males	13-14	1.84 (1.59-2.12)	1.90 (1.60-2.10)	3.00 (2.50-3.40)	4.60 (4.00-5.70)	6.30 (5.20-8.80)	1032
Males	15-16	1.61 (1.46-1.78)	1.60 (1.50-1.70)	2.50 (2.20-2.90)	3.90 (3.30-5.00)	5.80 (4.40-6.40)	964
Females	11-12	.989 (.876-1.12)	.970 (.880-1.07)	1.71 (1.39-2.05)	2.96 (2.23-4.28)	4.61 (3.00-5.61)	938
Females	13-14	1.01 (.909-1.12)	1.00 (.900-1.10)	1.80 (1.60-2.10)	3.40 (2.80-4.10)	4.90 (3.80-5.90)	1136
Females	15-16	.876 (.775-.990)	.900 (.800-1.00)	1.50 (1.40-1.70)	2.50 (2.10-3.50)	3.80 (2.90-5.70)	1029
Mexican Americans	11-12	.927 (.771-1.12)	.980 (.690-1.28)	1.56 (1.22-2.06)	2.26 (1.95-2.54)	2.78 (2.26-4.78)	211
Mexican Americans	13-14	.973 (.866-1.09)	1.10 (1.00-1.10)	1.60 (1.40-1.80)	2.40 (2.10-2.70)	2.90 (2.60-4.30)	332
Mexican Americans	15-16	.900 (.710-1.14)	1.00 (.700-1.20)	1.60 (1.30-1.90)	2.50 (1.90-3.30)	3.40 (2.40-4.30)	370
Non-Hispanic blacks	11-12	1.13 (1.03-1.23)	1.10 (1.01-1.22)	2.10 (1.84-2.35)	3.44 (2.86-4.15)	4.97 (3.68-6.89)	485
Non-Hispanic blacks	13-14	1.16 (1.00-1.33)	1.20 (1.00-1.40)	2.20 (1.80-2.70)	3.60 (2.90-5.10)	5.60 (3.80-9.80)	455
Non-Hispanic blacks	15-16	.997 (.794-1.25)	1.20 (.900-1.40)	2.00 (1.70-2.40)	3.20 (2.40-4.50)	4.50 (3.20-6.20)	439
Non-Hispanic whites	11-12	1.46 (1.28-1.66)	1.41 (1.20-1.69)	2.50 (2.10-3.00)	4.30 (3.47-4.99)	5.62 (4.70-7.60)	666
Non-Hispanic whites	13-14	1.53 (1.28-1.83)	1.50 (1.30-1.90)	2.70 (2.20-3.30)	4.80 (3.80-5.70)	5.90 (4.80-9.30)	862
Non-Hispanic whites	15-16	1.32 (1.19-1.46)	1.30 (1.20-1.50)	2.20 (1.80-2.60)	3.50 (3.00-4.80)	5.80 (4.20-6.40)	619
All Hispanics	11-12	.904 (.737-1.11)	.950 (.730-1.23)	1.66 (1.36-2.06)	2.54 (2.06-3.15)	3.59 (2.52-5.42)	406
All Hispanics	13-14	1.00 (.875-1.14)	1.10 (1.00-1.20)	1.80 (1.50-2.00)	2.70 (2.20-3.60)	3.90 (2.90-4.50)	537
All Hispanics	15-16	.908 (.741-1.11)	1.00 (.800-1.20)	1.60 (1.30-2.00)	2.60 (1.90-3.60)	3.50 (2.50-5.40)	629
Asians	11-12	.942 (.791-1.12)	.980 (.820-1.20)	1.69 (1.41-1.94)	2.62 (2.13-3.50)	3.72 (2.75-5.98)	291
Asians	13-14	1.15 (.948-1.40)	1.20 (.900-1.60)	2.20 (1.70-2.70)	3.30 (2.60-4.20)	4.40 (3.30-5.90)	236
Asians	15-16	.946 (.821-1.09)	1.00 (.800-1.20)	1.70 (1.50-2.30)	2.90 (2.30-3.80)	3.80 (2.80-4.40)	220

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.100, 0.100, and 0.100 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorohexane sulfonic acid (PFHxS) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 355-464-4

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.843 (.756-.939)	.810 (.710-.900)	1.24 (1.08-1.47)	2.14 (1.62-2.81)	3.12 (2.29-4.59)	639
Age 3-5 years	13-14	.715 (.617-.828)	.740 (.580-.830)	1.04 (.920-1.24)	1.55 (1.07-2.41)	1.62 (1.31-3.66)	181
Age 6-11 years	13-14	.913 (.803-1.04)	.850 (.730-.960)	1.41 (1.13-1.65)	2.33 (1.84-3.20)	4.14 (2.33-6.42)	458
Males	13-14	.933 (.813-1.07)	.930 (.770-1.02)	1.54 (1.24-1.59)	2.32 (1.64-3.70)	3.73 (2.32-5.97)	343
Females	13-14	.757 (.672-.853)	.740 (.620-.830)	1.03 (.930-1.19)	1.65 (1.41-2.26)	2.94 (1.75-3.74)	296
All Hispanics	13-14	.787 (.697-.890)	.740 (.640-.810)	1.13 (1.01-1.39)	2.20 (1.31-3.20)	2.81 (1.88-5.89)	220
Other	13-14	.862 (.761-.977)	.840 (.710-.940)	1.29 (1.08-1.55)	2.14 (1.62-3.02)	3.56 (2.32-4.74)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorononanoic acid (PFNA) (2011 - 2016)

CAS Number 375-95-1

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.881 (.801-.968)	.860 (.750-.960)	1.30 (1.13-1.45)	1.96 (1.68-2.21)	2.54 (2.28-2.89)	1904
Total population	13-14	.675 (.613-.742)	.700 (.600-.800)	1.00 (.900-1.20)	1.60 (1.40-1.70)	2.00 (1.80-2.30)	2168
Total population	15-16	.577 (.535-.623)	.600 (.500-.600)	.900 (.800-1.00)	1.40 (1.20-1.50)	1.90 (1.50-2.20)	1993
Age 12-19 years	11-12	.741 (.638-.861)	.680 (.620-.810)	1.00 (.800-1.33)	1.67 (1.12-2.06)	2.06 (1.51-3.07)	344
Age 12-19 years	13-14	.599 (.492-.730)	.500 (.500-.600)	.800 (.600-1.30)	1.50 (.800-2.80)	2.00 (1.00-3.40)	402
Age 12-19 years	15-16	.481 (.440-.526)	.500 (.400-.600)	.700 (.600-.800)	1.00 (.800-1.20)	1.20 (1.00-1.30)	353
Age 20 + years	11-12	.903 (.823-.992)	.890 (.800-.980)	1.34 (1.16-1.48)	2.00 (1.71-2.33)	2.64 (2.37-3.03)	1560
Age 20 + years	13-14	.685 (.625-.752)	.700 (.600-.800)	1.00 (1.00-1.20)	1.60 (1.40-1.70)	2.00 (1.80-2.30)	1766
Age 20 + years	15-16	.591 (.546-.640)	.600 (.500-.600)	.900 (.800-1.00)	1.40 (1.20-1.60)	1.90 (1.60-2.30)	1640
Males	11-12	.946 (.836-1.07)	.930 (.810-1.09)	1.36 (1.18-1.52)	1.89 (1.61-2.37)	2.57 (2.14-3.12)	966
Males	13-14	.763 (.682-.854)	.800 (.700-.800)	1.10 (1.00-1.30)	1.70 (1.50-1.80)	2.20 (1.80-2.40)	1032
Males	15-16	.633 (.577-.693)	.600 (.600-.700)	1.00 (.900-1.10)	1.40 (1.20-1.60)	1.90 (1.60-2.20)	964
Females	11-12	.824 (.762-.890)	.770 (.700-.870)	1.19 (1.00-1.44)	2.00 (1.69-2.28)	2.52 (2.20-2.76)	938
Females	13-14	.600 (.549-.657)	.600 (.500-.700)	.900 (.900-1.00)	1.50 (1.30-1.60)	1.90 (1.70-2.10)	1136
Females	15-16	.529 (.489-.572)	.500 (.500-.600)	.900 (.800-1.00)	1.30 (1.10-1.50)	1.80 (1.40-2.50)	1029
Mexican Americans	11-12	.810 (.631-1.04)	.790 (.580-1.10)	1.17 (.840-1.66)	1.74 (1.19-2.47)	2.36 (1.66-2.85)	211
Mexican Americans	13-14	.538 (.452-.641)	.500 (.500-.600)	.800 (.600-.900)	1.10 (.800-1.70)	1.60 (1.10-2.10)	332
Mexican Americans	15-16	.479 (.392-.585)	.500 (.400-.600)	.700 (.500-1.00)	1.10 (.800-1.60)	1.50 (1.10-2.00)	370
Non-Hispanic blacks	11-12	.939 (.842-1.05)	.950 (.870-1.00)	1.35 (1.18-1.59)	2.03 (1.60-3.03)	3.12 (1.89-5.08)	485
Non-Hispanic blacks	13-14	.665 (.564-.783)	.700 (.600-.800)	1.10 (.900-1.30)	1.70 (1.30-2.10)	2.20 (1.80-2.50)	455
Non-Hispanic blacks	15-16	.572 (.505-.648)	.600 (.500-.700)	.900 (.800-1.20)	1.50 (1.30-1.60)	1.80 (1.50-2.00)	439
Non-Hispanic whites	11-12	.864 (.766-.975)	.850 (.710-.980)	1.26 (1.04-1.45)	1.83 (1.54-2.21)	2.37 (2.00-3.14)	666
Non-Hispanic whites	13-14	.699 (.621-.786)	.700 (.600-.800)	1.10 (1.00-1.20)	1.60 (1.40-1.80)	2.00 (1.70-2.40)	862
Non-Hispanic whites	15-16	.576 (.533-.623)	.600 (.500-.600)	.900 (.800-1.00)	1.30 (1.10-1.50)	1.90 (1.40-2.30)	619
All Hispanics	11-12	.850 (.699-1.03)	.840 (.660-1.00)	1.21 (.970-1.67)	1.99 (1.51-2.53)	2.53 (2.07-2.85)	406
All Hispanics	13-14	.549 (.484-.622)	.600 (.500-.600)	.800 (.700-.900)	1.10 (.900-1.50)	1.60 (1.20-2.10)	537
All Hispanics	15-16	.520 (.452-.599)	.500 (.500-.600)	.800 (.700-1.00)	1.20 (1.00-1.50)	1.60 (1.40-1.80)	629
Asians	11-12	1.18 (.996-1.40)	1.18 (.970-1.49)	1.94 (1.56-2.38)	2.96 (2.52-3.50)	3.72 (3.04-4.31)	291
Asians	13-14	.893 (.789-1.01)	.900 (.800-1.10)	1.50 (1.20-1.60)	2.20 (1.80-2.80)	3.10 (2.40-4.20)	236
Asians	15-16	.771 (.681-.873)	.800 (.700-.900)	1.30 (1.20-1.50)	2.10 (1.60-2.50)	2.60 (2.20-3.20)	220

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.082, 0.100, and 0.100 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorononanoic acid (PFNA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 375-95-1

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.794 (.681-.926)	.700 (.610-.820)	1.08 (.920-1.35)	2.03 (1.29-3.42)	3.26 (1.94-5.35)	639
Age 3-5 years	13-14	.764 (.630-.928)	.620 (.540-.760)	1.11 (.840-1.53)	2.03 (1.21-5.03)	3.49 (1.41-7.95)	181
Age 6-11 years	13-14	.809 (.682-.960)	.750 (.630-.860)	1.07 (.920-1.38)	1.98 (1.16-3.56)	3.19 (1.55-4.88)	458
Males	13-14	.829 (.686-1.00)	.720 (.610-.850)	1.10 (.890-1.59)	2.34 (1.17-5.35)	3.85 (1.72-6.93)	343
Females	13-14	.759 (.638-.902)	.680 (.570-.870)	1.07 (.890-1.35)	1.88 (1.21-2.84)	2.58 (1.42-4.06)	296
All Hispanics	13-14	.753 (.622-.912)	.640 (.540-.760)	1.03 (.790-1.53)	1.98 (1.15-3.26)	3.00 (1.59-9.32)	220
Other	13-14	.808 (.681-.958)	.720 (.600-.870)	1.09 (.920-1.38)	2.08 (1.34-3.47)	3.46 (1.88-5.35)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorooctanoic acid (PFOA) (2011 - 2016)

Sum of linear and branched PFOA isomers

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.08 (1.95-2.22)	2.08 (1.96-2.26)	3.03 (2.76-3.27)	4.35 (3.82-4.85)	5.68 (5.02-6.49)	1904
Total population	13-14	1.94 (1.76-2.14)	2.07 (1.87-2.20)	3.07 (2.67-3.37)	4.27 (3.57-5.17)	5.57 (4.60-6.27)	2165
Total population	15-16	1.56 (1.47-1.66)	1.57 (1.47-1.77)	2.47 (2.27-2.57)	3.37 (3.07-3.57)	4.17 (3.87-4.67)	1993
Age 12-19 years	11-12	1.80 (1.71-1.91)	1.74 (1.67-1.89)	2.41 (2.17-2.62)	2.93 (2.68-3.19)	3.59 (2.93-4.25)	344
Age 12-19 years	13-14	1.66 (1.50-1.84)	1.67 (1.37-1.97)	2.20 (1.97-2.57)	2.87 (2.57-3.40)	3.47 (2.87-4.37)	401
Age 12-19 years	15-16	1.25 (1.14-1.37)	1.27 (1.17-1.47)	1.67 (1.47-1.87)	2.07 (1.77-2.57)	2.47 (2.07-2.97)	353
Age 20+ years	11-12	2.12 (1.98-2.28)	2.16 (2.01-2.33)	3.15 (2.90-3.36)	4.64 (3.93-5.25)	5.94 (5.34-7.45)	1560
Age 20+ years	13-14	1.98 (1.79-2.19)	2.07 (1.90-2.27)	3.17 (2.77-3.47)	4.47 (3.70-5.27)	5.60 (4.67-6.40)	1764
Age 20+ years	15-16	1.60 (1.51-1.71)	1.67 (1.57-1.87)	2.47 (2.37-2.67)	3.47 (3.17-3.67)	4.27 (4.07-4.97)	1640
Males	11-12	2.37 (2.22-2.53)	2.38 (2.26-2.56)	3.25 (3.00-3.56)	4.61 (4.11-5.02)	5.62 (4.85-6.20)	966
Males	13-14	2.29 (2.09-2.50)	2.37 (2.17-2.57)	3.27 (2.87-3.60)	4.67 (3.77-5.60)	5.67 (4.67-6.27)	1031
Males	15-16	1.80 (1.66-1.94)	1.87 (1.67-2.07)	2.57 (2.40-2.67)	3.37 (3.07-3.67)	4.07 (3.67-4.87)	964
Females	11-12	1.84 (1.68-2.01)	1.78 (1.62-1.98)	2.65 (2.34-3.14)	3.91 (3.36-4.99)	5.68 (4.33-8.45)	938
Females	13-14	1.66 (1.48-1.87)	1.67 (1.47-1.87)	2.67 (2.27-3.07)	3.77 (3.37-4.70)	5.07 (4.07-6.70)	1134
Females	15-16	1.36 (1.29-1.45)	1.37 (1.27-1.47)	2.17 (1.97-2.47)	3.37 (2.87-3.67)	4.17 (3.67-4.97)	1029
Mexican Americans	11-12	1.66 (1.37-2.02)	1.71 (1.32-2.23)	2.43 (1.98-2.98)	3.38 (2.43-4.48)	4.08 (2.98-6.15)	211
Mexican Americans	13-14	1.36 (1.25-1.47)	1.37 (1.27-1.47)	1.97 (1.87-2.10)	2.70 (2.40-3.10)	3.17 (2.57-3.77)	332
Mexican Americans	15-16	1.14 (1.01-1.28)	1.17 (1.07-1.27)	1.67 (1.47-1.87)	2.47 (1.87-2.97)	2.77 (2.20-4.67)	370
Non-Hispanic blacks	11-12	1.80 (1.71-1.90)	1.94 (1.76-2.09)	2.82 (2.65-2.95)	3.94 (3.51-4.40)	5.11 (4.40-5.79)	485
Non-Hispanic blacks	13-14	1.52 (1.34-1.73)	1.67 (1.37-1.97)	2.57 (2.17-2.97)	3.60 (3.07-4.50)	4.60 (3.40-5.77)	455
Non-Hispanic blacks	15-16	1.36 (1.21-1.53)	1.37 (1.27-1.57)	2.17 (1.97-2.57)	3.37 (2.77-3.77)	4.07 (3.57-5.27)	439
Non-Hispanic whites	11-12	2.25 (2.05-2.47)	2.25 (1.98-2.48)	3.21 (2.90-3.50)	4.68 (3.95-5.35)	6.20 (5.34-7.74)	666
Non-Hispanic whites	13-14	2.20 (1.91-2.52)	2.27 (1.97-2.67)	3.37 (2.77-3.77)	4.77 (3.77-5.67)	5.77 (4.80-6.87)	861
Non-Hispanic whites	15-16	1.69 (1.57-1.82)	1.77 (1.57-1.97)	2.57 (2.47-2.67)	3.47 (3.17-3.67)	4.47 (3.87-5.17)	619
All Hispanics	11-12	1.70 (1.48-1.95)	1.79 (1.59-1.95)	2.46 (2.15-2.91)	3.60 (2.95-4.48)	4.70 (3.87-5.94)	406
All Hispanics	13-14	1.45 (1.33-1.59)	1.47 (1.37-1.67)	2.10 (1.97-2.40)	3.07 (2.67-3.27)	3.47 (3.17-3.97)	537
All Hispanics	15-16	1.25 (1.14-1.36)	1.27 (1.17-1.47)	1.87 (1.67-2.20)	2.67 (2.37-3.07)	3.17 (2.77-4.17)	629
Asians	11-12	2.08 (1.83-2.36)	2.21 (2.04-2.27)	2.92 (2.55-3.45)	4.66 (3.42-5.79)	5.79 (4.93-8.91)	291
Asians	13-14	1.97 (1.75-2.23)	1.87 (1.67-2.27)	2.97 (2.47-3.57)	4.67 (3.97-5.77)	5.90 (5.00-6.40)	234
Asians	15-16	1.66 (1.42-1.94)	1.77 (1.37-2.07)	2.37 (2.17-2.87)	3.77 (2.97-4.47)	4.77 (3.87-7.57)	220

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.1.

‡See Calculation of PFOS and PFOA as the Sum of Isomers for additional information about Survey years 2013-2014 and 2015-2016.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum estimated PFOA (total) (Special Sample of Serum PFAS in Children, 2013-2014)

*Sum of linear and branched PFOA isomers**

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.92 (1.75-2.12)	1.94 (1.66-2.15)	2.67 (2.42-2.88)	3.53 (3.13-4.09)	4.19 (3.62-5.47)	639
Age 3-5 years	13-14	2.00 (1.75-2.29)	1.80 (1.62-2.40)	2.94 (2.66-3.28)	4.14 (2.88-5.86)	5.58 (3.28-7.02)	181
Age 6-11 years	13-14	1.89 (1.72-2.07)	1.94 (1.68-2.14)	2.53 (2.25-2.84)	3.26 (2.97-3.68)	3.84 (3.40-4.09)	458
Males	13-14	1.95 (1.76-2.15)	1.90 (1.64-2.19)	2.71 (2.39-3.26)	3.62 (3.23-4.00)	4.14 (3.41-5.86)	343
Females	13-14	1.90 (1.68-2.14)	1.94 (1.63-2.18)	2.55 (2.30-2.80)	3.30 (2.88-4.01)	4.22 (3.07-5.47)	296
All Hispanics	13-14	1.71 (1.56-1.88)	1.68 (1.55-1.93)	2.31 (2.05-2.60)	2.91 (2.48-3.30)	3.29 (2.86-4.00)	220
Other	13-14	2.00 (1.79-2.23)	1.99 (1.71-2.34)	2.75 (2.50-3.16)	3.72 (3.20-4.22)	4.28 (3.79-5.86)	419

* See Calculation of PFOS and PFOA as the Sum of Isomers for additional information about Survey years 2013-2014 and 2015-2016.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum n-Perfluorooctanoic acid (n-PFOA) (2013 - 2016)

CAS Number 335-67-1

Linear PFOA isomer

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.83 (1.65-2.03)	1.90 (1.80-2.10)	2.90 (2.60-3.20)	4.10 (3.50-5.10)	5.30 (4.40-6.00)	2165
Total population	15-16	1.46 (1.37-1.56)	1.50 (1.40-1.70)	2.40 (2.20-2.50)	3.30 (3.00-3.50)	4.10 (3.80-4.60)	1993
Age 12-19 years	13-14	1.56 (1.41-1.74)	1.60 (1.30-1.80)	2.10 (1.90-2.50)	2.70 (2.30-3.40)	3.40 (2.70-4.80)	401
Age 12-19 years	15-16	1.17 (1.06-1.28)	1.20 (1.10-1.40)	1.60 (1.40-1.80)	2.00 (1.70-2.50)	2.40 (2.00-2.90)	353
Age 20 + years	13-14	1.87 (1.68-2.08)	2.00 (1.80-2.20)	3.00 (2.70-3.30)	4.40 (3.60-5.10)	5.40 (4.60-6.20)	1764
Age 20 + years	15-16	1.50 (1.41-1.61)	1.60 (1.50-1.80)	2.40 (2.30-2.60)	3.40 (3.10-3.60)	4.20 (4.00-4.90)	1640
Males	13-14	2.18 (1.98-2.39)	2.30 (2.10-2.50)	3.20 (2.80-3.50)	4.60 (3.70-5.30)	5.40 (4.60-5.90)	1031
Males	15-16	1.70 (1.56-1.86)	1.80 (1.60-2.00)	2.50 (2.30-2.60)	3.30 (3.00-3.60)	4.00 (3.60-4.80)	964
Females	13-14	1.55 (1.37-1.75)	1.60 (1.40-1.80)	2.60 (2.20-2.90)	3.70 (3.30-4.70)	4.80 (3.90-6.60)	1134
Females	15-16	1.26 (1.18-1.35)	1.30 (1.20-1.40)	2.10 (1.90-2.40)	3.30 (2.80-3.60)	4.10 (3.60-4.90)	1029
Mexican Americans	13-14	1.27 (1.16-1.38)	1.30 (1.20-1.40)	1.90 (1.80-2.00)	2.60 (2.30-3.10)	3.10 (2.50-3.70)	332
Mexican Americans	15-16	1.04 (.918-1.19)	1.10 (1.00-1.20)	1.60 (1.40-1.80)	2.40 (1.80-2.90)	2.70 (2.10-4.60)	370
Non-Hispanic blacks	13-14	1.41 (1.23-1.62)	1.60 (1.30-1.90)	2.50 (2.10-2.80)	3.50 (2.90-4.40)	4.40 (3.30-5.70)	455
Non-Hispanic blacks	15-16	1.26 (1.11-1.43)	1.30 (1.20-1.50)	2.10 (1.90-2.50)	3.30 (2.70-3.70)	3.90 (3.40-5.20)	439
Non-Hispanic whites	13-14	2.08 (1.80-2.41)	2.20 (1.90-2.60)	3.20 (2.70-3.60)	4.60 (3.60-5.50)	5.60 (4.70-6.70)	861
Non-Hispanic whites	15-16	1.59 (1.46-1.73)	1.70 (1.50-1.90)	2.50 (2.40-2.60)	3.40 (3.10-3.60)	4.40 (3.80-5.10)	619
All Hispanics	13-14	1.35 (1.23-1.49)	1.40 (1.30-1.60)	2.00 (1.90-2.30)	2.90 (2.50-3.10)	3.40 (3.10-3.70)	537
All Hispanics	15-16	1.15 (1.05-1.27)	1.20 (1.10-1.40)	1.80 (1.60-2.10)	2.60 (2.30-3.00)	3.10 (2.70-4.10)	629
Asians	13-14	1.87 (1.65-2.12)	1.80 (1.60-2.20)	2.90 (2.40-3.50)	4.60 (3.90-5.70)	5.70 (4.70-6.80)	234
Asians	15-16	1.57 (1.32-1.85)	1.70 (1.30-2.00)	2.30 (2.10-2.80)	3.70 (2.90-4.40)	4.70 (3.80-7.50)	220

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum n-Perfluorooctanoic acid (n-PFOA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 335-67-1

Linear PFOA isomer

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.81 (1.64-2.01)	1.82 (1.57-2.04)	2.51 (2.30-2.81)	3.46 (2.94-3.94)	4.07 (3.53-5.32)	639
Age 3-5 years	13-14	1.87 (1.62-2.17)	1.72 (1.50-2.25)	2.87 (2.50-3.21)	4.07 (2.81-5.79)	5.32 (3.01-6.51)	181
Age 6-11 years	13-14	1.78 (1.61-1.97)	1.84 (1.59-2.04)	2.45 (2.18-2.73)	3.19 (2.83-3.61)	3.77 (3.43-3.97)	458
Males	13-14	1.83 (1.65-2.04)	1.80 (1.55-2.09)	2.64 (2.28-3.19)	3.55 (3.13-3.93)	4.07 (3.34-5.79)	343
Females	13-14	1.79 (1.57-2.03)	1.84 (1.57-2.04)	2.48 (2.23-2.73)	3.21 (2.81-3.97)	4.08 (2.92-5.32)	296
All Hispanics	13-14	1.61 (1.46-1.78)	1.60 (1.45-1.83)	2.23 (1.95-2.48)	2.84 (2.37-3.20)	3.18 (2.78-3.93)	220
Other	13-14	1.88 (1.68-2.11)	1.88 (1.63-2.23)	2.66 (2.39-3.01)	3.64 (3.13-4.15)	4.15 (3.55-5.79)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum branched Perfluorooctanoic acid (Sb-PFOA) (2013 - 2016)

Branched isomers of PFOA

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.200 (.100-.200)	.200 (.200-.300)	2165
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	1993
Age 12-19 years	13-14	*	<LOD	.100 (<LOD-.100)	.200 (.100-.200)	.200 (.100-.400)	401
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	353
Age 20+ years	13-14	*	<LOD	<LOD	.100 (.100-.200)	.200 (.200-.300)	1764
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1640
Males	13-14	*	<LOD	<LOD	.200 (.100-.200)	.200 (.200-.400)	1031
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	964
Females	13-14	*	<LOD	<LOD	.100 (.100-.200)	.200 (.200-.300)	1134
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1029
Mexican Americans	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.200)	332
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	370
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	455
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	439
Non-Hispanic whites	13-14	*	<LOD	<LOD	.200 (.100-.200)	.200 (.200-.500)	861
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	619
All Hispanics	13-14	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.300)	537
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	629
Asians	13-14	*	<LOD	<LOD	.100 (<LOD-.400)	.200 (<LOD-3.00)	234
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	220

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum branched Perfluorooctanoic acid (Sb-PFOA) (Special Sample of Serum PFAS in Children, 2013-2014)

Branched isomers of PFOA

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.100 (<LOD-.120)	.160 (.120-.230)	.230 (.180-.360)	639
Age 3-5 years	13-14	*	<LOD	.100 (<LOD-.190)	.200 (.120-.280)	.280 (.160-.510)	181
Age 6-11 years	13-14	*	<LOD	.100 (<LOD-.120)	.160 (.130-.200)	.230 (.170-.340)	458
Males	13-14	*	<LOD	.110 (<LOD-.130)	.180 (.150-.200)	.220 (.170-.310)	343
Females	13-14	*	<LOD	.100 (<LOD-.130)	.160 (.110-.310)	.230 (.150-.450)	296
All Hispanics	13-14	*	<LOD	.100 (<LOD-.110)	.150 (.120-.170)	.190 (.150-.250)	220
Other	13-14	*	<LOD	.110 (<LOD-.150)	.180 (.130-.230)	.250 (.180-.470)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorooctane sulfonic acid (PFOS) (2011 - 2016)

Sum of linear and branched PFOS isomers

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.31 (5.84-6.82)	6.53 (5.99-7.13)	10.5 (9.78-11.1)	15.7 (14.7-17.5)	21.7 (19.3-23.9)	1904
Total population	13-14	4.99 (4.50-5.52)	5.20 (4.80-5.70)	8.70 (7.90-9.40)	13.9 (11.9-15.5)	18.5 (15.4-22.0)	2165
Total population	15-16	4.72 (4.40-5.07)	4.80 (4.40-5.30)	8.10 (7.30-9.40)	13.2 (11.4-15.6)	18.3 (15.5-22.7)	1993
Age 12-19 years	11-12	4.16 (3.70-4.68)	4.11 (3.48-4.65)	5.90 (5.14-7.25)	9.05 (6.49-10.8)	10.8 (8.52-14.2)	344
Age 12-19 years	13-14	3.54 (3.17-3.96)	3.60 (3.10-4.20)	5.20 (4.60-6.20)	7.80 (7.00-8.90)	9.30 (7.90-11.7)	401
Age 12-19 years	15-16	2.94 (2.70-3.19)	2.90 (2.70-3.30)	4.30 (3.70-5.00)	6.00 (5.50-6.60)	6.60 (6.10-7.70)	353
Age 20+ years	11-12	6.71 (6.24-7.20)	7.07 (6.65-7.52)	11.0 (10.4-11.9)	17.0 (15.3-18.5)	22.7 (20.4-24.8)	1560
Age 20+ years	13-14	5.22 (4.70-5.81)	5.60 (5.10-6.00)	9.10 (8.20-10.2)	14.5 (12.9-16.1)	19.5 (15.8-23.0)	1764
Age 20+ years	15-16	5.02 (4.64-5.43)	5.20 (4.80-5.70)	8.80 (7.80-10.2)	14.0 (12.2-16.4)	19.1 (15.8-24.4)	1640
Males	11-12	7.91 (7.19-8.70)	8.31 (7.35-9.15)	12.5 (11.4-13.5)	19.3 (15.7-21.4)	24.1 (22.2-28.5)	966
Males	13-14	6.36 (5.62-7.20)	6.40 (5.70-7.30)	10.2 (8.70-11.5)	15.5 (13.2-19.8)	22.1 (16.7-26.9)	1031
Males	15-16	6.16 (5.66-6.70)	6.40 (5.60-6.70)	10.1 (8.90-11.0)	15.6 (13.2-18.8)	21.3 (17.4-24.4)	964
Females	11-12	5.10 (4.70-5.53)	5.27 (4.67-5.64)	8.57 (7.87-9.30)	12.5 (11.0-14.9)	17.5 (14.9-20.5)	938
Females	13-14	3.96 (3.60-4.35)	4.00 (3.60-4.60)	7.20 (6.40-7.70)	11.8 (9.70-13.6)	15.1 (13.9-17.3)	1134
Females	15-16	3.67 (3.34-4.03)	3.60 (3.30-3.90)	6.30 (5.50-7.10)	10.9 (9.10-12.7)	14.6 (12.2-18.3)	1029
Mexican Americans	11-12	4.79 (4.07-5.64)	5.18 (3.92-6.33)	7.91 (6.18-9.48)	10.5 (8.50-12.6)	12.1 (10.0-14.4)	211
Mexican Americans	13-14	3.47 (2.90-4.16)	3.70 (3.00-4.40)	5.20 (4.60-6.40)	8.80 (6.40-10.3)	10.8 (9.20-11.8)	332
Mexican Americans	15-16	3.36 (2.97-3.81)	3.40 (2.80-3.90)	5.80 (4.80-6.60)	8.80 (7.30-9.90)	12.5 (9.50-14.2)	370
Non-Hispanic blacks	11-12	6.35 (5.41-7.46)	6.57 (5.71-7.65)	11.3 (9.74-13.9)	21.8 (13.9-31.3)	30.7 (21.6-45.1)	485
Non-Hispanic blacks	13-14	5.32 (4.12-6.88)	5.30 (4.30-6.80)	10.2 (7.60-13.7)	17.4 (12.4-24.5)	24.5 (16.3-39.7)	455
Non-Hispanic blacks	15-16	4.81 (4.06-5.69)	4.80 (3.90-6.50)	9.70 (8.10-11.2)	17.7 (13.1-22.0)	23.8 (21.8-34.0)	439
Non-Hispanic whites	11-12	6.71 (6.15-7.32)	6.83 (6.07-7.73)	10.7 (9.89-12.2)	15.7 (14.8-18.1)	21.3 (18.7-23.5)	666
Non-Hispanic whites	13-14	5.31 (4.72-5.98)	5.70 (5.10-6.40)	8.90 (8.20-9.90)	14.1 (12.2-15.6)	18.0 (15.5-20.4)	861
Non-Hispanic whites	15-16	4.97 (4.67-5.29)	5.10 (4.60-5.60)	8.30 (7.40-9.90)	13.2 (11.3-15.5)	17.4 (14.2-21.3)	619
All Hispanics	11-12	4.63 (3.86-5.55)	5.18 (4.41-6.19)	8.10 (6.64-9.78)	11.0 (9.96-12.6)	13.4 (11.5-16.1)	406
All Hispanics	13-14	3.51 (3.09-3.98)	3.70 (3.20-4.20)	5.50 (4.90-6.40)	8.80 (8.00-9.70)	10.8 (9.70-12.1)	537
All Hispanics	15-16	3.57 (3.14-4.06)	3.60 (3.00-4.30)	6.30 (5.40-7.10)	9.50 (8.00-11.8)	13.0 (10.5-15.2)	629
Asians	11-12	7.10 (5.80-8.68)	7.53 (5.96-9.25)	12.6 (10.8-17.0)	24.6 (19.1-33.3)	35.1 (26.4-42.3)	291
Asians	13-14	6.18 (5.08-7.52)	6.30 (5.00-7.90)	13.2 (9.40-15.4)	23.8 (15.2-33.9)	33.6 (20.1-69.0)	234
Asians	15-16	5.75 (4.37-7.58)	5.30 (4.20-7.00)	10.5 (7.40-17.6)	25.2 (10.4-52.3)	34.8 (13.9-84.3)	220

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.2.

‡See Calculation of PFOS and PFOA as the Sum of Isomers for additional information about Survey years 2013-2014 and 2015-2016.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum estimated PFOS (total) (Special Sample of Serum PFAS in Children, 2013-2014)

*Sum of linear and branched PFOS isomers**

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	3.88 (3.53-4.27)	3.75 (3.44-4.17)	5.56 (4.83-6.33)	7.99 (7.02-9.53)	11.0 (9.03-12.4)	639
Age 3-5 years	13-14	3.38 (3.04-3.77)	3.41 (2.84-3.78)	4.78 (3.98-6.32)	7.18 (5.50-8.71)	8.82 (7.18-11.0)	181
Age 6-11 years	13-14	4.15 (3.76-4.58)	4.02 (3.54-4.45)	5.77 (5.10-6.43)	8.78 (6.75-11.8)	12.4 (9.32-14.1)	458
Males	13-14	4.07 (3.56-4.65)	4.13 (3.44-4.76)	6.19 (5.29-7.18)	8.78 (7.18-11.8)	11.8 (8.01-15.4)	343
Females	13-14	3.70 (3.38-4.06)	3.54 (3.24-3.96)	4.88 (4.45-5.70)	7.02 (6.33-8.71)	9.44 (7.17-12.0)	296
All Hispanics	13-14	3.53 (3.13-3.99)	3.41 (2.95-3.84)	4.71 (4.13-5.65)	7.60 (5.43-9.44)	9.32 (6.50-11.0)	220
Other	13-14	4.01 (3.62-4.44)	3.96 (3.44-4.48)	5.97 (5.02-6.49)	8.06 (6.98-11.3)	12.0 (9.10-13.6)	419

* See Calculation of PFOS and PFOA as the Sum of Isomers for additional information about Survey years 2013-2014 and 2015-2016.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum n-Perfluorooctane sulfonic acid (n-PFOS) (2013 - 2016)

CAS Number 1763-23-1

Linear PFOS isomer

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	3.45 (3.10-3.85)	3.50 (3.20-3.90)	6.00 (5.20-6.60)	9.90 (8.50-11.3)	14.0 (11.0-16.7)	2165
Total population	15-16	3.20 (2.93-3.49)	3.20 (2.80-3.60)	5.60 (4.90-6.40)	8.90 (7.70-10.4)	12.8 (10.1-17.9)	1993
Age 12-19 years	13-14	2.59 (2.29-2.93)	2.70 (2.30-2.90)	3.90 (3.40-4.80)	6.20 (4.80-7.00)	7.10 (6.20-8.60)	401
Age 12-19 years	15-16	2.07 (1.90-2.26)	2.00 (1.80-2.40)	3.10 (2.60-3.50)	4.40 (3.80-4.90)	5.10 (4.40-6.60)	353
Age 20 + years	13-14	3.59 (3.21-4.02)	3.70 (3.40-4.10)	6.30 (5.50-7.20)	10.3 (9.10-12.3)	15.1 (11.9-17.7)	1764
Age 20 + years	15-16	3.38 (3.07-3.73)	3.50 (3.00-3.90)	5.90 (5.20-6.80)	9.20 (8.10-11.1)	13.9 (10.0-19.7)	1640
Males	13-14	4.26 (3.74-4.86)	4.20 (3.70-4.80)	6.60 (6.00-7.90)	10.8 (9.30-15.1)	15.4 (12.1-20.2)	1031
Males	15-16	4.10 (3.70-4.53)	4.00 (3.50-4.70)	6.80 (5.70-7.60)	10.4 (8.60-12.9)	14.7 (10.5-20.4)	964
Females	13-14	2.83 (2.56-3.13)	2.90 (2.60-3.20)	4.90 (4.40-5.60)	8.50 (7.30-9.90)	11.6 (9.90-13.0)	1134
Females	15-16	2.53 (2.28-2.80)	2.50 (2.30-2.70)	4.30 (3.80-5.00)	7.50 (6.00-8.50)	10.1 (8.10-14.2)	1029
Mexican Americans	13-14	2.38 (1.99-2.84)	2.40 (2.10-2.80)	3.50 (3.00-3.90)	6.10 (3.90-8.00)	7.90 (6.20-8.90)	332
Mexican Americans	15-16	2.31 (2.01-2.65)	2.30 (2.00-2.60)	3.70 (3.00-4.80)	6.10 (5.10-7.70)	8.20 (6.80-9.40)	370
Non-Hispanic blacks	13-14	4.02 (3.03-5.34)	4.00 (3.00-5.50)	7.50 (5.30-10.9)	14.4 (9.00-20.3)	19.3 (14.4-32.6)	455
Non-Hispanic blacks	15-16	3.47 (2.87-4.19)	3.40 (2.70-4.60)	6.70 (5.30-8.70)	12.3 (9.20-16.5)	19.4 (14.4-27.0)	439
Non-Hispanic whites	13-14	3.58 (3.17-4.06)	3.70 (3.40-4.20)	6.10 (5.40-6.70)	10.0 (8.60-11.0)	13.0 (10.8-15.1)	861
Non-Hispanic whites	15-16	3.29 (3.04-3.55)	3.40 (2.90-3.70)	5.70 (4.90-6.50)	8.60 (7.60-10.1)	11.4 (9.20-14.7)	619
All Hispanics	13-14	2.43 (2.14-2.76)	2.50 (2.10-2.80)	3.90 (3.30-4.50)	6.20 (4.90-7.60)	8.00 (7.10-8.80)	537
All Hispanics	15-16	2.47 (2.15-2.84)	2.50 (2.10-2.90)	4.20 (3.50-5.00)	6.80 (5.30-8.50)	9.20 (7.60-10.3)	629
Asians	13-14	4.79 (3.83-5.99)	4.60 (4.00-6.20)	9.90 (8.00-12.5)	19.2 (12.4-32.5)	31.1 (17.0-64.8)	234
Asians	15-16	4.26 (3.15-5.77)	3.80 (2.80-5.30)	8.70 (5.30-15.6)	21.1 (8.60-47.5)	31.1 (10.9-77.9)	220

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum n-Perfluorooctane sulfonic acid (n-PFOS) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 1763-23-1

Linear PFOS isomer

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	2.51 (2.30-2.74)	2.47 (2.17-2.73)	3.57 (3.10-4.08)	5.60 (4.50-6.34)	7.72 (5.75-8.68)	639
Age 3-5 years	13-14	2.22 (2.01-2.46)	2.11 (1.74-2.33)	3.28 (2.69-4.15)	5.52 (3.95-6.34)	6.19 (5.72-7.72)	181
Age 6-11 years	13-14	2.67 (2.43-2.92)	2.65 (2.38-2.78)	3.72 (3.20-4.11)	5.62 (4.52-7.75)	8.41 (5.91-9.54)	458
Males	13-14	2.67 (2.33-3.06)	2.67 (2.20-2.93)	4.14 (3.51-4.52)	5.74 (4.36-8.37)	8.83 (5.74-10.3)	343
Females	13-14	2.36 (2.19-2.54)	2.24 (2.03-2.48)	3.07 (2.84-3.33)	4.97 (4.02-5.55)	6.08 (5.18-7.72)	296
All Hispanics	13-14	2.29 (2.00-2.61)	2.18 (1.93-2.51)	3.07 (2.73-3.80)	4.96 (3.52-6.51)	5.94 (4.29-9.62)	220
Other	13-14	2.59 (2.35-2.85)	2.55 (2.19-2.78)	3.82 (3.09-4.25)	5.71 (4.50-7.14)	7.75 (5.74-9.04)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum branched Perfluoromethylheptane sulfonic acid (Sm-PFOS) (2013 - 2016)

Perfluoromethylheptane sulfonic acid isomers

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.39 (1.25-1.55)	1.50 (1.40-1.60)	2.70 (2.50-2.90)	4.00 (3.60-4.50)	5.10 (4.60-5.80)	2165
Total population	15-16	1.42 (1.32-1.52)	1.50 (1.40-1.60)	2.60 (2.40-2.90)	4.40 (4.00-4.90)	5.70 (5.10-6.30)	1993
Age 12-19 years	13-14	.897 (.800-1.01)	1.00 (.800-1.10)	1.40 (1.20-1.50)	1.90 (1.50-2.10)	2.30 (1.80-3.00)	401
Age 12-19 years	15-16	.819 (.715-.939)	.900 (.700-1.00)	1.20 (1.00-1.40)	1.60 (1.30-2.00)	2.00 (1.50-2.40)	353
Age 20+ years	13-14	1.47 (1.32-1.65)	1.60 (1.50-1.80)	2.90 (2.60-3.10)	4.20 (3.70-4.70)	5.30 (4.70-6.00)	1764
Age 20+ years	15-16	1.52 (1.42-1.62)	1.60 (1.50-1.80)	2.90 (2.60-3.10)	4.70 (4.20-5.10)	5.90 (5.30-6.70)	1640
Males	13-14	1.94 (1.72-2.19)	2.10 (1.80-2.40)	3.20 (2.90-3.60)	4.60 (4.00-5.60)	5.90 (4.90-7.00)	1031
Males	15-16	1.94 (1.77-2.12)	2.00 (1.80-2.20)	3.30 (3.10-3.60)	5.10 (4.40-5.40)	6.30 (5.40-7.10)	964
Females	13-14	1.01 (.914-1.12)	1.10 (.900-1.20)	1.90 (1.70-2.10)	3.30 (3.00-3.60)	4.20 (3.70-4.70)	1134
Females	15-16	1.05 (.967-1.14)	1.00 (.900-1.10)	1.90 (1.70-2.10)	3.50 (2.70-4.30)	4.80 (3.90-5.90)	1029
Mexican Americans	13-14	1.00 (.823-1.23)	1.10 (.900-1.30)	1.70 (1.50-2.20)	2.70 (2.20-3.20)	3.70 (2.90-4.20)	332
Mexican Americans	15-16	1.00 (.892-1.13)	1.00 (.900-1.20)	1.80 (1.50-2.00)	2.80 (2.40-3.20)	3.70 (3.10-4.40)	370
Non-Hispanic blacks	13-14	1.15 (.942-1.40)	1.20 (1.00-1.50)	2.40 (1.90-3.00)	4.40 (3.40-5.20)	5.50 (4.50-7.00)	455
Non-Hispanic blacks	15-16	1.23 (1.06-1.42)	1.30 (1.10-1.70)	2.80 (2.30-3.30)	4.60 (3.80-5.40)	6.10 (5.40-7.10)	439
Non-Hispanic whites	13-14	1.61 (1.41-1.82)	1.70 (1.50-2.00)	3.00 (2.70-3.20)	4.20 (3.70-4.90)	5.50 (4.80-6.00)	861
Non-Hispanic whites	15-16	1.59 (1.47-1.71)	1.60 (1.50-1.80)	3.00 (2.60-3.20)	4.80 (4.30-5.20)	6.00 (5.20-6.90)	619
All Hispanics	13-14	.987 (.859-1.13)	1.00 (.900-1.20)	1.80 (1.60-2.10)	2.70 (2.40-3.20)	3.50 (2.90-4.00)	537
All Hispanics	15-16	1.05 (.930-1.18)	1.10 (1.00-1.20)	2.00 (1.60-2.30)	3.00 (2.70-3.30)	3.80 (3.30-4.40)	629
Asians	13-14	1.10 (.955-1.28)	1.20 (1.00-1.40)	2.30 (1.60-2.70)	3.50 (2.50-4.50)	4.40 (3.50-7.20)	234
Asians	15-16	1.23 (1.03-1.47)	1.30 (1.10-1.40)	2.20 (1.60-3.00)	3.90 (2.60-5.80)	5.10 (3.10-9.80)	220

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum branched Perfluoromethylheptane sulfonic acid (Sm-PFOS) (Special Sample of Serum PFAS in Children, 2013-2014)

Perfluoromethylheptane sulfonic acid isomers

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.23 (1.09-1.40)	1.28 (1.05-1.45)	1.90 (1.64-2.21)	3.02 (2.57-3.92)	4.07 (3.23-4.78)	639
Age 3-5 years	13-14	1.03 (.874-1.21)	1.00 (.820-1.32)	1.65 (1.40-2.14)	2.63 (2.14-3.23)	3.60 (2.21-4.23)	181
Age 6-11 years	13-14	1.35 (1.19-1.52)	1.41 (1.19-1.51)	2.03 (1.74-2.48)	3.32 (2.59-4.10)	4.25 (3.26-6.00)	458
Males	13-14	1.26 (1.08-1.48)	1.31 (1.04-1.46)	2.07 (1.67-2.56)	3.44 (2.56-4.25)	4.25 (3.02-5.55)	343
Females	13-14	1.20 (1.04-1.39)	1.22 (1.03-1.48)	1.79 (1.53-2.25)	2.90 (2.18-3.60)	3.60 (2.54-5.28)	296
All Hispanics	13-14	1.13 (.997-1.27)	1.12 (.990-1.33)	1.67 (1.45-1.89)	2.28 (1.93-2.94)	3.14 (2.21-3.63)	220
Other	13-14	1.27 (1.11-1.46)	1.32 (1.13-1.49)	2.05 (1.66-2.48)	3.48 (2.65-4.10)	4.23 (3.60-5.28)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorooctane sulfonamide (PFOSA or FOSA) (2011 - 2012)

CAS Number 754-91-6

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	1904
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	344
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1560
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	966
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	938
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	211
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	485
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	666
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	406
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluorooctane sulfonamide (PFOSA or FOSA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 754-91-6

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	639
Age 3-5 years	13-14	*	<LOD	<LOD	<LOD	.110 (<LOD-.170)	181
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	458
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	343
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	296
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	220
Other	13-14	*	<LOD	<LOD	<LOD	<LOD	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum 2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid (EtFOSAA) (2011 - 2012)

CAS Number 2991-50-6

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.130)	1904
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	344
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.150)	1560
Males	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.140)	966
Females	11-12	*	<LOD	<LOD	<LOD	.100 (<LOD-.130)	938
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	.100 (<LOD-.160)	211
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	485
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	.120 (<LOD-.140)	666
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	406
Asians	11-12	*	<LOD	<LOD	<LOD	.110 (<LOD-.200)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum 2-(N-ethyl-perfluorooctane sulfonamido) acetic acid (EtFOSAA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 2991-50-6

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	639
Age 3-5 years	13-14	*	<LOD	<LOD	<LOD	<LOD	181
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	458
Males	13-14	*	<LOD	<LOD	<LOD	.100 (<LOD-.140)	343
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	296
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	220
Other	13-14	*	<LOD	<LOD	<LOD	<LOD	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum 2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH or MeFOSAA) (2011 - 2016)

CAS Number 2355-31-9

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.100 (<LOD-.160)	.250 (.200-.310)	.500 (.440-.530)	.690 (.580-.850)	1904
Total population	13-14	*	<LOD	.200 (.200-.200)	.400 (.300-.500)	.600 (.500-.900)	2168
Total population	15-16	*	<LOD	.200 (.100-.200)	.400 (.300-.400)	.600 (.500-.800)	1993
Age 12-19 years	11-12	.134 (.110-.163)	.110 (.090-.170)	.260 (.170-.350)	.420 (.350-.480)	.510 (.420-.850)	344
Age 12-19 years	13-14	*	.100 (<LOD-.100)	.200 (.200-.300)	.500 (.400-.500)	.600 (.500-.900)	402
Age 12-19 years	15-16	*	<LOD	.200 (.100-.300)	.300 (.200-.600)	.600 (.300-1.30)	353
Age 20+ years	11-12	*	.100 (<LOD-.160)	.250 (.200-.310)	.510 (.460-.550)	.700 (.640-.840)	1560
Age 20+ years	13-14	*	<LOD	.200 (.200-.200)	.400 (.300-.500)	.600 (.500-1.00)	1766
Age 20+ years	15-16	*	<LOD	.200 (.100-.200)	.400 (.300-.500)	.600 (.500-.700)	1640
Males	11-12	*	.110 (<LOD-.160)	.270 (.190-.350)	.490 (.390-.660)	.720 (.510-1.06)	966
Males	13-14	*	<LOD	.200 (.200-.200)	.400 (.300-.500)	.600 (.400-.900)	1032
Males	15-16	*	<LOD	.200 (.100-.200)	.400 (.300-.500)	.600 (.500-.800)	964
Females	11-12	*	.100 (<LOD-.160)	.250 (.200-.300)	.510 (.410-.540)	.690 (.560-.810)	938
Females	13-14	*	<LOD	.200 (.200-.200)	.400 (.300-.600)	.700 (.500-1.10)	1136
Females	15-16	*	<LOD	.200 (.100-.200)	.400 (.300-.400)	.500 (.400-.800)	1029
Mexican Americans	11-12	*	<LOD	.220 (.160-.310)	.440 (.310-.590)	.590 (.390-.970)	211
Mexican Americans	13-14	*	<LOD	.100 (<LOD-.100)	.200 (.100-.500)	.500 (.300-.500)	332
Mexican Americans	15-16	*	<LOD	.100 (<LOD-.100)	.200 (.200-.300)	.300 (.200-.400)	370
Non-Hispanic blacks	11-12	*	.100 (<LOD-.150)	.240 (.170-.340)	.520 (.390-.660)	.780 (.580-1.06)	485
Non-Hispanic blacks	13-14	*	<LOD	.200 (.100-.300)	.400 (.200-1.00)	.800 (.400-1.60)	455
Non-Hispanic blacks	15-16	*	<LOD	.200 (.100-.200)	.300 (.200-.400)	.600 (.400-.700)	439
Non-Hispanic whites	11-12	*	.120 (<LOD-.170)	.280 (.230-.340)	.510 (.460-.580)	.700 (.600-.990)	666
Non-Hispanic whites	13-14	*	.100 (<LOD-.100)	.200 (.200-.300)	.500 (.400-.500)	.700 (.500-1.00)	862
Non-Hispanic whites	15-16	*	<LOD	.200 (.200-.200)	.400 (.400-.600)	.700 (.600-.800)	619
All Hispanics	11-12	*	<LOD	.170 (.130-.230)	.350 (.260-.450)	.510 (.380-.740)	406
All Hispanics	13-14	*	<LOD	.100 (<LOD-.100)	.200 (.200-.300)	.300 (.200-.500)	537
All Hispanics	15-16	*	<LOD	.100 (<LOD-.100)	.200 (.200-.300)	.300 (.200-.400)	629
Asians	11-12	*	<LOD	.170 (.130-.260)	.370 (.300-.520)	.580 (.420-.860)	291
Asians	13-14	*	<LOD	.100 (<LOD-.200)	.200 (.100-.400)	.400 (.200-.600)	236
Asians	15-16	*	<LOD	.100 (<LOD-.200)	.200 (.100-.400)	.400 (.200-.600)	220

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.087, 0.100, and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum 2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH or MeFOSAA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 2355-31-9

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	.110 (<LOD-.150)	.260 (.190-.390)	.650 (.360-1.02)	1.02 (.650-1.81)	639
Age 3-5 years	13-14	*	.110 (<LOD-.190)	.240 (.170-.550)	.880 (.250-1.81)	1.02 (.530-3.15)	181
Age 6-11 years	13-14	*	.110 (<LOD-.140)	.270 (.180-.370)	.570 (.350-.940)	.940 (.570-1.92)	458
Males	13-14	*	.100 (<LOD-.170)	.270 (.180-.480)	.870 (.360-1.37)	1.14 (.690-1.99)	343
Females	13-14	*	.120 (<LOD-.140)	.260 (.180-.360)	.490 (.290-.860)	.810 (.590-.970)	296
All Hispanics	13-14	*	<LOD	.160 (.100-.280)	.440 (.250-.650)	.650 (.440-1.02)	220
Other	13-14	*	.130 (<LOD-.190)	.280 (.220-.420)	.810 (.400-1.04)	1.14 (.860-1.99)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluoroundecanoic acid (PFUA or PFUnDA) (2011 - 2016)

CAS Number 2058-94-8

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.120 (.100-.140)	.220 (.180-.250)	.380 (.310-.520)	.620 (.440-.790)	1904
Total population	13-14	*	<LOD	.200 (.100-.200)	.300 (.200-.400)	.500 (.400-.600)	2168
Total population	15-16	*	<LOD	.100 (.100-.200)	.200 (.200-.500)	.400 (.300-.500)	1993
Age 12-19 years	11-12	*	<LOD	.110 (<LOD-.140)	.180 (.140-.220)	.250 (.190-.390)	344
Age 12-19 years	13-14	*	<LOD	<LOD	.200 (.100-.200)	.200 (.200-.300)	402
Age 12-19 years	15-16	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.400)	353
Age 20+ years	11-12	.146 (.129-.165)	.130 (.110-.150)	.230 (.190-.280)	.420 (.330-.530)	.660 (.490-.840)	1560
Age 20+ years	13-14	*	<LOD	.200 (.100-.200)	.300 (.300-.500)	.500 (.400-.700)	1766
Age 20+ years	15-16	*	<LOD	.100 (.100-.200)	.300 (.200-.300)	.400 (.300-.500)	1640
Males	11-12	*	.120 (.100-.150)	.220 (.180-.260)	.340 (.290-.480)	.590 (.390-.820)	966
Males	13-14	*	<LOD	.200 (.100-.200)	.300 (.200-.500)	.500 (.400-.700)	1032
Males	15-16	*	<LOD	.100 (.100-.200)	.200 (.200-.500)	.400 (.300-.500)	964
Females	11-12	*	.120 (.100-.140)	.210 (.180-.270)	.420 (.320-.540)	.650 (.520-.740)	938
Females	13-14	*	<LOD	.200 (.100-.200)	.300 (.200-.400)	.500 (.400-.600)	1136
Females	15-16	*	<LOD	.100 (.100-.200)	.200 (.200-.500)	.400 (.300-.500)	1029
Mexican Americans	11-12	*	<LOD	.150 (.130-.180)	.230 (.190-.300)	.310 (.230-.330)	211
Mexican Americans	13-14	*	<LOD	<LOD	.200 (.100-.300)	.200 (.100-.600)	332
Mexican Americans	15-16	*	<LOD	<LOD	.100 (<LOD-.200)	.200 (.100-.400)	370
Non-Hispanic blacks	11-12	.164 (.135-.199)	.140 (.110-.190)	.260 (.200-.390)	.530 (.350-.840)	.840 (.520-1.26)	485
Non-Hispanic blacks	13-14	*	.100 (<LOD-.200)	.200 (.100-.400)	.500 (.300-.700)	.700 (.500-.900)	455
Non-Hispanic blacks	15-16	*	<LOD	.200 (.100-.200)	.300 (.200-.400)	.400 (.300-.700)	439
Non-Hispanic whites	11-12	*	.110 (<LOD-.140)	.200 (.160-.240)	.330 (.280-.410)	.450 (.330-.690)	666
Non-Hispanic whites	13-14	*	<LOD	.200 (.100-.200)	.300 (.200-.400)	.400 (.300-.600)	862
Non-Hispanic whites	15-16	*	<LOD	.100 (.100-.200)	.200 (.100-.300)	.300 (.200-.500)	619
All Hispanics	11-12	*	.110 (<LOD-.130)	.180 (.160-.210)	.310 (.230-.390)	.420 (.300-.630)	406
All Hispanics	13-14	*	<LOD	.100 (<LOD-.100)	.200 (.100-.200)	.200 (.100-.600)	537
All Hispanics	15-16	*	<LOD	<LOD	.200 (.100-.200)	.300 (.200-.300)	629
Asians	11-12	.338 (.277-.412)	.330 (.220-.510)	.840 (.630-1.01)	1.38 (1.02-2.33)	2.40 (1.33-3.41)	291
Asians	13-14	.274 (.231-.326)	.300 (.200-.400)	.600 (.400-.800)	1.00 (.900-1.20)	1.50 (1.00-2.40)	236
Asians	15-16	.233 (.189-.287)	.300 (.200-.300)	.500 (.400-.600)	1.00 (.600-1.40)	1.50 (.800-2.20)	220

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.100, 0.100, and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Serum Perfluoroundecanoic acid (PFUA or PFUnDA) (Special Sample of Serum PFAS in Children, 2013-2014)

CAS Number 2058-94-8

Geometric mean and selected percentiles of serum concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.100 (<LOD-.130)	.200 (.150-.270)	.280 (.210-.480)	639
Age 3-5 years	13-14	*	<LOD	.110 (<LOD-.140)	.250 (.110-.480)	.370 (.140-.650)	181
Age 6-11 years	13-14	*	<LOD	.100 (<LOD-.130)	.190 (.160-.240)	.250 (.200-.310)	458
Males	13-14	*	<LOD	.100 (<LOD-.140)	.190 (.150-.270)	.300 (.180-.530)	343
Females	13-14	*	<LOD	.110 (<LOD-.130)	.200 (.140-.280)	.280 (.200-.440)	296
All Hispanics	13-14	*	<LOD	.100 (<LOD-.140)	.190 (.150-.220)	.250 (.190-.370)	220
Other	13-14	*	<LOD	.110 (<LOD-.140)	.200 (.140-.300)	.300 (.200-.480)	419

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Perfluoroalkyl and Polyfluoroalkyl Substances: Urine

Urinary Perfluorobutanoic acid (PFBA) (2013 - 2014)

CAS Number 375-22-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.100 (<LOD-.400)	.300 (.100-.900)	2682
Age 6-11 years	13-14	*	<LOD	<LOD	.200 (<LOD-.500)	.300 (<LOD-.700)	409
Age 12-19 years	13-14	*	<LOD	<LOD	.200 (<LOD-.900)	.300 (<LOD-1.20)	461
Age 20+ years	13-14	*	<LOD	<LOD	.100 (<LOD-.400)	.300 (.100-.700)	1812
Males	13-14	*	<LOD	<LOD	.100 (<LOD-.500)	.300 (.100-.700)	1284
Females	13-14	*	<LOD	<LOD	.100 (<LOD-.400)	.300 (<LOD-1.20)	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.100 (<LOD-.200)	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.100 (<LOD-.500)	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	.200 (<LOD-.600)	.400 (.100-1.20)	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	.200 (<LOD-.300)	690
Asians	13-14	*	<LOD	<LOD	.100 (<LOD-.300)	.200 (<LOD-1.60)	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorobutanoic acid (PFBA) (creatinine corrected) (2013 - 2014)

CAS Number 375-22-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.292 (<LOD-.423)	.438 (.299-.700)	2680
Age 6-11 years	13-14	*	<LOD	<LOD	.350 (<LOD-.462)	.467 (<LOD-.631)	409
Age 12-19 years	13-14	*	<LOD	<LOD	.233 (<LOD-.612)	.423 (<LOD-3.70)	461
Age 20+ years	13-14	*	<LOD	<LOD	.292 (<LOD-.430)	.438 (.292-.702)	1810
Males	13-14	*	<LOD	<LOD	.215 (<LOD-.333)	.389 (.219-.606)	1283
Females	13-14	*	<LOD	<LOD	.333 (<LOD-.500)	.500 (<LOD-.778)	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.304 (<LOD-.389)	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.241 (<LOD-.333)	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	.350 (<LOD-.538)	.494 (.333-.870)	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	.331 (<LOD-.438)	690
Asians	13-14	*	<LOD	<LOD	.270 (<LOD-.368)	.368 (<LOD-.500)	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorobutane sulfonic acid (PFBS) (2013 - 2014)

CAS Number 375-73-5

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorobutane sulfonic acid (PFBS) (creatinine corrected) (2013 - 2014)

CAS Number 375-73-5

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorodecanoic acid (PFDA) (2013 - 2014)

CAS Number 335-76-2

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorodecanoic acid (PFDA) (creatinine corrected) (2013 - 2014)

CAS Number 335-76-2

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoroheptane sulfonic acid (PFHpS) (2013 - 2014)

CAS Number 375-92-8

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoroheptane sulfonic acid (PFHpS) (creatinine corrected) (2013 - 2014)

CAS Number 375-92-8

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoroheptanoic acid (PFHpA) (2013 - 2014)

CAS Number 375-85-9

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoroheptanoic acid (PFHpA) (creatinine corrected) (2013 - 2014)

CAS Number 375-85-9

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorohexane sulfonic acid (PFHxS) (2013 - 2014)

CAS Number 355-46-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorohexane sulfonic acid (PFHxS) (creatinine corrected) (2013 - 2014)

CAS Number 355-46-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorohexanoic acid (PFHxA) (2013 - 2014)

CAS Number 307-24-4

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.300 (.200-.400)	.500 (.400-.600)	2682
Age 6-11 years	13-14	*	<LOD	<LOD	.300 (.200-.400)	.500 (.300-.700)	409
Age 12-19 years	13-14	*	<LOD	<LOD	.200 (.200-.400)	.400 (.300-.600)	461
Age 20+ years	13-14	*	<LOD	<LOD	.300 (.200-.400)	.500 (.400-.600)	1812
Males	13-14	*	<LOD	<LOD	.300 (.200-.400)	.500 (.400-.600)	1284
Females	13-14	*	<LOD	<LOD	.300 (.200-.400)	.500 (.400-.600)	1398
Mexican Americans	13-14	*	<LOD	<LOD	.300 (.100-.500)	.500 (.200-.900)	438
Non-Hispanic blacks	13-14	*	<LOD	.100 (<LOD-.200)	.300 (.200-.500)	.500 (.400-.700)	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	.300 (.300-.400)	.500 (.400-.600)	987
All Hispanics	13-14	*	<LOD	<LOD	.200 (.100-.500)	.500 (.300-.800)	690
Asians	13-14	*	<LOD	<LOD	.300 (.200-.400)	.400 (.300-.600)	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorohexanoic acid (PFHxA) (creatinine corrected) (2013 - 2014)

CAS Number 307-24-4

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.370 (.318-.417)	.575 (.438-.676)	2680
Age 6-11 years	13-14	*	<LOD	<LOD	.365 (.303-.441)	.577 (.389-.847)	409
Age 12-19 years	13-14	*	<LOD	<LOD	.250 (.206-.294)	.417 (.294-.533)	461
Age 20+ years	13-14	*	<LOD	<LOD	.389 (.318-.438)	.588 (.438-.769)	1810
Males	13-14	*	<LOD	<LOD	.316 (.270-.389)	.500 (.388-.641)	1283
Females	13-14	*	<LOD	<LOD	.411 (.351-.500)	.612 (.500-.800)	1397
Mexican Americans	13-14	*	<LOD	<LOD	.350 (.244-.443)	.508 (.351-.774)	438
Non-Hispanic blacks	13-14	*	<LOD	.130 (<LOD-.182)	.284 (.233-.368)	.429 (.300-.588)	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	.389 (.328-.438)	.597 (.438-.787)	986
All Hispanics	13-14	*	<LOD	<LOD	.347 (.250-.417)	.479 (.389-.667)	690
Asians	13-14	*	<LOD	<LOD	.373 (.328-.500)	.680 (.448-.870)	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorononanoic acid (PFNA) (2013 - 2014)

CAS Number 375-95-1

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluorononanoic acid (PFNA) (creatinine corrected) (2013 - 2014)

CAS Number 375-95-1

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary n-Perfluorooctanoic acid (n-PFOA) (2013 - 2014)

CAS Number 335-67-1

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary n-Perfluorooctanoic acid (n-PFOA) (creatinine corrected) (2013 - 2014)

CAS Number 335-67-1

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary branched isomers of Perfluorooctanoic acid (Sb-PFOA) (2013 - 2014)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary branched isomers of Perfluorooctanoic acid (Sb-PFOA) (creatinine corrected) (2013 - 2014)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary n-Perfluorooctane sulfonic acid (n-PFOS) (2013 - 2014)

CAS Number 1763-23-1

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary n-Perfluorooctane sulfonic acid (n-PFOS) (creatinine corrected) (2013 - 2014)

CAS Number 1763-23-1

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary branched Perfluoromethylheptane sulfonic acid (Sm-PFOS) (2013 - 2014)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary branched Perfluoromethylheptane sulfonic acid (Sm-PFOS) (creatinine corrected) (2013 - 2014)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoropentanoic acid (PFPeA) (2013 - 2014)

CAS Number 2706-90-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoropentanoic acid (PFPeA) (creatinine corrected) (2013 - 2014)

CAS Number 2706-90-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoroundecanoic acid (PFUA or PFUnDA) (2013 - 2014)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Perfluoroundecanoic acid (PFUA or PFUnDA) (creatinine corrected) (2013 - 2014)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (2013 - 2014)

CAS Number 73606-19-6

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (creatinine corrected) (2013 - 2014)

CAS Number 73606-19-6

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Adona (ammonium salt of 4,8-dioxa-3H-perfluorononanoic acid) (2013 - 2014)

CAS Number 958445-44-8

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary Adona (ammonium salt of 4,8-dioxa-3H-perfluorononanoic acid) (creatinine corrected) (2013 - 2014)

CAS Number 958445-44-8

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary GenX (ammonium salt of 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (HFPO-DA)) (2013 - 2014)

CAS Number 62037-80-3

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2682
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1812
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	987
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	287

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.100.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Urinary GenX (ammonium salt of 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (HFPO-DA)) (creatinine corrected) (2013 - 2014)

CAS Number 62037-80-3

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2680
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	409
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	461
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1810
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1397
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	690
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/PFAS_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PFAS_FactSheet.html

Phthalate and Phthalate Alternative Metabolites

Urinary Mono-benzyl phthalate (MBzP) (2011 - 2016)†

CAS Number 2528-16-7

Metabolite of Benzylbutyl phthalate (BzBP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.52 (4.17-4.90)	4.40 (4.10-5.00)	10.7 (9.80-12.2)	21.7 (20.2-24.4)	35.9 (29.2-41.7)	2489
Total population	13-14	4.45 (4.07-4.86)	4.50 (4.10-5.00)	11.0 (9.50-12.7)	23.1 (20.5-25.6)	35.1 (28.4-40.2)	2685
Total population	15-16	4.47 (3.91-5.10)	4.30 (3.80-4.90)	10.7 (9.70-11.5)	26.0 (22.5-29.4)	44.8 (37.8-56.3)	2975
Age 3-5 years	15-16	8.27 (6.78-10.1)	7.10 (5.50-9.00)	20.5 (16.2-26.0)	55.8 (44.4-76.5)	88.1 (75.1-134)	465
Age 6-11 years	11-12	8.62 (7.22-10.3)	8.50 (6.60-10.4)	21.6 (15.8-26.2)	50.7 (31.4-71.7)	75.2 (51.3-124)	396
Age 6-11 years	13-14	8.55 (7.14-10.2)	8.40 (6.50-10.3)	20.2 (15.0-25.2)	36.6 (28.9-56.3)	59.9 (42.6-86.9)	409
Age 6-11 years	15-16	10.7 (8.58-13.3)	10.9 (8.40-13.8)	26.7 (20.6-33.3)	59.2 (41.6-73.2)	81.1 (61.8-174)	415
Age 12-19 years	11-12	6.62 (5.28-8.30)	7.30 (4.80-10.2)	17.0 (13.3-20.2)	31.5 (24.1-39.2)	42.6 (33.4-65.3)	388
Age 12-19 years	13-14	6.55 (5.62-7.62)	7.50 (5.60-9.60)	14.7 (11.3-18.7)	25.0 (21.2-35.1)	38.8 (31.3-50.2)	462
Age 12-19 years	15-16	6.05 (4.33-8.45)	6.50 (4.70-8.40)	14.1 (10.5-17.5)	26.6 (20.8-34.5)	43.5 (25.8-80.6)	405
Age 20+ years	11-12	3.98 (3.60-4.39)	4.00 (3.70-4.40)	9.70 (8.10-10.5)	19.2 (17.0-21.0)	28.0 (22.4-37.0)	1705
Age 20+ years	13-14	3.91 (3.53-4.34)	4.00 (3.60-4.40)	9.10 (7.80-11.0)	21.2 (19.9-23.2)	30.9 (25.8-37.1)	1814
Age 20+ years	15-16	3.80 (3.39-4.27)	3.70 (3.20-4.30)	8.50 (8.00-9.30)	21.3 (18.1-24.5)	37.8 (29.9-46.8)	1690
Males	11-12	4.80 (4.25-5.41)	4.80 (4.20-5.40)	11.1 (9.80-12.7)	22.4 (19.9-25.7)	37.0 (28.0-58.3)	1259
Males	13-14	4.67 (4.20-5.19)	4.80 (4.30-5.40)	10.5 (9.10-12.0)	21.8 (19.9-23.8)	36.0 (28.6-42.7)	1285
Males	15-16	4.60 (3.99-5.29)	4.50 (4.00-5.10)	10.9 (9.50-12.1)	28.1 (21.8-32.5)	43.5 (32.9-58.5)	1474
Females	11-12	4.27 (3.81-4.77)	4.20 (3.80-4.90)	10.5 (9.50-12.3)	21.6 (19.7-24.4)	33.9 (27.4-42.0)	1230
Females	13-14	4.25 (3.80-4.75)	4.30 (3.80-4.90)	11.8 (8.80-13.8)	24.7 (20.2-27.4)	35.1 (26.9-43.4)	1400
Females	15-16	4.35 (3.76-5.03)	4.20 (3.40-5.00)	10.2 (9.30-11.5)	23.9 (21.4-29.3)	47.6 (34.8-59.2)	1501
Mexican Americans	11-12	5.11 (4.03-6.48)	5.10 (3.90-6.60)	11.3 (7.60-16.9)	20.4 (14.7-28.8)	29.1 (19.9-69.3)	316
Mexican Americans	13-14	4.33 (3.82-4.90)	4.20 (3.70-5.20)	9.30 (8.00-11.3)	18.6 (15.5-22.3)	28.4 (20.1-45.3)	438
Mexican Americans	15-16	4.42 (3.34-5.86)	4.10 (3.10-5.60)	11.4 (6.90-15.7)	26.5 (17.1-40.0)	42.5 (26.2-83.6)	595
Non-Hispanic blacks	11-12	7.43 (6.14-8.98)	7.50 (6.40-9.00)	16.4 (13.4-20.1)	33.9 (24.3-48.6)	54.9 (42.7-76.1)	665
Non-Hispanic blacks	13-14	6.55 (5.72-7.49)	6.50 (5.60-8.10)	17.3 (14.9-19.5)	33.5 (28.4-37.6)	55.0 (37.6-75.3)	609
Non-Hispanic blacks	15-16	7.00 (5.60-8.74)	6.50 (5.30-8.30)	16.6 (13.2-19.3)	39.3 (30.1-49.1)	57.8 (49.8-72.6)	698
Non-Hispanic whites	11-12	4.14 (3.84-4.46)	4.10 (3.80-4.40)	10.1 (8.50-11.4)	20.2 (17.9-22.9)	30.4 (24.8-38.2)	813
Non-Hispanic whites	13-14	4.34 (3.87-4.86)	4.40 (3.90-5.10)	10.9 (8.70-13.3)	22.9 (20.1-25.9)	35.1 (26.9-42.7)	987
Non-Hispanic whites	15-16	4.23 (3.58-4.99)	4.20 (3.50-5.00)	9.90 (8.40-11.2)	24.5 (21.1-30.1)	42.7 (32.6-52.6)	862
All Hispanics	11-12	4.80 (4.03-5.72)	4.90 (4.00-5.70)	11.3 (8.40-14.8)	22.4 (17.6-29.8)	33.6 (22.4-45.5)	571
All Hispanics	13-14	4.24 (3.88-4.63)	4.40 (3.80-4.80)	9.10 (8.10-10.7)	19.1 (16.3-20.8)	28.6 (21.2-39.5)	690
All Hispanics	15-16	4.50 (3.69-5.50)	4.20 (3.40-5.10)	11.8 (8.80-14.7)	27.6 (19.9-36.2)	44.2 (29.9-77.3)	971
Asians	11-12	2.99 (2.44-3.67)	2.90 (2.40-3.50)	7.20 (5.20-9.50)	15.1 (11.2-21.5)	27.7 (17.5-45.9)	352
Asians	13-14	2.50 (2.02-3.08)	2.60 (1.90-3.80)	5.60 (4.20-7.60)	14.4 (9.40-17.5)	21.9 (17.0-24.1)	289
Asians	15-16	2.69 (1.83-3.96)	2.80 (1.60-4.70)	6.00 (3.80-11.7)	14.2 (8.00-23.4)	23.4 (14.8-29.8)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.300, 0.300, and 0.300 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/BzBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-benzyl phthalate (MBzP) (creatinine corrected) (2011 - 2016)†

CAS Number 2528-16-7

Metabolite of Benzylbutyl phthalate (BzBP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	5.15 (4.80-5.52)	4.96 (4.62-5.35)	9.49 (8.71-10.5)	17.4 (16.2-19.1)	26.7 (24.3-30.0)	2487
Total population	13-14	4.46 (4.13-4.81)	4.20 (3.78-4.62)	8.40 (7.56-9.32)	17.9 (15.6-19.5)	25.8 (21.3-32.1)	2684
Total population	15-16	4.63 (4.06-5.28)	4.17 (3.60-4.89)	9.83 (8.25-11.3)	21.0 (18.2-26.0)	36.8 (31.4-42.5)	2974
Age 3-5 years	15-16	19.7 (16.3-24.0)	17.6 (13.9-21.7)	46.4 (32.9-64.2)	115 (82.6-142)	183 (131-211)	464
Age 6-11 years	11-12	12.5 (10.8-14.5)	11.9 (10.0-14.3)	24.1 (18.5-28.9)	53.2 (35.9-67.4)	81.0 (54.1-97.7)	395
Age 6-11 years	13-14	10.8 (9.23-12.6)	10.3 (8.79-12.6)	19.9 (16.5-24.0)	39.6 (25.6-74.1)	78.1 (38.3-168)	409
Age 6-11 years	15-16	13.8 (11.3-16.8)	12.0 (10.0-15.6)	28.4 (20.7-42.2)	57.9 (49.0-85.7)	113 (57.9-156)	415
Age 12-19 years	11-12	6.45 (5.81-7.16)	6.23 (5.39-7.54)	11.7 (10.1-13.2)	18.3 (15.2-22.1)	25.5 (20.3-39.9)	388
Age 12-19 years	13-14	5.31 (4.68-6.03)	5.04 (4.42-5.65)	9.90 (8.22-12.1)	17.9 (13.9-23.3)	30.6 (18.2-35.1)	462
Age 12-19 years	15-16	4.7 (3.68-6.00)	4.34 (3.80-5.50)	8.43 (6.32-11.2)	17.8 (11.6-24.8)	28.2 (17.8-36.8)	405
Age 20+ years	11-12	4.52 (4.18-4.89)	4.46 (4.05-4.76)	8.08 (7.50-8.83)	15.1 (12.9-16.8)	21.6 (18.5-24.5)	1704
Age 20+ years	13-14	3.95 (3.59-4.34)	3.78 (3.36-4.18)	7.14 (6.39-8.04)	15.2 (13.2-17.7)	22.3 (18.7-26.5)	1813
Age 20+ years	15-16	3.87 (3.43-4.38)	3.44 (3.05-4.10)	8.11 (6.40-9.37)	15.4 (13.6-18.3)	27.6 (21.0-31.8)	1690
Males	11-12	4.49 (4.01-5.04)	4.26 (3.91-4.73)	8.46 (7.56-9.10)	15.4 (13.8-18.3)	24.7 (18.3-37.0)	1258
Males	13-14	3.92 (3.62-4.25)	3.71 (3.33-4.08)	7.16 (6.42-7.87)	15.6 (13.7-17.7)	23.2 (19.4-27.7)	1284
Males	15-16	4.1 (3.53-4.76)	3.72 (3.08-4.30)	9.18 (7.22-11.3)	18.9 (15.2-24.8)	35.4 (27.6-44.8)	1474
Females	11-12	5.87 (5.43-6.35)	5.65 (5.00-6.43)	10.5 (9.45-12.1)	19.7 (16.4-23.3)	28.7 (24.5-34.8)	1229
Females	13-14	5.04 (4.60-5.52)	4.62 (4.25-5.17)	9.73 (8.18-11.5)	19.5 (16.2-24.2)	28.8 (23.6-37.7)	1400
Females	15-16	5.2 (4.57-5.92)	4.60 (4.02-5.22)	10.3 (8.57-11.9)	23.1 (19.8-28.0)	37.2 (31.3-45.0)	1500
Mexican Americans	11-12	5.76 (4.41-7.51)	5.86 (5.00-7.08)	10.2 (8.61-13.1)	17.8 (12.4-34.6)	28.3 (17.1-50.2)	316
Mexican Americans	13-14	4.41 (3.77-5.16)	4.00 (3.25-5.12)	7.57 (6.12-10.7)	16.5 (12.9-24.7)	26.4 (18.6-36.9)	438
Mexican Americans	15-16	4.81 (3.56-6.50)	4.27 (2.98-6.13)	10.0 (6.98-15.0)	26.3 (14.9-41.3)	41.4 (31.4-59.7)	595
Non-Hispanic blacks	11-12	5.78 (4.83-6.92)	5.30 (4.49-6.16)	10.5 (8.68-13.6)	21.1 (17.4-27.5)	35.3 (25.2-53.4)	665
Non-Hispanic blacks	13-14	4.83 (4.31-5.42)	4.77 (4.26-5.38)	9.71 (8.12-11.6)	19.9 (15.4-25.6)	29.4 (24.8-33.4)	609
Non-Hispanic blacks	15-16	5.57 (4.72-6.58)	5.00 (4.18-5.98)	10.6 (8.52-14.2)	28.7 (19.5-38.8)	50.7 (39.2-67.9)	697
Non-Hispanic whites	11-12	5.04 (4.67-5.44)	4.82 (4.44-5.37)	9.11 (8.18-10.7)	16.6 (15.1-18.5)	24.7 (21.4-28.7)	811
Non-Hispanic whites	13-14	4.57 (4.11-5.07)	4.24 (3.70-4.76)	8.50 (7.32-10.2)	18.5 (15.6-20.3)	25.8 (21.0-34.4)	987
Non-Hispanic whites	15-16	4.54 (3.89-5.30)	4.00 (3.28-4.93)	9.91 (8.14-11.5)	20.3 (16.6-24.5)	35.5 (28.5-42.0)	862
All Hispanics	11-12	5.38 (4.45-6.51)	5.29 (4.55-6.14)	9.63 (7.95-12.7)	18.4 (13.9-34.6)	35.6 (18.4-49.3)	571
All Hispanics	13-14	4.21 (3.78-4.68)	3.91 (3.36-4.56)	7.57 (6.67-8.64)	15.6 (13.2-18.6)	24.7 (18.4-32.6)	690
All Hispanics	15-16	4.75 (3.79-5.94)	4.25 (3.23-5.38)	10.2 (7.54-13.8)	24.8 (15.2-35.4)	41.3 (31.1-55.0)	971
Asians	11-12	4.01 (3.49-4.60)	3.96 (3.27-4.72)	7.74 (6.39-9.73)	13.4 (10.5-16.4)	20.5 (14.3-27.7)	352
Asians	13-14	3.16 (2.58-3.87)	3.29 (2.37-4.00)	6.33 (5.00-8.00)	14.7 (10.8-16.4)	17.8 (14.7-30.8)	288
Asians	15-16	3.33 (2.51-4.44)	3.17 (2.15-4.58)	6.30 (4.97-9.14)	13.3 (7.92-22.1)	20.0 (14.3-25.2)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/BzBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-3-hydroxybutyl phthalate (MHBP) (2015 - 2016)

CAS Number 2528-16-7

Metabolite of Di-n-butyl phthalate (DBP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	.895 (.828-.968)	.900 (.800-.900)	1.70 (1.60-1.90)	3.40 (3.00-3.90)	4.70 (4.10-5.50)	2975
Age 3-5 years	15-16	1.26 (1.13-1.39)	1.40 (1.00-1.50)	2.40 (2.10-2.70)	4.10 (3.20-4.90)	5.90 (4.70-7.30)	465
Age 6-11 years	15-16	1.50 (1.39-1.63)	1.70 (1.40-1.80)	2.80 (2.50-3.20)	4.10 (3.50-5.00)	5.60 (4.70-7.20)	415
Age 12-19 years	15-16	1.10 (.904-1.33)	1.10 (.900-1.30)	2.10 (1.50-2.80)	4.10 (3.10-5.20)	5.40 (4.20-6.10)	405
Age 20+ years	15-16	.811 (.749-.879)	.800 (.700-.900)	1.50 (1.40-1.70)	3.10 (2.40-3.60)	4.50 (3.60-5.50)	1690
Males	15-16	.847 (.770-.932)	.800 (.700-.900)	1.60 (1.40-1.80)	3.10 (2.60-3.60)	4.30 (3.60-5.50)	1474
Females	15-16	.944 (.862-1.03)	.900 (.800-1.00)	1.80 (1.70-1.90)	3.60 (3.20-4.30)	4.80 (4.30-5.90)	1501
Mexican Americans	15-16	.901 (.800-1.01)	.800 (.700-1.00)	1.80 (1.50-2.10)	3.20 (2.60-4.00)	4.30 (3.70-5.30)	595
Non-Hispanic blacks	15-16	1.06 (.944-1.18)	1.00 (.900-1.20)	2.10 (1.80-2.40)	4.10 (3.50-4.60)	5.80 (4.40-9.40)	698
Non-Hispanic whites	15-16	.869 (.795-.949)	.900 (.800-.900)	1.70 (1.50-1.80)	3.30 (2.70-4.00)	4.70 (3.90-5.60)	862
All Hispanics	15-16	.917 (.853-.985)	.900 (.800-1.00)	1.80 (1.60-1.90)	3.30 (2.90-3.60)	4.30 (3.90-5.00)	971
Asians	15-16	.830 (.647-1.07)	.800 (.600-.900)	1.50 (1.20-2.10)	3.00 (2.40-3.90)	5.00 (3.40-7.00)	301

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.400.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-3-hydroxybutyl phthalate (MHBP) (creatinine corrected) (2015 - 2016)

CAS Number 2528-16-7

Metabolite of Di-n-butyl phthalate (DBP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	0.927 (.877-.979)	.897 (.847-.966)	1.59 (1.47-1.71)	2.68 (2.46-2.97)	3.87 (3.51-4.30)	2974
Age 3-5 years	15-16	2.99 (2.71-3.29)	3.04 (2.76-3.33)	4.71 (3.92-5.19)	7.57 (6.15-8.75)	9.75 (8.18-12.1)	464
Age 6-11 years	15-16	1.94 (1.77-2.12)	1.86 (1.74-2.00)	2.80 (2.55-3.30)	4.81 (4.11-6.07)	7.42 (5.39-9.09)	415
Age 12-19 years	15-16	0.853 (.748-.973)	.825 (.704-.924)	1.43 (1.16-1.88)	2.50 (1.86-3.09)	3.09 (2.46-4.00)	405
Age 20+ years	15-16	0.827 (.778-.879)	.811 (.752-.886)	1.39 (1.27-1.47)	2.16 (1.87-2.50)	3.06 (2.57-3.37)	1690
Males	15-16	0.756 (.699-.817)	.732 (.647-.797)	1.26 (1.14-1.44)	2.27 (2.05-2.58)	3.37 (2.91-3.85)	1474
Females	15-16	1.13 (1.06-1.21)	1.10 (1.02-1.20)	1.82 (1.64-2.00)	3.03 (2.71-3.24)	4.34 (3.75-4.77)	1500
Mexican Americans	15-16	0.981 (.895-1.08)	1.00 (.886-1.07)	1.69 (1.47-1.82)	3.04 (2.61-3.70)	4.34 (3.91-5.41)	595
Non-Hispanic blacks	15-16	0.841 (.763-.928)	.728 (.667-.853)	1.53 (1.32-1.82)	2.88 (2.56-3.62)	4.67 (3.90-6.71)	697
Non-Hispanic whites	15-16	0.934 (.880-.990)	.916 (.866-1.00)	1.61 (1.45-1.74)	2.55 (2.28-3.02)	3.58 (3.11-4.13)	862
All Hispanics	15-16	0.966 (.916-1.02)	.933 (.865-1.01)	1.65 (1.47-1.77)	2.90 (2.55-3.33)	4.24 (3.83-4.86)	971
Asians	15-16	1.03 (.869-1.22)	1.03 (.855-1.12)	1.63 (1.31-2.10)	2.83 (2.20-4.68)	4.81 (3.47-5.30)	301

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-n-butyl phthalate (MnBP) (2011 - 2016)†

CAS Number 131-70-4

Metabolite of Dibutyl phthalate (DBP) and Benzylbutyl phthalate (BzBP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	7.61 (6.64-8.72)	9.20 (8.10-10.1)	20.0 (17.8-22.1)	35.5 (31.3-41.8)	55.0 (44.3-68.5)	2489
Total population	13-14	9.08 (8.53-9.66)	10.2 (9.40-11.2)	19.9 (18.1-21.0)	35.1 (32.4-37.9)	49.2 (45.7-54.0)	2685
Total population	15-16	9.83 (8.90-10.9)	10.6 (9.70-11.9)	19.7 (18.3-21.1)	33.6 (31.7-37.0)	45.0 (42.3-51.3)	2975
Age 3-5 years	15-16	10.9 (9.92-11.9)	11.1 (9.30-13.0)	20.6 (17.3-24.1)	35.9 (29.9-47.4)	56.1 (43.6-73.8)	465
Age 6-11 years	11-12	11.1 (8.73-14.2)	14.9 (10.8-17.1)	25.7 (23.2-32.1)	58.6 (39.6-71.4)	97.0 (59.3-163)	396
Age 6-11 years	13-14	12.0 (10.1-14.2)	13.1 (10.5-15.3)	26.9 (22.1-32.2)	45.3 (36.5-51.7)	55.5 (46.7-63.0)	409
Age 6-11 years	15-16	14.4 (13.1-15.8)	15.4 (13.4-17.3)	26.2 (22.1-29.1)	40.6 (36.0-43.0)	47.2 (42.5-62.1)	415
Age 12-19 years	11-12	9.69 (7.91-11.9)	12.2 (10.0-14.7)	24.7 (21.0-30.7)	44.2 (36.1-56.9)	60.7 (51.3-83.4)	388
Age 12-19 years	13-14	12.1 (11.2-13.1)	13.6 (12.4-14.8)	24.5 (20.6-27.7)	45.7 (30.5-57.1)	61.0 (46.0-64.9)	462
Age 12-19 years	15-16	11.6 (8.96-14.9)	12.2 (10.1-16.2)	22.0 (18.4-28.1)	37.9 (31.3-45.7)	51.6 (42.4-59.9)	405
Age 20+ years	11-12	7.04 (6.04-8.21)	8.20 (7.20-9.60)	18.2 (15.7-20.7)	31.8 (27.3-38.3)	46.4 (37.7-64.3)	1705
Age 20+ years	13-14	8.44 (7.84-9.10)	9.40 (8.70-10.2)	18.0 (17.0-19.7)	32.4 (29.0-35.1)	46.6 (38.9-52.3)	1814
Age 20+ years	15-16	9.18 (8.32-10.1)	9.80 (9.20-11.1)	18.7 (17.0-20.4)	32.5 (29.7-35.3)	44.1 (41.0-47.8)	1690
Males	11-12	8.14 (7.03-9.43)	9.20 (8.50-10.1)	20.1 (17.6-23.2)	34.0 (29.7-43.1)	56.9 (38.5-75.1)	1259
Males	13-14	9.43 (8.56-10.4)	10.3 (9.30-11.4)	19.7 (17.5-21.5)	32.4 (28.8-36.9)	46.8 (38.9-53.0)	1285
Males	15-16	9.88 (8.84-11.1)	10.6 (9.50-12.2)	19.6 (17.7-21.6)	32.0 (29.0-34.5)	44.9 (39.4-51.6)	1474
Females	11-12	7.14 (6.05-8.41)	9.00 (7.10-10.6)	19.7 (17.5-21.9)	36.1 (30.3-43.1)	51.8 (44.3-68.0)	1230
Females	13-14	8.76 (7.89-9.73)	10.1 (9.10-11.6)	20.1 (17.2-22.5)	36.9 (32.9-42.7)	51.0 (44.7-59.1)	1400
Females	15-16	9.78 (8.77-10.9)	10.6 (9.60-11.9)	19.7 (17.5-21.9)	36.6 (33.1-40.4)	45.8 (42.0-54.0)	1501
Mexican Americans	11-12	8.96 (7.58-10.6)	10.1 (7.70-13.1)	20.6 (15.2-26.4)	35.8 (29.1-45.4)	50.3 (38.9-83.4)	316
Mexican Americans	13-14	9.81 (8.41-11.4)	10.4 (8.40-13.6)	18.7 (15.2-23.9)	36.2 (23.6-53.5)	54.0 (43.6-64.9)	438
Mexican Americans	15-16	9.86 (8.75-11.1)	10.6 (8.70-12.3)	20.2 (16.8-22.9)	35.3 (28.7-44.4)	50.6 (42.4-66.3)	595
Non-Hispanic blacks	11-12	13.2 (11.2-15.6)	15.3 (13.3-17.9)	29.7 (26.4-32.8)	53.1 (43.6-67.3)	76.4 (60.3-100)	665
Non-Hispanic blacks	13-14	11.8 (10.4-13.4)	13.1 (11.4-15.1)	26.0 (23.7-27.9)	43.8 (38.3-49.2)	58.9 (48.8-68.8)	609
Non-Hispanic blacks	15-16	13.7 (11.9-15.6)	14.4 (12.3-17.0)	26.1 (23.1-28.8)	45.0 (40.0-52.2)	67.3 (51.4-92.5)	698
Non-Hispanic whites	11-12	6.47 (5.66-7.39)	7.60 (6.70-8.50)	17.1 (15.2-18.4)	30.3 (25.9-33.4)	43.1 (32.3-59.3)	813
Non-Hispanic whites	13-14	8.40 (7.76-9.09)	9.40 (8.20-11.2)	18.0 (16.5-21.0)	32.4 (28.1-36.7)	46.8 (37.9-53.1)	987
Non-Hispanic whites	15-16	9.05 (7.99-10.3)	9.80 (9.10-11.3)	18.3 (16.9-19.8)	32.0 (29.0-35.6)	41.6 (37.9-45.8)	862
All Hispanics	11-12	9.78 (8.15-11.7)	11.0 (8.80-14.4)	23.3 (20.0-27.0)	38.9 (31.8-50.6)	60.5 (45.4-93.3)	571
All Hispanics	13-14	9.91 (8.98-10.9)	10.5 (9.40-11.8)	19.3 (16.1-23.6)	38.2 (30.3-49.7)	59.5 (48.8-75.0)	690
All Hispanics	15-16	9.98 (9.11-10.9)	11.0 (9.90-12.0)	19.5 (17.6-21.8)	34.6 (31.1-38.6)	48.7 (42.5-53.2)	971
Asians	11-12	6.77 (5.05-9.06)	8.20 (5.80-10.8)	18.9 (13.5-29.1)	40.5 (29.1-58.6)	64.3 (45.9-104)	352
Asians	13-14	8.29 (6.86-10.0)	9.40 (6.60-12.3)	18.3 (14.0-22.2)	31.5 (25.2-35.7)	41.3 (34.2-51.6)	289
Asians	15-16	9.81 (8.06-11.9)	10.2 (7.70-13.7)	19.9 (17.5-22.4)	34.2 (28.1-47.2)	57.4 (43.1-71.9)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.400, 0.400, and 0.400 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-n-butyl phthalate (MnBP) (creatinine corrected) (2011 - 2016)†

CAS Number 131-70-4

Metabolite of Dibutyl phthalate (DBP) and Benzylbutyl phthalate (BzBP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	8.66 (7.79-9.62)	9.04 (8.30-9.92)	15.8 (15.0-17.3)	27.9 (24.2-30.9)	41.2 (33.0-51.8)	2487
Total population	13-14	9.1 (8.56-9.69)	9.17 (8.62-9.63)	14.9 (14.1-15.5)	23.8 (21.8-26.3)	34.4 (30.5-39.5)	2684
Total population	15-16	10.2 (9.53-10.9)	9.91 (9.11-10.6)	16.7 (15.7-17.6)	26.4 (25.2-28.9)	36.1 (34.2-38.0)	2974
Age 3-5 years	15-16	25.9 (23.8-28.1)	26.1 (23.8-29.2)	38.1 (34.1-43.0)	58.1 (52.5-72.4)	82.8 (67.6-103)	464
Age 6-11 years	11-12	15.9 (13.0-19.5)	17.7 (15.0-20.6)	29.8 (24.8-34.4)	51.2 (38.4-66.4)	73.3 (47.3-114)	395
Age 6-11 years	13-14	15.1 (13.4-17.1)	14.8 (13.0-17.8)	26.3 (22.2-28.8)	42.2 (31.5-53.2)	56.2 (43.1-77.1)	409
Age 6-11 years	15-16	18.5 (17.4-19.7)	18.6 (17.2-19.8)	26.3 (24.6-28.9)	40.1 (35.5-44.3)	58.2 (44.3-78.9)	415
Age 12-19 years	11-12	9.44 (8.71-10.2)	10.5 (8.61-12.7)	15.7 (14.9-17.8)	28.1 (22.0-30.0)	37.0 (29.2-46.7)	388
Age 12-19 years	13-14	9.82 (8.79-11.0)	9.93 (8.95-10.3)	15.0 (13.8-16.8)	22.2 (18.3-30.6)	34.1 (22.2-60.4)	462
Age 12-19 years	15-16	8.98 (7.71-10.5)	8.78 (7.59-9.94)	15.2 (12.1-18.4)	22.8 (19.2-26.1)	28.0 (22.1-38.2)	405
Age 20+ years	11-12	8 (7.09-9.01)	8.32 (7.64-9.12)	14.6 (13.0-16.0)	23.4 (21.4-27.9)	36.2 (29.4-47.3)	1704
Age 20+ years	13-14	8.52 (8.01-9.05)	8.62 (8.06-9.13)	13.9 (13.3-14.9)	22.2 (20.3-23.8)	30.2 (26.4-34.5)	1813
Age 20+ years	15-16	9.36 (8.75-10.0)	9.09 (8.39-10.0)	14.8 (13.9-15.7)	24.0 (21.3-25.7)	32.9 (28.5-36.1)	1690
Males	11-12	7.61 (6.65-8.69)	8.07 (7.54-8.85)	13.7 (11.9-15.5)	22.7 (19.3-26.3)	34.6 (24.1-53.0)	1258
Males	13-14	7.92 (7.26-8.65)	7.67 (6.97-8.47)	13.0 (11.6-14.2)	20.3 (18.3-22.4)	28.8 (22.9-35.8)	1284
Males	15-16	8.81 (8.18-9.50)	8.42 (7.89-8.93)	14.0 (12.8-15.4)	23.6 (21.3-25.2)	31.1 (26.6-35.0)	1474
Females	11-12	9.81 (8.86-10.9)	10.3 (9.18-11.5)	18.1 (16.8-19.7)	31.8 (28.1-34.6)	44.8 (38.4-54.6)	1229
Females	13-14	10.4 (9.80-11.0)	10.5 (9.67-11.3)	16.3 (15.2-17.7)	26.4 (24.1-30.1)	40.0 (33.4-45.3)	1400
Females	15-16	11.7 (10.8-12.6)	11.6 (10.3-12.9)	19.0 (17.3-20.1)	30.2 (26.6-34.1)	39.3 (36.1-44.9)	1500
Mexican Americans	11-12	10.1 (8.62-11.8)	10.7 (8.62-12.9)	17.6 (14.2-19.7)	32.6 (24.7-46.4)	55.9 (35.1-76.6)	316
Mexican Americans	13-14	10 (8.98-11.1)	10.0 (8.38-11.3)	16.8 (14.5-19.7)	27.6 (22.4-36.7)	40.3 (30.3-45.7)	438
Mexican Americans	15-16	10.7 (9.87-11.7)	10.4 (9.55-11.3)	18.3 (15.6-20.0)	30.0 (26.0-35.2)	46.4 (36.2-56.3)	595
Non-Hispanic blacks	11-12	10.3 (8.80-12.0)	11.1 (9.27-12.6)	19.1 (17.0-21.5)	31.7 (25.7-37.0)	43.5 (34.0-56.0)	665
Non-Hispanic blacks	13-14	8.71 (8.05-9.42)	8.96 (8.09-9.57)	14.7 (13.7-15.8)	24.2 (20.2-28.4)	32.0 (26.6-39.6)	609
Non-Hispanic blacks	15-16	10.9 (9.92-11.9)	10.1 (9.01-11.4)	18.5 (15.8-21.7)	32.5 (28.0-37.7)	46.8 (39.8-62.0)	697
Non-Hispanic whites	11-12	7.85 (6.92-8.91)	8.13 (7.43-8.99)	14.5 (13.0-15.9)	22.9 (21.4-27.9)	34.6 (27.9-46.4)	811
Non-Hispanic whites	13-14	8.84 (8.10-9.65)	8.87 (8.01-9.58)	14.3 (13.4-15.3)	22.4 (18.7-26.4)	31.4 (25.4-44.5)	987
Non-Hispanic whites	15-16	9.73 (8.91-10.6)	9.58 (8.59-10.5)	16.2 (14.8-17.5)	25.2 (23.2-27.2)	32.9 (29.7-36.0)	862
All Hispanics	11-12	11 (9.71-12.3)	11.2 (10.3-12.5)	19.3 (15.8-24.9)	36.1 (28.8-47.4)	55.6 (42.1-65.6)	571
All Hispanics	13-14	9.84 (8.97-10.8)	10.0 (8.65-11.3)	17.1 (14.9-18.8)	26.6 (23.1-33.4)	40.0 (30.8-42.7)	690
All Hispanics	15-16	10.5 (9.83-11.3)	10.4 (9.82-11.0)	17.0 (15.6-19.0)	28.0 (25.2-30.9)	40.0 (33.2-48.6)	971
Asians	11-12	9.07 (7.35-11.2)	9.84 (7.57-11.9)	19.0 (14.0-24.5)	35.6 (25.9-45.0)	46.2 (41.5-73.3)	352
Asians	13-14	10.6 (9.16-12.2)	10.0 (8.68-12.9)	17.3 (15.0-20.8)	31.3 (24.4-38.8)	45.3 (34.5-56.5)	288
Asians	15-16	12.1 (11.0-13.4)	11.2 (9.48-13.3)	19.7 (16.2-21.5)	36.8 (28.1-46.0)	51.8 (42.9-57.7)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-isobutyl phthalate (MiBP) (2011 - 2016)†

CAS Number 30833-53-5

Metabolite of Di-isobutyl phthalate (DiBP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.00 (5.41-6.65)	6.30 (5.80-6.90)	13.0 (11.9-14.5)	25.4 (22.3-29.7)	36.5 (33.4-41.0)	2489
Total population	13-14	7.06 (6.42-7.76)	7.50 (6.60-8.60)	14.9 (13.6-16.4)	26.1 (23.1-28.7)	39.3 (33.8-45.7)	2685
Total population	15-16	8.42 (7.57-9.37)	9.10 (8.30-9.90)	16.7 (15.1-18.2)	29.8 (26.1-33.9)	44.2 (39.3-49.3)	2975
Age 3-5 years	15-16	9.44 (8.65-10.3)	9.60 (8.10-10.9)	17.6 (15.8-20.1)	30.8 (26.3-35.9)	53.4 (35.8-67.3)	465
Age 6-11 years	11-12	8.28 (6.93-9.91)	9.40 (6.90-11.6)	18.6 (14.1-23.6)	31.8 (26.0-38.2)	43.1 (33.6-66.5)	396
Age 6-11 years	13-14	9.31 (8.03-10.8)	10.2 (8.90-11.9)	18.6 (16.3-19.8)	32.3 (25.8-38.3)	44.7 (37.2-62.3)	409
Age 6-11 years	15-16	11.2 (9.30-13.5)	11.6 (10.2-13.7)	19.6 (15.8-26.2)	39.2 (31.1-52.1)	59.7 (41.0-80.3)	415
Age 12-19 years	11-12	7.73 (6.74-8.86)	8.10 (6.90-9.60)	19.0 (14.5-23.0)	34.2 (25.3-38.5)	43.3 (36.5-45.4)	388
Age 12-19 years	13-14	9.73 (8.29-11.4)	10.1 (8.00-12.1)	19.7 (15.6-24.9)	39.4 (31.5-52.3)	59.3 (44.1-78.5)	462
Age 12-19 years	15-16	10.4 (8.22-13.2)	11.7 (8.90-14.6)	21.3 (15.6-27.9)	32.3 (27.9-42.5)	43.1 (36.8-46.7)	405
Age 20+ years	11-12	5.57 (4.92-6.31)	6.00 (5.40-6.60)	12.2 (10.6-13.6)	23.6 (19.4-27.8)	34.4 (31.1-39.2)	1705
Age 20+ years	13-14	6.53 (5.89-7.24)	6.90 (6.30-7.90)	14.0 (12.7-15.4)	23.6 (20.8-27.0)	35.4 (28.7-42.4)	1814
Age 20+ years	15-16	7.88 (7.09-8.75)	8.70 (7.70-9.40)	15.6 (14.0-17.5)	27.5 (25.2-31.6)	42.5 (35.8-49.0)	1690
Males	11-12	6.54 (5.70-7.51)	6.60 (5.70-7.50)	13.6 (11.7-15.8)	27.6 (21.8-35.1)	39.3 (33.6-46.9)	1259
Males	13-14	7.42 (6.64-8.30)	7.70 (6.60-8.90)	14.7 (13.1-16.5)	25.4 (21.7-28.7)	35.5 (29.5-43.0)	1285
Males	15-16	8.69 (7.66-9.87)	9.50 (8.20-11.0)	16.6 (14.4-19.7)	29.4 (25.3-34.8)	43.1 (37.4-49.0)	1474
Females	11-12	5.52 (4.95-6.15)	6.10 (5.60-6.80)	12.7 (11.3-14.5)	24.1 (21.2-26.3)	32.7 (30.2-36.5)	1230
Females	13-14	6.73 (6.00-7.54)	7.20 (6.40-8.10)	15.0 (13.5-16.6)	26.4 (23.1-32.3)	43.1 (35.6-51.7)	1400
Females	15-16	8.16 (7.31-9.12)	8.70 (8.00-9.30)	16.8 (15.3-18.0)	29.8 (26.3-35.6)	44.5 (39.3-53.8)	1501
Mexican Americans	11-12	6.71 (5.77-7.82)	6.60 (5.30-8.40)	12.4 (10.5-15.2)	23.7 (15.5-31.2)	33.4 (23.7-54.7)	316
Mexican Americans	13-14	8.79 (6.87-11.3)	8.70 (6.50-12.2)	17.4 (12.8-23.6)	32.8 (26.5-43.0)	49.3 (40.7-55.9)	438
Mexican Americans	15-16	9.33 (8.29-10.5)	9.90 (8.90-11.5)	17.6 (16.0-19.2)	33.0 (26.3-44.2)	52.2 (40.8-70.1)	595
Non-Hispanic blacks	11-12	9.88 (8.55-11.4)	10.4 (8.90-12.5)	19.7 (16.5-23.6)	36.5 (30.8-41.2)	49.9 (41.2-67.8)	665
Non-Hispanic blacks	13-14	10.5 (9.44-11.6)	11.2 (9.60-12.4)	20.7 (18.2-22.9)	42.2 (34.8-47.2)	58.0 (46.1-74.6)	609
Non-Hispanic blacks	15-16	11.7 (10.5-13.0)	11.8 (10.2-13.4)	23.0 (20.3-25.2)	38.2 (31.1-44.9)	51.6 (44.5-63.1)	698
Non-Hispanic whites	11-12	5.23 (4.71-5.82)	5.50 (4.90-6.00)	11.7 (9.40-13.3)	23.7 (17.6-28.8)	34.2 (28.6-37.7)	813
Non-Hispanic whites	13-14	6.12 (5.48-6.82)	6.60 (5.60-7.70)	13.6 (11.8-15.0)	22.7 (19.7-25.0)	30.2 (26.8-35.4)	987
Non-Hispanic whites	15-16	7.60 (6.69-8.64)	8.60 (7.20-9.50)	14.7 (13.2-17.4)	26.7 (22.1-31.5)	40.5 (30.5-47.2)	862
All Hispanics	11-12	7.22 (5.89-8.87)	7.70 (5.70-10.0)	13.7 (11.4-18.2)	24.8 (18.8-32.4)	33.4 (23.9-64.8)	571
All Hispanics	13-14	8.90 (7.59-10.4)	8.80 (7.10-10.6)	17.5 (13.2-21.8)	32.4 (27.6-43.0)	50.5 (40.7-55.9)	690
All Hispanics	15-16	9.35 (8.30-10.5)	9.80 (8.90-10.8)	17.6 (15.9-20.1)	33.9 (30.1-40.8)	53.8 (41.8-73.5)	971
Asians	11-12	5.70 (4.35-7.46)	6.20 (4.30-8.70)	13.8 (9.80-21.2)	27.8 (19.9-39.3)	40.1 (27.8-65.3)	352
Asians	13-14	6.47 (5.47-7.66)	6.50 (5.20-8.20)	13.7 (10.8-16.4)	21.5 (17.9-24.7)	26.8 (22.7-33.6)	289
Asians	15-16	8.00 (6.88-9.31)	7.90 (6.20-10.3)	16.8 (13.4-19.4)	36.2 (24.4-42.3)	55.1 (39.8-65.6)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.800, and 0.800 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-isobutyl phthalate (MiBP) (creatinine corrected) (2011 - 2016)†

CAS Number 30833-53-5

Metabolite of Di-isobutyl phthalate (DiBP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.83 (6.30-7.40)	6.77 (6.19-7.27)	11.6 (10.9-12.6)	19.4 (17.5-22.6)	27.5 (24.5-31.6)	2487
Total population	13-14	7.07 (6.67-7.50)	7.00 (6.67-7.37)	11.2 (10.7-11.9)	18.9 (17.1-20.8)	26.2 (23.3-30.0)	2684
Total population	15-16	8.71 (8.06-9.42)	8.33 (7.57-8.94)	14.3 (12.9-15.8)	23.1 (21.5-25.0)	32.4 (28.3-38.3)	2974
Age 3-5 years	15-16	22.5 (20.3-25.0)	22.4 (20.0-24.2)	34.6 (30.0-38.2)	59.9 (45.0-79.6)	86.1 (60.4-104)	464
Age 6-11 years	11-12	11.8 (10.2-13.6)	12.2 (10.4-14.2)	18.5 (16.2-22.4)	31.1 (24.5-46.3)	46.4 (30.8-70.0)	395
Age 6-11 years	13-14	11.8 (10.6-13.1)	11.5 (10.8-12.9)	18.9 (16.5-22.7)	33.8 (25.3-44.0)	46.4 (41.1-56.3)	409
Age 6-11 years	15-16	14.5 (12.6-16.6)	13.5 (11.9-15.0)	22.2 (18.0-26.8)	42.5 (28.4-49.6)	54.3 (46.3-62.8)	415
Age 12-19 years	11-12	7.53 (6.81-8.32)	7.61 (6.84-8.26)	11.7 (10.9-13.8)	19.9 (14.9-24.8)	25.6 (20.6-33.5)	388
Age 12-19 years	13-14	7.9 (7.38-8.45)	7.72 (7.18-8.31)	12.3 (10.4-14.9)	21.0 (18.0-26.2)	32.4 (23.1-39.1)	462
Age 12-19 years	15-16	8.11 (7.03-9.35)	7.85 (6.77-9.32)	13.0 (10.2-15.9)	19.6 (15.8-23.3)	24.0 (20.6-27.3)	405
Age 20+ years	11-12	6.34 (5.83-6.89)	6.19 (5.56-6.85)	10.8 (9.54-11.6)	18.1 (15.5-20.1)	25.2 (23.3-29.9)	1704
Age 20+ years	13-14	6.58 (6.15-7.04)	6.54 (6.13-7.00)	10.5 (9.91-11.2)	16.7 (15.4-19.0)	23.9 (19.8-28.2)	1813
Age 20+ years	15-16	8.03 (7.41-8.70)	7.60 (6.84-8.62)	13.0 (11.2-14.6)	21.1 (19.2-22.8)	27.5 (23.8-31.0)	1690
Males	11-12	6.13 (5.47-6.86)	5.91 (5.12-6.88)	10.7 (8.81-12.2)	17.6 (14.6-22.4)	25.8 (22.2-33.3)	1258
Males	13-14	6.23 (5.78-6.72)	6.09 (5.72-6.59)	10.2 (9.38-10.8)	16.6 (14.6-18.4)	23.2 (18.5-28.9)	1284
Males	15-16	7.76 (7.03-8.55)	7.27 (6.40-8.43)	12.8 (10.7-14.8)	20.9 (19.4-23.3)	28.4 (25.0-31.0)	1474
Females	11-12	7.58 (7.03-8.17)	7.57 (6.94-7.90)	12.8 (11.6-13.8)	21.2 (18.5-24.5)	28.5 (25.2-31.6)	1229
Females	13-14	7.98 (7.58-8.41)	8.00 (7.44-8.56)	12.4 (11.5-13.6)	21.1 (19.1-23.9)	29.5 (25.3-33.9)	1400
Females	15-16	9.75 (9.06-10.5)	9.25 (8.68-9.95)	15.7 (14.0-17.0)	24.8 (22.4-27.5)	37.7 (28.6-47.9)	1500
Mexican Americans	11-12	7.57 (6.49-8.81)	7.00 (5.61-8.77)	12.3 (9.74-15.2)	18.4 (15.2-30.8)	33.1 (18.0-61.6)	316
Mexican Americans	13-14	8.96 (7.59-10.6)	8.75 (6.71-10.5)	14.4 (11.8-18.2)	26.7 (20.9-31.5)	34.9 (29.2-45.4)	438
Mexican Americans	15-16	10.2 (9.35-11.0)	9.17 (8.63-10.3)	17.3 (15.6-19.1)	28.3 (25.2-33.2)	42.5 (35.4-48.9)	595
Non-Hispanic blacks	11-12	7.69 (6.69-8.83)	7.83 (6.73-8.89)	13.2 (10.6-15.4)	20.6 (17.1-26.9)	30.9 (24.5-35.8)	665
Non-Hispanic blacks	13-14	7.74 (7.14-8.39)	7.30 (6.79-7.98)	12.7 (11.7-13.8)	21.4 (19.0-24.0)	33.2 (24.2-41.9)	609
Non-Hispanic blacks	15-16	9.29 (8.45-10.2)	8.99 (7.84-10.0)	15.6 (13.6-17.2)	25.5 (23.3-28.2)	39.6 (30.3-48.3)	697
Non-Hispanic whites	11-12	6.36 (5.68-7.12)	6.12 (5.43-6.93)	11.0 (9.52-11.8)	18.5 (14.8-22.9)	25.8 (21.2-33.8)	811
Non-Hispanic whites	13-14	6.44 (5.96-6.96)	6.51 (6.04-6.98)	10.3 (9.23-11.2)	16.7 (15.4-18.0)	22.1 (18.9-25.8)	987
Non-Hispanic whites	15-16	8.17 (7.40-9.02)	7.75 (6.92-8.71)	13.6 (11.2-15.3)	21.6 (19.0-23.9)	27.6 (23.8-34.6)	862
All Hispanics	11-12	8.09 (6.94-9.43)	8.02 (6.80-9.43)	13.0 (10.6-15.9)	21.0 (15.6-30.5)	30.5 (20.5-45.0)	571
All Hispanics	13-14	8.83 (7.82-9.98)	8.53 (7.02-10.0)	14.3 (12.0-16.8)	26.0 (21.2-29.7)	34.8 (29.6-44.5)	690
All Hispanics	15-16	9.85 (9.05-10.7)	9.20 (8.61-10.0)	16.5 (14.7-18.1)	27.5 (25.2-32.4)	42.5 (36.3-46.5)	971
Asians	11-12	7.64 (6.21-9.39)	7.84 (6.10-9.68)	14.3 (10.5-17.7)	25.0 (18.2-30.6)	33.2 (22.5-55.5)	352
Asians	13-14	8.19 (7.41-9.05)	8.04 (6.60-9.52)	13.0 (11.8-15.0)	22.7 (18.5-25.9)	32.8 (24.5-40.0)	288
Asians	15-16	9.9 (9.19-10.7)	9.28 (8.20-10.5)	16.6 (13.9-19.0)	26.1 (21.5-35.9)	45.4 (26.2-59.6)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-2-methyl-2-hydroxypropyl phthalate (MHiBP) (2013 - 2016)†

CAS Number 30833-53-5

Metabolite of Di-isobutyl phthalate (DiBP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	2.50 (2.31-2.72)	2.60 (2.40-2.90)	5.20 (4.80-5.60)	9.40 (8.70-10.1)	13.7 (11.9-15.5)	2681
Total population	15-16	2.67 (2.42-2.95)	2.70 (2.50-3.10)	5.50 (4.90-5.90)	10.4 (9.20-11.5)	15.1 (12.8-16.8)	2975
Age 3-5 years	15-16	3.76 (3.45-4.09)	3.80 (3.20-4.10)	7.20 (6.30-7.80)	13.6 (10.7-16.5)	20.6 (15.0-23.5)	465
Age 6-11 years	13-14	3.95 (3.37-4.63)	4.30 (3.70-4.80)	7.30 (6.50-8.90)	11.8 (10.7-13.6)	15.3 (13.3-20.2)	409
Age 6-11 years	15-16	4.04 (3.32-4.92)	4.20 (3.60-4.70)	8.00 (5.70-10.0)	14.5 (10.8-18.3)	21.4 (15.9-25.7)	415
Age 12-19 years	13-14	3.64 (3.10-4.29)	3.70 (3.10-4.30)	7.20 (5.90-8.70)	15.8 (12.1-19.5)	25.2 (16.9-33.5)	461
Age 12-19 years	15-16	3.47 (2.79-4.33)	3.60 (2.80-4.50)	6.50 (5.00-9.00)	11.4 (9.20-15.0)	15.0 (11.3-20.7)	405
Age 20+ years	13-14	2.25 (2.07-2.45)	2.40 (2.20-2.60)	4.70 (4.40-5.00)	8.30 (7.50-9.30)	11.8 (10.4-13.6)	1811
Age 20+ years	15-16	2.43 (2.19-2.68)	2.50 (2.20-2.80)	5.00 (4.50-5.70)	9.70 (8.60-10.7)	14.3 (11.7-15.9)	1690
Males	13-14	2.56 (2.29-2.87)	2.80 (2.40-3.20)	4.90 (4.50-5.50)	8.90 (7.60-10.7)	12.6 (11.0-15.2)	1284
Males	15-16	2.61 (2.34-2.91)	2.70 (2.40-3.10)	5.40 (4.70-5.90)	9.80 (8.50-11.1)	14.4 (11.6-16.1)	1474
Females	13-14	2.45 (2.21-2.70)	2.50 (2.20-2.80)	5.40 (4.90-6.10)	9.60 (8.60-10.7)	14.4 (12.3-17.1)	1397
Females	15-16	2.73 (2.43-3.08)	2.70 (2.50-3.10)	5.70 (5.00-6.50)	11.1 (9.40-12.7)	15.7 (13.8-18.7)	1501
Mexican Americans	13-14	2.85 (2.13-3.81)	2.90 (2.00-4.50)	6.20 (4.80-7.60)	11.4 (9.10-13.3)	14.7 (12.7-17.7)	438
Mexican Americans	15-16	2.93 (2.62-3.29)	3.20 (2.70-3.60)	5.40 (4.90-6.00)	10.7 (8.70-13.8)	16.1 (12.9-19.1)	595
Non-Hispanic blacks	13-14	3.61 (3.17-4.11)	3.70 (3.30-4.20)	7.10 (6.40-7.70)	14.6 (11.7-17.9)	20.6 (17.6-24.7)	608
Non-Hispanic blacks	15-16	3.46 (3.03-3.95)	3.70 (3.30-4.20)	7.00 (6.10-8.00)	11.6 (9.80-14.2)	16.1 (14.2-18.8)	698
Non-Hispanic whites	13-14	2.26 (2.05-2.49)	2.40 (2.20-2.70)	4.70 (4.40-5.00)	8.30 (7.30-9.50)	11.4 (9.60-13.2)	986
Non-Hispanic whites	15-16	2.48 (2.22-2.77)	2.50 (2.20-2.90)	5.10 (4.50-5.90)	9.90 (8.40-11.3)	15.0 (11.6-15.7)	862
All Hispanics	13-14	2.89 (2.39-3.49)	3.10 (2.40-3.80)	6.00 (4.90-7.60)	11.3 (9.40-14.3)	15.7 (13.6-18.9)	690
All Hispanics	15-16	2.96 (2.67-3.28)	3.10 (2.70-3.50)	5.50 (5.20-6.20)	11.4 (9.50-13.2)	18.0 (14.0-22.4)	971
Asians	13-14	2.07 (1.74-2.45)	2.10 (1.60-2.70)	4.30 (3.60-5.50)	7.30 (5.80-9.50)	9.70 (7.50-15.6)	287
Asians	15-16	2.48 (2.07-2.98)	2.40 (1.90-3.10)	5.20 (4.00-6.50)	10.5 (7.80-15.4)	18.7 (10.6-21.2)	301

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.400 and 0.400 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-2-methyl-2-hydroxypropyl phthalate (MHiBP) (creatinine corrected) (2013 - 2016)†

CAS Number 30833-53-5

Metabolite of Di-isobutyl phthalate (DiBP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	2.51 (2.37-2.66)	2.55 (2.33-2.73)	4.05 (3.86-4.33)	7.12 (6.39-7.54)	9.44 (8.79-10.7)	2680
Total population	15-16	2.76 (2.57-2.97)	2.73 (2.50-2.98)	4.62 (4.37-4.92)	7.82 (7.21-8.66)	11.1 (9.80-13.1)	2974
Age 3-5 years	15-16	8.97 (8.00-10.1)	8.64 (7.64-9.52)	14.4 (12.4-15.6)	25.2 (19.2-29.0)	32.1 (25.6-48.4)	464
Age 6-11 years	13-14	4.99 (4.44-5.61)	4.74 (3.94-5.97)	8.56 (7.24-10.0)	13.8 (11.9-15.3)	16.5 (15.0-25.3)	409
Age 6-11 years	15-16	5.21 (4.47-6.06)	4.84 (4.32-5.82)	8.07 (6.92-9.67)	13.9 (10.2-18.5)	20.3 (13.1-30.3)	415
Age 12-19 years	13-14	2.96 (2.70-3.24)	2.84 (2.60-3.10)	4.70 (3.89-5.52)	8.42 (7.54-10.0)	12.1 (9.36-15.3)	461
Age 12-19 years	15-16	2.7 (2.35-3.10)	2.79 (2.41-3.08)	4.48 (3.57-5.46)	6.60 (5.46-8.32)	8.32 (6.57-9.93)	405
Age 20+ years	13-14	2.27 (2.12-2.44)	2.34 (2.12-2.57)	3.67 (3.44-3.89)	5.78 (5.38-6.36)	7.59 (7.19-8.55)	1810
Age 20+ years	15-16	2.47 (2.29-2.67)	2.46 (2.21-2.73)	4.08 (3.82-4.44)	6.47 (5.79-7.69)	9.19 (8.28-10.2)	1690
Males	13-14	2.16 (1.99-2.33)	2.15 (1.92-2.40)	3.51 (3.26-3.74)	6.19 (5.42-6.83)	8.56 (7.49-10.2)	1283
Males	15-16	2.33 (2.15-2.51)	2.15 (1.94-2.50)	3.97 (3.53-4.42)	6.96 (6.07-7.78)	9.51 (8.89-10.2)	1474
Females	13-14	2.9 (2.71-3.11)	2.86 (2.64-3.09)	4.69 (4.27-5.05)	7.64 (7.07-8.48)	10.4 (8.99-12.5)	1397
Females	15-16	3.27 (3.01-3.54)	3.20 (3.02-3.39)	5.00 (4.63-5.83)	8.76 (7.48-9.80)	13.1 (9.93-17.6)	1500
Mexican Americans	13-14	2.9 (2.35-3.58)	2.95 (2.30-3.53)	5.46 (4.12-6.39)	8.79 (7.19-11.6)	12.5 (9.66-16.5)	438
Mexican Americans	15-16	3.19 (2.97-3.43)	2.98 (2.79-3.24)	5.35 (4.83-5.75)	9.26 (8.28-10.4)	14.0 (11.4-16.3)	595
Non-Hispanic blacks	13-14	2.67 (2.40-2.97)	2.70 (2.33-2.96)	4.39 (3.69-5.00)	7.16 (6.30-8.42)	11.2 (8.42-14.4)	608
Non-Hispanic blacks	15-16	2.76 (2.50-3.04)	2.74 (2.34-3.05)	4.78 (4.35-5.12)	8.28 (6.72-9.64)	11.8 (9.64-14.0)	697
Non-Hispanic whites	13-14	2.38 (2.16-2.62)	2.43 (2.14-2.75)	3.81 (3.38-4.14)	6.27 (5.19-7.49)	8.55 (7.57-9.38)	986
Non-Hispanic whites	15-16	2.66 (2.45-2.90)	2.65 (2.34-2.89)	4.46 (4.05-4.81)	7.48 (6.25-8.89)	9.93 (8.47-13.9)	862
All Hispanics	13-14	2.87 (2.47-3.33)	2.88 (2.46-3.29)	5.38 (4.25-5.96)	8.75 (7.18-11.0)	13.0 (10.9-16.5)	690
All Hispanics	15-16	3.12 (2.91-3.34)	2.97 (2.78-3.17)	5.23 (4.82-5.67)	9.26 (8.35-10.2)	14.2 (11.4-16.2)	971
Asians	13-14	2.64 (2.38-2.94)	2.64 (2.22-2.87)	4.65 (4.09-5.50)	7.73 (6.36-9.60)	9.94 (8.63-12.3)	286
Asians	15-16	3.07 (2.76-3.42)	2.88 (2.31-3.46)	5.20 (4.16-6.00)	7.96 (7.14-9.95)	14.9 (8.83-18.9)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DBP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-ethyl phthalate (MEP) (2011 - 2016)†

CAS Number 863029-89-4

Metabolite of Diethyl phthalate (DEP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	37.9 (33.0-43.5)	31.1 (27.3-37.9)	96.4 (83.7-114)	277 (227-367)	570 (419-738)	2489
Total population	13-14	35.7 (32.1-39.8)	29.9 (27.4-33.1)	82.4 (68.5-98.1)	253 (211-329)	560 (420-684)	2685
Total population	15-16	33.6 (29.3-38.4)	28.6 (24.7-33.7)	80.4 (66.9-102)	217 (181-259)	433 (340-531)	2975
Age 3-5 years	15-16	19.4 (17.1-22.1)	17.6 (14.8-20.5)	36.4 (30.7-44.9)	86.4 (71.0-106)	140 (109-273)	465
Age 6-11 years	11-12	23.4 (18.7-29.2)	24.5 (18.9-28.7)	49.8 (38.4-70.6)	112 (85.0-165)	199 (139-277)	396
Age 6-11 years	13-14	24.5 (20.6-29.2)	22.0 (18.4-27.9)	50.0 (36.5-66.2)	133 (88.8-241)	249 (131-390)	409
Age 6-11 years	15-16	24.5 (18.6-32.3)	22.1 (16.3-31.1)	49.8 (31.9-75.7)	115 (70.4-203)	211 (143-352)	415
Age 12-19 years	11-12	36.2 (27.9-47.0)	30.6 (24.0-40.4)	86.7 (59.0-129)	216 (155-256)	378 (254-642)	388
Age 12-19 years	13-14	33.2 (29.3-37.8)	29.8 (24.9-35.6)	77.7 (56.3-96.4)	171 (132-218)	340 (226-459)	462
Age 12-19 years	15-16	35.1 (27.8-44.2)	34.1 (25.4-43.7)	79.1 (58.7-106)	191 (113-414)	427 (191-612)	405
Age 20+ years	11-12	40.2 (34.9-46.5)	32.0 (27.6-40.9)	105 (93.7-119)	315 (253-406)	688 (460-801)	1705
Age 20+ years	13-14	37.6 (33.3-42.6)	31.5 (28.4-35.0)	87.7 (71.1-110)	296 (228-368)	632 (455-821)	1814
Age 20+ years	15-16	35.2 (30.9-40.2)	29.0 (25.1-35.9)	90.8 (70.8-113)	235 (192-312)	448 (353-563)	1690
Males	11-12	38.1 (33.3-43.7)	29.6 (26.1-35.9)	93.8 (75.3-118)	262 (227-369)	566 (371-875)	1259
Males	13-14	36.1 (32.0-40.8)	28.8 (25.1-33.7)	82.4 (61.3-104)	299 (203-387)	588 (405-897)	1285
Males	15-16	30.8 (27.2-34.8)	26.6 (21.8-29.9)	68.9 (54.5-87.6)	183 (148-247)	374 (258-480)	1474
Females	11-12	37.7 (30.6-46.4)	32.5 (25.2-45.3)	101 (82.8-118)	295 (207-406)	596 (447-727)	1230
Females	13-14	35.4 (29.9-41.8)	31.2 (26.2-38.2)	82.2 (68.0-103)	231 (193-308)	485 (374-632)	1400
Females	15-16	36.5 (30.2-44.0)	31.6 (25.6-41.1)	96.6 (68.7-125)	243 (192-343)	457 (352-551)	1501
Mexican Americans	11-12	49.5 (39.3-62.3)	39.3 (34.0-47.0)	120 (69.8-163)	375 (259-561)	874 (394-1420)	316
Mexican Americans	13-14	44.7 (38.5-51.9)	37.0 (28.8-47.6)	106 (85.8-134)	316 (196-435)	568 (353-897)	438
Mexican Americans	15-16	35.8 (30.1-42.5)	29.1 (25.8-32.6)	73.7 (54.9-105)	282 (170-437)	652 (364-1080)	595
Non-Hispanic blacks	11-12	89.2 (77.9-102)	82.1 (71.0-93.2)	196 (166-229)	524 (381-669)	942 (653-1790)	665
Non-Hispanic blacks	13-14	74.3 (67.9-81.3)	63.3 (52.4-75.3)	175 (156-218)	513 (381-616)	1160 (875-1710)	609
Non-Hispanic blacks	15-16	68.9 (55.8-85.1)	65.6 (47.8-80.4)	172 (127-237)	436 (312-566)	717 (519-2030)	698
Non-Hispanic whites	11-12	30.4 (26.0-35.6)	25.4 (20.1-29.2)	77.6 (64.2-92.9)	221 (166-290)	460 (290-697)	813
Non-Hispanic whites	13-14	28.5 (26.1-31.3)	24.5 (21.4-27.4)	58.1 (49.5-67.3)	191 (130-241)	377 (277-632)	987
Non-Hispanic whites	15-16	28.7 (25.1-32.9)	24.3 (20.3-28.5)	66.1 (51.6-84.6)	175 (126-217)	339 (200-457)	862
All Hispanics	11-12	55.5 (44.2-69.6)	47.6 (38.0-59.6)	132 (99.9-180)	406 (334-537)	809 (461-1240)	571
All Hispanics	13-14	49.4 (42.6-57.4)	42.2 (37.0-50.9)	113 (96.4-140)	376 (237-501)	681 (454-1020)	690
All Hispanics	15-16	38.6 (33.4-44.6)	31.7 (29.0-35.6)	86.4 (68.9-106)	257 (211-374)	612 (429-786)	971
Asians	11-12	23.3 (17.9-30.3)	18.8 (13.9-28.3)	60.7 (38.6-89.5)	166 (109-289)	405 (175-1080)	352
Asians	13-14	23.7 (20.7-27.1)	19.3 (15.4-24.0)	54.6 (42.8-72.0)	166 (103-293)	316 (187-433)	289
Asians	15-16	24.4 (15.9-37.5)	22.9 (15.7-31.3)	62.0 (42.2-95.4)	163 (90.0-316)	335 (163-761)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.600, 1.20, and 1.20 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-ethyl phthalate (MEP) (creatinine corrected) (2011 - 2016)†

CAS Number 863029-89-4

Metabolite of Diethyl phthalate (DEP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	43.2 (38.5-48.5)	34.4 (30.5-39.2)	94.2 (79.5-111)	263 (198-368)	541 (398-777)	2487
Total population	13-14	35.8 (32.6-39.4)	27.9 (24.6-31.7)	73.7 (65.2-84.6)	216 (173-260)	460 (351-606)	2684
Total population	15-16	34.7 (31.0-39.0)	27.7 (24.8-31.1)	72.6 (61.8-84.7)	209 (149-250)	374 (301-518)	2974
Age 3-5 years	15-16	46.3 (41.3-51.9)	40.0 (35.1-46.3)	73.1 (63.9-86.4)	157 (135-209)	343 (209-455)	464
Age 6-11 years	11-12	33.4 (26.7-41.6)	29.2 (23.0-36.7)	59.7 (39.8-99.6)	123 (90.0-172)	177 (144-353)	395
Age 6-11 years	13-14	31 (26.4-36.3)	26.8 (22.7-30.9)	49.7 (37.1-70.7)	117 (72.5-182)	255 (149-475)	409
Age 6-11 years	15-16	31.6 (25.6-39.0)	26.5 (21.8-33.6)	52.0 (38.6-72.1)	120 (77.8-205)	219 (127-358)	415
Age 12-19 years	11-12	35.3 (30.5-40.9)	29.4 (22.8-37.3)	61.1 (46.7-94.5)	157 (122-223)	262 (163-549)	388
Age 12-19 years	13-14	27 (24.7-29.5)	22.1 (20.2-25.0)	49.0 (42.4-55.9)	113 (75.9-162)	192 (139-260)	462
Age 12-19 years	15-16	27.3 (23.3-31.9)	21.5 (18.3-27.6)	51.5 (40.4-66.0)	122 (74.4-185)	194 (140-311)	405
Age 20+ years	11-12	45.8 (40.4-52.0)	35.4 (32.2-42.3)	101 (86.9-124)	328 (235-405)	634 (432-1010)	1704
Age 20+ years	13-14	38 (34.2-42.2)	29.6 (25.3-35.2)	84.2 (72.4-97.5)	255 (194-318)	528 (385-699)	1813
Age 20+ years	15-16	35.9 (32.0-40.4)	28.5 (25.3-31.9)	78.2 (64.6-96.8)	230 (177-280)	393 (310-560)	1690
Males	11-12	35.8 (31.7-40.4)	29.3 (25.0-33.6)	77.3 (60.9-92.4)	203 (156-293)	455 (271-703)	1258
Males	13-14	30.4 (26.8-34.4)	22.4 (20.4-25.7)	62.9 (48.7-73.3)	192 (140-290)	442 (295-664)	1284
Males	15-16	27.4 (24.7-30.5)	22.4 (19.9-24.8)	53.9 (41.8-67.5)	141 (103-198)	258 (224-308)	1474
Females	11-12	51.8 (44.5-60.4)	40.7 (34.0-49.9)	111 (89.2-132)	339 (249-415)	646 (436-1020)	1229
Females	13-14	42 (37.5-47.0)	33.8 (29.4-41.2)	86.5 (77.2-98.0)	230 (182-279)	468 (352-619)	1400
Females	15-16	43.6 (36.8-51.7)	35.2 (30.3-41.2)	93.3 (69.7-117)	262 (208-328)	466 (352-660)	1500
Mexican Americans	11-12	55.7 (47.0-66.1)	41.6 (34.5-52.5)	122 (85.3-164)	335 (223-549)	736 (398-1080)	316
Mexican Americans	13-14	45.5 (39.9-51.9)	35.9 (32.6-43.8)	94.1 (76.1-129)	320 (192-523)	697 (441-880)	438
Mexican Americans	15-16	39 (33.7-45.0)	28.0 (24.3-33.2)	83.9 (53.7-115)	246 (148-420)	557 (267-971)	595
Non-Hispanic blacks	11-12	69.4 (59.9-80.4)	57.7 (49.7-67.4)	141 (124-168)	404 (274-571)	973 (609-1220)	665
Non-Hispanic blacks	13-14	54.8 (48.7-61.7)	44.9 (38.6-52.7)	111 (91.7-132)	393 (275-519)	806 (512-1520)	609
Non-Hispanic blacks	15-16	54.9 (46.8-64.3)	47.6 (38.6-55.0)	119 (95.8-141)	313 (228-409)	741 (355-1390)	697
Non-Hispanic whites	11-12	37 (31.9-43.0)	29.1 (25.0-33.0)	80.4 (62.3-98.6)	230 (152-346)	481 (314-704)	811
Non-Hispanic whites	13-14	30 (27.2-33.2)	23.5 (21.2-26.7)	56.5 (49.7-68.5)	153 (129-200)	344 (228-455)	987
Non-Hispanic whites	15-16	30.8 (27.1-35.1)	25.1 (20.9-29.1)	64.2 (48.0-76.7)	176 (102-256)	310 (233-445)	862
All Hispanics	11-12	62.1 (52.3-73.8)	51.2 (42.6-57.4)	138 (101-187)	393 (257-484)	739 (398-1400)	571
All Hispanics	13-14	49.1 (44.2-54.5)	40.2 (35.6-46.3)	104 (81.7-121)	332 (242-487)	680 (468-914)	690
All Hispanics	15-16	40.6 (35.8-46.2)	30.5 (26.9-36.3)	84.4 (67.6-110)	240 (156-370)	504 (349-736)	971
Asians	11-12	31.2 (24.6-39.7)	24.7 (18.6-32.4)	71.3 (49.0-101)	186 (94.0-527)	405 (200-886)	352
Asians	13-14	30.1 (24.4-37.1)	24.5 (17.6-33.7)	71.8 (48.4-93.5)	162 (132-241)	418 (209-569)	288
Asians	15-16	30.2 (21.4-42.7)	24.6 (16.7-39.5)	74.4 (47.2-111)	198 (102-377)	315 (187-554)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-2-ethylhexyl phthalate (MEHP) (2011 - 2016)†

CAS Number 4376-20-9

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.36 (1.25-1.49)	1.40 (1.20-1.50)	3.00 (2.70-3.30)	6.00 (5.30-6.40)	8.70 (7.60-9.70)	2489
Total population	13-14	*	1.10 (.900-1.20)	2.30 (2.10-2.60)	4.40 (4.00-5.00)	6.30 (5.60-7.10)	2685
Total population	15-16	*	1.10 (1.00-1.10)	2.20 (2.00-2.40)	4.00 (3.80-4.20)	6.00 (5.60-7.10)	2975
Age 3-5 years	15-16	1.28 (1.16-1.40)	1.10 (1.00-1.40)	2.20 (1.90-2.50)	3.80 (3.20-5.00)	6.00 (5.00-8.00)	465
Age 6-11 years	11-12	1.41 (1.23-1.61)	1.50 (1.20-1.80)	2.90 (2.50-3.40)	5.30 (4.10-7.10)	7.60 (6.30-8.80)	396
Age 6-11 years	13-14	1.44 (1.24-1.66)	1.20 (1.00-1.50)	2.70 (2.20-3.20)	5.20 (3.70-8.50)	8.70 (5.20-11.8)	409
Age 6-11 years	15-16	1.42 (1.28-1.57)	1.30 (1.00-1.60)	2.60 (2.20-3.00)	4.20 (3.60-4.80)	5.90 (4.70-8.10)	415
Age 12-19 years	11-12	1.58 (1.33-1.87)	1.50 (1.00-2.30)	3.90 (3.10-4.40)	6.80 (5.20-10.3)	12.5 (8.90-14.3)	388
Age 12-19 years	13-14	1.43 (1.26-1.62)	1.20 (1.00-1.40)	2.60 (2.00-3.50)	4.90 (4.20-5.80)	8.30 (5.50-10.7)	462
Age 12-19 years	15-16	1.17 (1.07-1.27)	1.00 (.900-1.10)	1.80 (1.50-2.30)	3.50 (3.10-4.40)	5.00 (3.90-7.20)	405
Age 20+ years	11-12	1.33 (1.19-1.48)	1.30 (1.10-1.50)	2.90 (2.50-3.20)	5.90 (5.10-6.40)	8.30 (7.10-9.60)	1705
Age 20+ years	13-14	*	1.00 (.900-1.20)	2.30 (2.00-2.50)	4.30 (3.80-4.90)	6.10 (5.40-6.80)	1814
Age 20+ years	15-16	*	1.00 (.900-1.10)	2.20 (2.00-2.40)	4.00 (3.80-4.40)	6.40 (5.70-8.20)	1690
Males	11-12	1.51 (1.33-1.70)	1.50 (1.20-1.80)	3.10 (2.60-3.90)	6.10 (5.50-7.00)	9.20 (7.70-11.3)	1259
Males	13-14	1.29 (1.17-1.41)	1.10 (1.00-1.30)	2.30 (2.00-2.70)	4.20 (3.50-5.00)	5.70 (5.10-6.60)	1285
Males	15-16	1.33 (1.23-1.43)	1.10 (1.00-1.30)	2.40 (2.20-2.80)	4.10 (3.80-4.80)	6.40 (5.20-8.40)	1474
Females	11-12	1.24 (1.14-1.34)	1.20 (1.00-1.40)	2.90 (2.50-3.10)	5.60 (4.90-6.30)	8.10 (6.80-9.20)	1230
Females	13-14	*	1.00 (.900-1.10)	2.40 (2.10-2.60)	4.80 (4.20-5.30)	7.00 (5.70-8.70)	1400
Females	15-16	*	1.00 (.900-1.10)	1.90 (1.70-2.10)	3.90 (3.40-4.40)	5.80 (5.00-7.60)	1501
Mexican Americans	11-12	1.49 (1.16-1.91)	1.50 (1.00-1.90)	3.40 (2.50-4.30)	6.60 (5.10-8.90)	9.60 (6.60-12.9)	316
Mexican Americans	13-14	1.55 (1.35-1.78)	1.50 (1.20-1.70)	2.90 (2.20-3.80)	5.60 (4.20-7.00)	7.40 (6.30-9.30)	438
Mexican Americans	15-16	1.38 (1.23-1.55)	1.20 (.900-1.50)	2.60 (2.00-3.10)	4.90 (3.70-5.80)	7.60 (5.10-9.70)	595
Non-Hispanic blacks	11-12	1.89 (1.67-2.13)	2.00 (1.60-2.40)	4.00 (3.40-4.90)	8.00 (6.20-9.70)	11.3 (9.60-14.9)	665
Non-Hispanic blacks	13-14	1.63 (1.39-1.92)	1.50 (1.10-2.00)	3.30 (2.50-4.00)	5.80 (5.10-6.70)	8.10 (6.50-10.5)	609
Non-Hispanic blacks	15-16	1.59 (1.44-1.77)	1.50 (1.20-1.80)	2.90 (2.60-3.30)	5.80 (4.80-7.60)	9.30 (6.60-13.9)	698
Non-Hispanic whites	11-12	1.21 (1.07-1.37)	1.10 (.900-1.50)	2.70 (2.20-3.10)	4.90 (4.20-6.10)	6.70 (6.00-8.30)	813
Non-Hispanic whites	13-14	*	.900 (.800-1.00)	2.00 (1.80-2.30)	3.90 (3.20-4.30)	5.50 (4.80-6.30)	987
Non-Hispanic whites	15-16	*	.900 (<LOD-1.10)	1.90 (1.70-2.10)	3.50 (3.00-3.90)	5.00 (4.10-7.10)	862
All Hispanics	11-12	1.61 (1.40-1.83)	1.70 (1.30-2.00)	3.90 (3.10-4.70)	7.30 (6.30-8.70)	11.6 (9.20-12.9)	571
All Hispanics	13-14	1.55 (1.40-1.73)	1.50 (1.20-1.70)	2.90 (2.50-3.40)	5.20 (4.40-6.30)	7.20 (6.20-9.20)	690
All Hispanics	15-16	1.37 (1.25-1.49)	1.20 (1.10-1.40)	2.40 (2.20-2.80)	4.30 (3.80-5.10)	6.20 (5.10-8.10)	971
Asians	11-12	1.69 (1.44-1.98)	1.70 (1.30-1.90)	3.60 (2.80-4.40)	7.80 (6.60-11.4)	13.8 (10.0-17.8)	352
Asians	13-14	*	1.00 (<LOD-1.20)	2.10 (1.80-2.80)	4.30 (3.50-6.10)	7.90 (4.90-10.5)	289
Asians	15-16	1.57 (1.35-1.83)	1.50 (1.10-1.70)	3.20 (2.60-4.00)	6.90 (4.30-8.40)	8.80 (7.60-11.5)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.500, 0.800, and 0.800 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-2-ethylhexyl phthalate (MEHP) (creatinine corrected) (2011 - 2016)†

CAS Number 4376-20-9

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.55 (1.43-1.68)	1.46 (1.33-1.67)	2.73 (2.50-2.92)	4.91 (4.55-5.52)	8.47 (6.72-9.86)	2487
Total population	13-14	*	1.21 (1.11-1.33)	2.19 (2.05-2.38)	3.82 (3.46-4.15)	5.18 (4.66-5.74)	2684
Total population	15-16	*	1.24 (1.13-1.33)	2.19 (2.03-2.39)	4.07 (3.56-4.48)	5.93 (5.43-6.51)	2974
Age 3-5 years	15-16	3.05 (2.77-3.36)	2.86 (2.58-3.24)	4.90 (4.23-5.54)	8.49 (7.13-9.64)	11.0 (9.64-13.2)	464
Age 6-11 years	11-12	2.02 (1.81-2.25)	2.07 (1.75-2.44)	3.45 (2.82-4.06)	5.26 (4.60-5.89)	7.15 (5.89-8.17)	395
Age 6-11 years	13-14	1.81 (1.57-2.09)	1.76 (1.53-2.01)	3.13 (2.59-3.86)	6.33 (4.02-8.32)	8.32 (5.53-14.1)	409
Age 6-11 years	15-16	1.83 (1.63-2.04)	1.82 (1.60-2.08)	2.96 (2.56-3.39)	4.67 (4.07-5.23)	6.25 (5.08-8.45)	415
Age 12-19 years	11-12	1.53 (1.33-1.78)	1.40 (1.12-1.88)	2.79 (2.20-3.88)	5.00 (4.11-6.94)	9.86 (5.00-11.1)	388
Age 12-19 years	13-14	1.16 (1.03-1.31)	1.15 (1.00-1.27)	1.88 (1.67-2.10)	3.35 (2.38-4.07)	4.79 (3.61-6.76)	462
Age 12-19 years	15-16	0.908 (.814-1.01)	.864 (.731-.991)	1.53 (1.29-1.75)	2.53 (2.28-2.72)	3.41 (2.72-4.56)	405
Age 20+ years	11-12	1.51 (1.39-1.64)	1.46 (1.28-1.58)	2.59 (2.38-2.84)	4.81 (4.35-5.51)	8.49 (6.18-11.2)	1704
Age 20+ years	13-14	*	1.19 (1.08-1.31)	2.19 (1.98-2.41)	3.70 (3.25-4.09)	5.00 (4.34-5.40)	1813
Age 20+ years	15-16	*	1.18 (1.10-1.29)	2.10 (1.90-2.31)	3.88 (3.27-4.50)	5.90 (4.96-6.67)	1690
Males	11-12	1.41 (1.28-1.56)	1.36 (1.19-1.58)	2.52 (2.21-2.83)	4.58 (3.77-5.46)	7.19 (6.16-8.79)	1258
Males	13-14	1.08 (.984-1.19)	1.03 (.950-1.12)	1.78 (1.58-2.00)	3.17 (2.73-3.60)	4.30 (3.94-5.06)	1284
Males	15-16	1.18 (1.08-1.30)	1.14 (1.02-1.29)	2.04 (1.84-2.27)	3.41 (2.85-4.27)	4.83 (4.23-6.25)	1474
Females	11-12	1.7 (1.56-1.85)	1.58 (1.43-1.75)	2.86 (2.63-3.18)	5.36 (4.64-5.89)	8.89 (6.67-13.2)	1229
Females	13-14	*	1.48 (1.33-1.64)	2.59 (2.36-2.96)	4.29 (3.70-5.00)	5.74 (5.12-7.70)	1400
Females	15-16	*	1.32 (1.17-1.46)	2.42 (2.18-2.71)	4.50 (4.05-5.06)	6.84 (5.61-8.00)	1500
Mexican Americans	11-12	1.68 (1.36-2.06)	1.67 (1.21-2.06)	2.91 (2.46-3.50)	6.23 (4.32-9.05)	11.3 (5.67-18.3)	316
Mexican Americans	13-14	1.58 (1.35-1.85)	1.48 (1.24-1.83)	2.85 (2.46-3.39)	4.62 (4.07-5.56)	7.13 (5.53-8.04)	438
Mexican Americans	15-16	1.5 (1.39-1.62)	1.47 (1.34-1.57)	2.64 (2.19-3.00)	4.30 (3.91-4.83)	5.88 (5.14-7.81)	595
Non-Hispanic blacks	11-12	1.47 (1.29-1.67)	1.44 (1.26-1.75)	2.75 (2.37-3.14)	5.16 (4.17-7.05)	8.69 (6.07-12.1)	665
Non-Hispanic blacks	13-14	1.2 (1.07-1.36)	1.13 (.957-1.39)	2.11 (1.85-2.44)	3.46 (2.96-4.07)	5.05 (3.74-6.31)	609
Non-Hispanic blacks	15-16	1.27 (1.13-1.43)	1.19 (1.07-1.37)	2.40 (2.08-2.69)	4.39 (3.75-5.23)	7.08 (5.23-8.22)	697
Non-Hispanic whites	11-12	1.47 (1.29-1.68)	1.45 (1.25-1.65)	2.51 (2.17-2.84)	4.43 (3.77-5.00)	6.77 (5.00-9.54)	811
Non-Hispanic whites	13-14	*	1.16 (1.02-1.31)	2.11 (1.84-2.33)	3.56 (3.00-4.10)	4.68 (4.19-5.62)	987
Non-Hispanic whites	15-16	*	1.14 (<LOD-1.27)	1.97 (1.78-2.19)	3.56 (2.98-4.30)	5.58 (4.39-6.54)	862
All Hispanics	11-12	1.8 (1.63-1.98)	1.79 (1.59-2.00)	3.32 (2.86-3.76)	6.37 (5.67-8.07)	11.3 (7.79-14.4)	571
All Hispanics	13-14	1.54 (1.38-1.73)	1.43 (1.22-1.67)	2.80 (2.48-3.10)	4.39 (3.98-5.09)	6.61 (5.53-7.64)	690
All Hispanics	15-16	1.44 (1.35-1.53)	1.40 (1.27-1.50)	2.48 (2.20-2.71)	4.27 (3.76-4.75)	5.88 (5.18-7.12)	971
Asians	11-12	2.26 (1.98-2.58)	1.98 (1.71-2.33)	4.18 (3.26-5.00)	8.89 (6.40-12.6)	14.0 (10.0-20.1)	352
Asians	13-14	*	1.43 (<LOD-1.70)	2.76 (2.31-3.13)	5.00 (3.96-5.87)	6.85 (5.17-9.73)	288
Asians	15-16	1.94 (1.66-2.27)	1.95 (1.63-2.18)	3.56 (2.74-4.05)	6.57 (5.09-8.18)	11.5 (7.13-14.8)	301

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP) (2011 - 2016)†

CAS Number 40321-99-1

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	7.91 (7.47-8.36)	8.30 (7.50-9.00)	16.0 (14.4-17.4)	29.0 (25.8-32.5)	43.1 (40.6-47.2)	2489
Total population	13-14	6.47 (5.98-7.00)	6.90 (6.30-7.70)	13.2 (11.9-14.7)	23.7 (20.7-26.6)	33.7 (28.2-37.6)	2685
Total population	15-16	5.67 (5.34-6.01)	5.70 (5.40-6.10)	10.8 (10.1-11.8)	18.9 (17.1-21.8)	28.3 (26.0-32.2)	2975
Age 3-5 years	15-16	8.65 (7.86-9.52)	8.40 (7.40-9.60)	16.4 (13.9-19.0)	32.7 (26.2-42.5)	49.3 (42.5-54.3)	465
Age 6-11 years	11-12	10.5 (8.82-12.4)	11.8 (10.4-14.2)	23.3 (19.9-26.1)	39.5 (30.6-50.3)	55.4 (41.8-68.5)	396
Age 6-11 years	13-14	9.54 (7.94-11.5)	9.40 (7.50-12.8)	18.7 (16.2-23.0)	36.4 (26.5-44.8)	50.8 (37.3-76.5)	409
Age 6-11 years	15-16	8.81 (7.83-9.90)	9.00 (7.90-10.0)	14.5 (13.3-17.1)	27.5 (20.0-35.9)	39.0 (31.7-47.9)	415
Age 12-19 years	11-12	8.55 (6.93-10.6)	8.80 (6.80-10.6)	18.3 (14.3-23.2)	36.0 (27.4-46.6)	56.7 (38.1-99.8)	388
Age 12-19 years	13-14	7.62 (6.43-9.04)	7.70 (6.20-10.3)	15.8 (12.3-19.3)	26.8 (21.9-32.5)	35.3 (27.6-59.5)	462
Age 12-19 years	15-16	5.81 (4.93-6.84)	5.70 (5.00-7.20)	11.0 (9.00-12.7)	17.3 (13.8-22.5)	25.3 (17.6-29.3)	405
Age 20+ years	11-12	7.58 (7.03-8.16)	8.00 (7.20-8.90)	15.0 (13.5-16.9)	26.7 (23.8-30.6)	41.5 (34.7-46.2)	1705
Age 20+ years	13-14	6.06 (5.63-6.51)	6.70 (5.70-7.30)	12.3 (11.3-13.4)	22.3 (19.6-24.0)	30.3 (26.5-35.9)	1814
Age 20+ years	15-16	5.29 (5.00-5.61)	5.40 (5.00-5.70)	10.2 (9.30-11.0)	18.5 (16.2-20.5)	26.5 (24.1-32.2)	1690
Males	11-12	8.71 (7.98-9.51)	9.40 (7.80-10.6)	16.4 (14.2-19.5)	31.1 (26.7-35.8)	46.2 (41.5-55.4)	1259
Males	13-14	6.98 (6.32-7.71)	7.40 (6.70-8.40)	13.1 (11.7-14.8)	22.7 (20.1-24.9)	32.9 (27.3-36.0)	1285
Males	15-16	6.11 (5.71-6.54)	6.00 (5.50-6.90)	11.6 (10.2-12.5)	20.1 (18.3-23.2)	29.3 (24.1-43.8)	1474
Females	11-12	7.20 (6.77-7.66)	7.60 (6.90-8.20)	15.5 (14.4-17.1)	27.6 (25.0-30.5)	40.7 (35.1-46.4)	1230
Females	13-14	6.02 (5.40-6.72)	6.30 (5.30-7.20)	13.4 (11.5-15.3)	24.8 (20.7-27.8)	35.3 (27.4-40.8)	1400
Females	15-16	5.27 (4.89-5.66)	5.40 (4.90-5.70)	10.4 (9.70-11.0)	18.0 (15.5-22.1)	27.9 (22.6-34.2)	1501
Mexican Americans	11-12	9.13 (7.22-11.5)	9.60 (7.30-11.7)	17.7 (12.7-24.7)	32.1 (24.8-37.7)	50.2 (36.4-56.3)	316
Mexican Americans	13-14	7.71 (6.53-9.10)	8.00 (7.40-8.80)	14.4 (12.5-16.2)	28.1 (18.9-42.0)	43.7 (31.8-50.3)	438
Mexican Americans	15-16	6.39 (5.71-7.14)	6.30 (5.60-7.30)	12.4 (9.90-16.0)	22.3 (18.9-27.0)	34.7 (25.1-48.6)	595
Non-Hispanic blacks	11-12	11.3 (10.1-12.7)	11.2 (10.2-12.7)	22.1 (17.4-26.8)	38.8 (34.9-47.9)	56.2 (46.8-65.1)	665
Non-Hispanic blacks	13-14	8.06 (6.79-9.56)	8.80 (7.30-10.4)	16.5 (14.0-18.6)	27.4 (22.8-32.7)	38.7 (32.7-48.1)	609
Non-Hispanic blacks	15-16	7.48 (6.44-8.69)	7.20 (6.40-8.10)	13.5 (11.6-16.4)	26.0 (21.5-34.0)	45.8 (29.9-59.5)	698
Non-Hispanic whites	11-12	7.20 (6.73-7.70)	7.40 (6.80-8.30)	14.6 (12.9-17.2)	25.0 (23.4-27.9)	36.6 (30.6-42.9)	813
Non-Hispanic whites	13-14	6.05 (5.54-6.61)	6.70 (5.60-7.20)	12.6 (10.8-14.2)	22.4 (19.1-24.6)	30.1 (26.3-35.3)	987
Non-Hispanic whites	15-16	5.15 (4.71-5.63)	5.30 (4.80-5.90)	10.1 (8.90-11.0)	16.5 (14.8-19.4)	24.8 (19.5-32.2)	862
All Hispanics	11-12	9.28 (8.07-10.7)	9.40 (7.70-10.8)	18.8 (15.3-22.9)	37.5 (32.1-43.9)	53.8 (46.3-70.6)	571
All Hispanics	13-14	7.56 (6.92-8.26)	8.00 (7.40-8.60)	14.4 (13.1-15.5)	27.2 (21.3-37.3)	39.3 (35.1-46.4)	690
All Hispanics	15-16	6.21 (5.58-6.91)	6.20 (5.50-7.20)	12.0 (10.2-13.9)	21.2 (18.6-22.8)	30.6 (26.0-39.1)	971
Asians	11-12	6.85 (5.53-8.48)	6.70 (5.40-7.90)	15.1 (11.5-18.6)	31.8 (22.5-41.9)	64.2 (35.7-82.8)	352
Asians	13-14	4.78 (4.07-5.61)	4.50 (3.70-5.60)	10.2 (8.30-12.4)	17.1 (14.6-21.8)	26.7 (17.9-47.0)	289
Asians	15-16	6.04 (5.36-6.80)	6.10 (5.00-7.00)	12.7 (10.9-15.8)	27.2 (20.1-32.1)	41.6 (27.6-65.3)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.400, and 0.400 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP) (creatinine corrected) (2011 - 2016)†

CAS Number 40321-99-1

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	8.99 (8.55-9.46)	8.46 (7.90-9.27)	14.1 (13.5-14.9)	25.3 (23.1-27.8)	37.7 (32.9-45.3)	2487
Total population	13-14	6.49 (5.97-7.05)	6.15 (5.67-6.86)	10.5 (9.47-11.7)	18.1 (15.4-20.4)	25.8 (22.9-29.3)	2684
Total population	15-16	5.86 (5.62-6.12)	5.53 (5.25-5.77)	9.19 (8.66-9.76)	16.4 (15.3-18.0)	27.2 (22.9-30.0)	2974
Age 3-5 years	15-16	20.6 (19.2-22.2)	20.0 (18.0-22.3)	33.7 (30.0-39.2)	54.5 (50.1-62.8)	75.1 (62.9-91.4)	464
Age 6-11 years	11-12	14.9 (12.9-17.2)	14.8 (13.0-18.2)	26.5 (22.9-28.2)	42.6 (30.9-46.5)	58.1 (43.2-75.1)	395
Age 6-11 years	13-14	12 (10.4-14.0)	11.6 (9.32-14.4)	19.3 (17.2-24.2)	36.9 (24.6-61.7)	61.7 (34.3-130)	409
Age 6-11 years	15-16	11.3 (10.5-12.3)	10.5 (9.57-11.6)	16.3 (14.7-19.1)	28.8 (21.7-35.2)	36.6 (31.7-44.4)	415
Age 12-19 years	11-12	8.33 (7.38-9.41)	7.60 (6.41-8.29)	12.6 (10.4-15.5)	28.7 (20.1-37.2)	53.9 (31.7-68.8)	388
Age 12-19 years	13-14	6.19 (5.36-7.14)	5.94 (5.00-7.14)	9.82 (8.59-11.5)	16.9 (13.0-21.1)	24.8 (19.9-31.1)	462
Age 12-19 years	15-16	4.51 (4.18-4.87)	4.38 (4.01-4.95)	6.71 (6.02-7.78)	10.3 (8.60-12.6)	13.7 (10.2-19.1)	405
Age 20+ years	11-12	8.61 (8.17-9.07)	8.20 (7.63-8.94)	13.5 (12.6-14.1)	22.5 (20.1-25.3)	32.0 (28.1-39.3)	1704
Age 20+ years	13-14	6.1 (5.62-6.63)	5.93 (5.40-6.41)	9.81 (8.89-10.8)	15.4 (14.1-18.3)	22.2 (19.2-26.0)	1813
Age 20+ years	15-16	5.4 (5.13-5.68)	5.15 (4.85-5.43)	8.10 (7.69-8.84)	13.5 (12.4-15.5)	20.9 (17.6-27.2)	1690
Males	11-12	8.15 (7.67-8.66)	7.80 (7.18-8.21)	12.2 (11.5-13.2)	24.2 (20.9-25.9)	37.2 (29.5-50.2)	1258
Males	13-14	5.86 (5.38-6.39)	5.68 (5.26-6.12)	8.97 (8.48-9.79)	15.2 (13.9-16.7)	22.3 (19.8-26.3)	1284
Males	15-16	5.45 (5.04-5.89)	5.14 (4.66-5.62)	8.60 (7.78-9.31)	15.4 (12.9-18.2)	24.0 (18.3-33.3)	1474
Females	11-12	9.89 (9.16-10.7)	9.64 (8.33-11.1)	15.6 (14.7-17.3)	27.0 (23.9-28.8)	37.7 (33.2-44.4)	1229
Females	13-14	7.15 (6.38-8.01)	6.94 (6.25-7.58)	12.0 (10.3-13.7)	20.4 (16.4-23.6)	28.3 (22.9-36.4)	1400
Females	15-16	6.29 (5.99-6.61)	5.86 (5.50-6.25)	9.90 (9.00-10.5)	17.7 (15.5-19.9)	28.4 (23.3-30.5)	1500
Mexican Americans	11-12	10.3 (8.35-12.7)	9.10 (7.02-12.5)	18.6 (14.4-21.1)	30.4 (25.1-36.0)	49.6 (30.4-114)	316
Mexican Americans	13-14	7.86 (7.13-8.66)	7.54 (6.78-8.10)	12.6 (10.8-16.5)	23.5 (19.6-32.1)	37.2 (25.8-54.9)	438
Mexican Americans	15-16	6.96 (6.42-7.54)	6.87 (6.19-7.88)	11.4 (10.5-12.9)	20.3 (16.7-27.4)	33.6 (25.3-40.0)	595
Non-Hispanic blacks	11-12	8.8 (7.84-9.87)	8.12 (7.37-8.96)	14.7 (12.4-17.8)	28.2 (20.7-37.4)	46.2 (29.7-57.5)	665
Non-Hispanic blacks	13-14	5.94 (5.28-6.70)	5.68 (4.84-6.85)	9.94 (9.02-11.4)	17.1 (15.0-20.1)	23.9 (19.2-32.4)	609
Non-Hispanic blacks	15-16	5.96 (5.46-6.51)	5.43 (4.77-6.07)	10.4 (9.06-12.3)	19.3 (16.6-22.1)	30.0 (23.8-38.8)	697
Non-Hispanic whites	11-12	8.74 (8.02-9.53)	8.36 (7.62-9.58)	13.5 (12.5-14.5)	23.1 (19.7-25.9)	32.7 (27.8-42.9)	811
Non-Hispanic whites	13-14	6.37 (5.74-7.07)	6.06 (5.56-6.74)	10.0 (8.72-11.6)	16.2 (14.2-20.0)	23.1 (20.8-27.7)	987
Non-Hispanic whites	15-16	5.54 (5.16-5.94)	5.34 (4.96-5.60)	8.33 (7.69-8.96)	13.9 (12.3-18.2)	21.8 (18.3-27.8)	862
All Hispanics	11-12	10.4 (9.42-11.5)	9.29 (8.14-10.5)	18.7 (16.7-21.1)	30.5 (27.1-35.6)	49.6 (33.4-67.9)	571
All Hispanics	13-14	7.5 (7.04-8.00)	7.19 (6.58-7.77)	12.3 (11.1-14.1)	22.3 (19.0-27.0)	34.9 (27.1-40.6)	690
All Hispanics	15-16	6.54 (6.09-7.03)	6.32 (5.77-6.97)	10.6 (10.0-11.5)	18.3 (16.7-21.1)	30.0 (24.5-34.6)	971
Asians	11-12	9.18 (7.54-11.2)	8.45 (7.34-10.0)	16.2 (12.7-21.0)	33.0 (23.6-42.6)	57.4 (35.8-85.4)	352
Asians	13-14	6.06 (5.35-6.86)	5.63 (4.83-6.50)	11.0 (9.79-13.2)	19.6 (16.0-24.5)	26.3 (19.6-41.9)	288
Asians	15-16	7.47 (6.41-8.72)	6.03 (5.45-7.61)	12.6 (10.4-16.5)	30.9 (19.3-41.6)	43.2 (33.5-72.8)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP) (2011 - 2016)†

CAS Number 40321-98-0

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	5.08 (4.78-5.41)	5.30 (4.90-5.80)	10.3 (9.40-11.5)	18.4 (17.0-19.5)	26.5 (23.7-30.2)	2489
Total population	13-14	4.24 (3.94-4.57)	4.70 (4.20-5.00)	8.50 (7.60-9.30)	15.2 (13.3-17.3)	20.2 (18.2-23.7)	2685
Total population	15-16	3.57 (3.31-3.86)	3.70 (3.40-4.10)	7.00 (6.40-7.80)	12.1 (10.9-13.7)	19.0 (16.1-21.4)	2975
Age 3-5 years	15-16	5.80 (5.28-6.38)	5.70 (5.00-6.50)	11.0 (9.80-12.7)	22.1 (17.3-26.3)	30.2 (26.2-36.6)	465
Age 6-11 years	11-12	6.96 (5.86-8.28)	8.10 (6.90-9.70)	14.6 (12.8-17.1)	26.1 (22.6-28.4)	34.7 (27.9-42.5)	396
Age 6-11 years	13-14	6.51 (5.49-7.72)	6.60 (5.10-8.30)	12.4 (10.2-16.4)	23.4 (17.1-30.0)	33.0 (24.2-50.7)	409
Age 6-11 years	15-16	5.97 (5.35-6.67)	6.10 (5.30-6.80)	10.0 (8.80-12.1)	19.0 (14.7-21.5)	24.5 (19.6-33.7)	415
Age 12-19 years	11-12	5.70 (4.64-7.01)	5.70 (4.60-7.30)	12.2 (10.5-13.7)	22.2 (19.1-29.5)	35.1 (23.0-46.8)	388
Age 12-19 years	13-14	5.34 (4.57-6.24)	5.50 (4.40-7.00)	10.5 (8.10-13.3)	17.5 (14.9-23.8)	25.6 (17.6-33.7)	462
Age 12-19 years	15-16	3.75 (3.16-4.46)	3.80 (3.20-4.70)	6.90 (6.00-8.60)	10.9 (9.10-14.7)	16.2 (11.5-19.2)	405
Age 20+ years	11-12	4.83 (4.45-5.23)	5.10 (4.70-5.60)	9.60 (8.50-10.8)	16.7 (14.5-18.6)	23.0 (20.8-26.5)	1705
Age 20+ years	13-14	3.91 (3.65-4.19)	4.40 (3.90-4.80)	7.80 (7.10-8.70)	13.9 (12.1-15.7)	19.1 (17.1-20.8)	1814
Age 20+ years	15-16	3.29 (3.05-3.56)	3.50 (3.00-3.80)	6.50 (5.90-7.30)	11.4 (10.2-13.1)	18.2 (14.3-20.3)	1690
Males	11-12	5.50 (5.07-5.95)	5.70 (5.10-6.30)	10.5 (8.90-12.2)	18.7 (16.9-21.2)	28.1 (23.4-34.3)	1259
Males	13-14	4.45 (4.05-4.89)	4.90 (4.40-5.30)	8.10 (7.30-9.00)	13.7 (12.6-15.9)	19.8 (17.3-23.6)	1285
Males	15-16	3.74 (3.44-4.08)	4.00 (3.40-4.40)	7.00 (6.40-8.00)	12.2 (10.9-14.7)	19.6 (15.4-26.9)	1474
Females	11-12	4.71 (4.39-5.07)	5.00 (4.70-5.60)	10.2 (9.20-11.1)	18.1 (15.8-19.3)	25.4 (21.9-29.6)	1230
Females	13-14	4.06 (3.65-4.50)	4.20 (3.60-4.80)	9.00 (7.70-9.90)	16.2 (13.9-18.2)	21.5 (17.6-25.5)	1400
Females	15-16	3.42 (3.14-3.72)	3.50 (3.20-3.90)	7.00 (6.20-7.80)	12.0 (10.1-14.6)	17.1 (15.1-20.8)	1501
Mexican Americans	11-12	5.86 (4.69-7.33)	5.90 (4.40-7.50)	11.6 (8.40-14.4)	20.5 (15.4-25.4)	31.5 (22.5-35.1)	316
Mexican Americans	13-14	5.03 (4.21-6.01)	5.20 (4.60-5.80)	9.40 (7.70-11.5)	18.3 (12.3-24.2)	25.1 (19.5-34.3)	438
Mexican Americans	15-16	3.96 (3.53-4.45)	4.00 (3.50-4.60)	8.00 (6.10-9.90)	14.5 (11.6-16.0)	20.8 (15.4-31.3)	595
Non-Hispanic blacks	11-12	7.30 (6.48-8.22)	7.40 (6.70-8.00)	14.0 (11.5-16.0)	26.0 (21.1-32.1)	36.9 (30.8-48.2)	665
Non-Hispanic blacks	13-14	5.38 (4.58-6.31)	5.80 (5.00-7.00)	10.8 (9.10-12.0)	17.5 (15.2-21.8)	25.3 (21.7-29.7)	609
Non-Hispanic blacks	15-16	4.59 (3.93-5.37)	4.50 (4.20-4.90)	8.60 (7.80-9.50)	16.6 (13.0-21.7)	28.7 (17.9-40.0)	698
Non-Hispanic whites	11-12	4.62 (4.31-4.96)	4.90 (4.50-5.50)	9.50 (8.40-10.8)	16.1 (13.8-18.6)	21.2 (19.0-25.9)	813
Non-Hispanic whites	13-14	3.95 (3.63-4.30)	4.40 (3.90-4.80)	7.90 (7.00-9.10)	14.2 (12.0-16.5)	19.1 (16.5-23.4)	987
Non-Hispanic whites	15-16	3.30 (2.95-3.68)	3.50 (2.90-4.00)	6.50 (5.90-7.30)	10.7 (9.40-12.7)	16.6 (12.8-20.3)	862
All Hispanics	11-12	5.94 (5.17-6.83)	6.00 (4.80-7.30)	11.8 (9.70-14.0)	22.5 (19.8-25.8)	34.3 (26.2-39.8)	571
All Hispanics	13-14	4.95 (4.46-5.49)	5.30 (4.80-5.70)	9.20 (8.30-10.4)	17.5 (12.9-20.2)	24.2 (19.7-28.5)	690
All Hispanics	15-16	3.88 (3.49-4.31)	4.00 (3.50-4.60)	7.80 (6.60-8.90)	13.5 (11.7-15.1)	18.8 (16.3-23.5)	971
Asians	11-12	4.39 (3.63-5.31)	4.20 (3.30-5.20)	9.40 (7.20-11.3)	19.0 (15.0-27.8)	36.8 (25.4-52.4)	352
Asians	13-14	3.25 (2.81-3.76)	3.20 (2.60-4.10)	6.20 (5.10-7.30)	11.0 (9.50-13.7)	16.1 (11.7-23.3)	289
Asians	15-16	3.70 (3.21-4.27)	4.10 (3.20-4.60)	8.60 (6.50-10.0)	17.8 (12.5-22.0)	29.6 (17.0-56.9)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.200, and 0.200 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP) (creatinine corrected) (2011 - 2016)†

CAS Number 40321-98-0

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	5.78 (5.51-6.06)	5.51 (5.12-5.83)	8.99 (8.41-9.83)	15.6 (14.3-16.8)	23.4 (19.6-28.0)	2487
Total population	13-14	4.25 (3.92-4.61)	4.02 (3.74-4.43)	6.61 (5.93-7.26)	11.1 (9.73-12.7)	16.4 (13.9-18.1)	2684
Total population	15-16	3.7 (3.49-3.92)	3.47 (3.27-3.75)	5.90 (5.52-6.24)	10.6 (9.71-11.9)	16.9 (14.7-18.4)	2974
Age 3-5 years	15-16	13.9 (12.9-14.8)	13.6 (12.2-15.0)	23.0 (20.5-25.2)	35.5 (30.6-40.8)	47.8 (40.8-54.3)	464
Age 6-11 years	11-12	9.93 (8.63-11.4)	9.89 (8.25-11.4)	16.5 (14.3-18.9)	25.6 (22.9-30.2)	34.5 (27.9-41.9)	395
Age 6-11 years	13-14	8.23 (7.16-9.44)	7.77 (6.25-9.38)	12.8 (10.7-17.1)	24.7 (17.9-37.1)	37.4 (21.4-80.7)	409
Age 6-11 years	15-16	7.7 (7.12-8.32)	7.26 (6.63-8.04)	11.2 (10.0-13.0)	19.4 (14.6-22.9)	23.9 (20.6-30.3)	415
Age 12-19 years	11-12	5.55 (4.95-6.23)	5.21 (4.81-5.61)	8.54 (7.09-11.1)	16.3 (12.9-21.3)	31.6 (16.8-35.3)	388
Age 12-19 years	13-14	4.33 (3.82-4.92)	4.07 (3.71-4.69)	6.55 (5.64-7.19)	10.7 (8.02-13.4)	15.3 (11.5-18.6)	462
Age 12-19 years	15-16	2.92 (2.66-3.20)	2.81 (2.50-3.07)	4.49 (3.72-5.22)	7.04 (5.50-8.67)	9.31 (7.26-10.7)	405
Age 20+ years	11-12	5.48 (5.23-5.74)	5.19 (4.89-5.56)	8.39 (7.95-8.98)	13.9 (12.8-15.3)	19.3 (16.6-25.4)	1704
Age 20+ years	13-14	3.95 (3.63-4.30)	3.85 (3.54-4.15)	6.15 (5.48-6.75)	9.83 (8.57-11.1)	13.6 (12.2-16.3)	1813
Age 20+ years	15-16	3.36 (3.15-3.57)	3.26 (3.00-3.46)	5.27 (4.80-5.66)	8.64 (7.27-9.88)	13.0 (10.6-15.7)	1690
Males	11-12	5.14 (4.86-5.43)	4.86 (4.55-5.12)	7.83 (7.29-8.24)	14.7 (12.7-16.1)	22.6 (18.1-29.7)	1258
Males	13-14	3.74 (3.45-4.06)	3.70 (3.46-3.91)	5.59 (5.13-6.37)	9.03 (8.37-9.74)	14.3 (11.6-16.8)	1284
Males	15-16	3.34 (3.03-3.67)	3.18 (2.87-3.46)	5.41 (4.74-6.00)	9.81 (8.57-11.7)	14.8 (12.8-18.8)	1474
Females	11-12	6.48 (6.07-6.91)	6.34 (5.71-6.91)	10.0 (9.34-11.0)	16.5 (14.7-18.6)	23.5 (19.5-27.9)	1229
Females	13-14	4.81 (4.31-5.37)	4.58 (4.00-5.16)	7.42 (6.58-8.62)	12.6 (10.7-15.6)	17.2 (14.8-21.3)	1400
Females	15-16	4.08 (3.85-4.34)	3.84 (3.64-4.05)	6.27 (5.87-6.82)	11.2 (10.0-13.1)	17.6 (15.0-19.6)	1500
Mexican Americans	11-12	6.61 (5.43-8.05)	6.00 (4.83-7.45)	11.3 (8.87-13.9)	18.9 (15.8-22.8)	28.1 (18.2-60.8)	316
Mexican Americans	13-14	5.13 (4.57-5.75)	4.90 (4.42-5.49)	8.51 (6.80-10.7)	14.3 (12.0-19.5)	20.7 (15.6-31.7)	438
Mexican Americans	15-16	4.32 (3.95-4.71)	4.34 (3.81-4.74)	7.35 (6.51-8.00)	12.3 (10.5-16.8)	19.7 (15.0-27.3)	595
Non-Hispanic blacks	11-12	5.68 (5.11-6.32)	5.31 (4.71-5.70)	9.33 (7.79-10.8)	16.9 (13.6-23.4)	29.4 (18.8-39.2)	665
Non-Hispanic blacks	13-14	3.97 (3.55-4.44)	3.79 (3.28-4.42)	6.43 (5.67-7.31)	10.6 (9.55-12.2)	14.1 (11.2-18.6)	609
Non-Hispanic blacks	15-16	3.66 (3.31-4.03)	3.33 (3.04-3.74)	6.33 (5.27-7.50)	12.0 (10.8-14.0)	19.8 (14.7-23.8)	697
Non-Hispanic whites	11-12	5.61 (5.17-6.08)	5.41 (4.90-5.99)	8.42 (7.84-9.61)	14.3 (12.5-15.8)	20.5 (16.6-25.4)	811
Non-Hispanic whites	13-14	4.16 (3.75-4.62)	3.96 (3.70-4.41)	6.37 (5.47-7.23)	10.3 (8.57-12.7)	15.6 (12.8-17.3)	987
Non-Hispanic whites	15-16	3.54 (3.26-3.86)	3.36 (3.10-3.64)	5.49 (5.07-5.98)	9.27 (7.33-12.5)	14.6 (12.5-18.3)	862
All Hispanics	11-12	6.66 (6.05-7.33)	6.04 (5.49-6.74)	11.3 (10.0-13.5)	18.9 (16.9-21.0)	30.2 (20.8-41.9)	571
All Hispanics	13-14	4.91 (4.55-5.31)	4.60 (4.26-5.07)	7.76 (6.94-9.27)	13.6 (11.5-17.0)	20.2 (16.9-25.2)	690
All Hispanics	15-16	4.09 (3.80-4.39)	4.00 (3.68-4.29)	6.78 (6.36-7.27)	11.6 (10.5-12.9)	18.6 (14.9-22.0)	971
Asians	11-12	5.88 (4.96-6.97)	5.30 (4.59-6.36)	10.0 (8.11-12.2)	20.2 (14.7-26.3)	39.3 (23.5-50.1)	352
Asians	13-14	4.12 (3.68-4.62)	3.67 (3.20-4.49)	7.02 (5.79-8.62)	11.2 (10.0-13.9)	15.7 (12.1-24.4)	288
Asians	15-16	4.59 (3.93-5.35)	4.04 (3.53-4.78)	7.73 (6.67-10.5)	20.0 (11.4-25.5)	27.7 (20.0-45.0)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP) (2011 - 2016)†

CAS Number 40809-41-4

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	12.9 (12.0-13.9)	13.5 (12.4-14.8)	25.3 (23.6-26.7)	43.9 (40.0-51.1)	68.9 (60.4-75.2)	2489
Total population	13-14	10.5 (9.71-11.5)	11.1 (10.1-12.0)	20.0 (17.9-22.5)	36.4 (31.4-42.0)	50.7 (46.5-58.7)	2685
Total population	15-16	8.83 (8.10-9.64)	9.00 (8.30-10.0)	17.1 (15.2-19.0)	29.2 (25.3-33.1)	46.2 (37.1-50.6)	2975
Age 3-5 years	15-16	14.9 (13.5-16.6)	14.4 (12.4-15.9)	29.5 (24.3-32.6)	56.1 (44.0-65.0)	74.8 (64.3-88.1)	465
Age 6-11 years	11-12	18.8 (16.1-21.9)	21.6 (17.3-24.1)	36.8 (31.5-41.4)	63.5 (51.5-71.5)	81.5 (68.1-95.1)	396
Age 6-11 years	13-14	18.2 (15.5-21.4)	18.1 (14.2-23.4)	33.9 (28.3-39.6)	54.3 (45.5-71.8)	81.1 (58.5-142)	409
Age 6-11 years	15-16	14.6 (12.9-16.6)	14.9 (13.3-16.7)	24.5 (21.5-28.5)	42.5 (35.3-54.8)	60.3 (54.2-75.0)	415
Age 12-19 years	11-12	14.3 (11.3-18.0)	14.0 (11.6-17.5)	28.4 (23.5-36.8)	59.3 (47.1-70.2)	74.6 (59.3-135)	388
Age 12-19 years	13-14	13.6 (11.8-15.7)	13.8 (11.2-16.2)	25.7 (20.0-29.9)	44.4 (31.2-64.6)	64.9 (48.6-99.5)	462
Age 12-19 years	15-16	9.38 (7.97-11.0)	9.60 (8.30-11.8)	16.5 (14.2-19.5)	24.6 (20.9-36.9)	41.4 (25.8-49.7)	405
Age 20+ years	11-12	12.2 (11.3-13.3)	13.0 (11.4-14.4)	23.8 (21.8-25.8)	40.2 (36.9-43.9)	61.8 (52.1-73.6)	1705
Age 20+ years	13-14	9.57 (8.84-10.4)	10.1 (9.10-11.3)	18.3 (16.6-19.8)	32.1 (27.5-37.8)	46.4 (39.5-51.8)	1814
Age 20+ years	15-16	8.12 (7.42-8.88)	8.30 (7.60-8.90)	16.0 (14.0-17.9)	26.3 (23.5-31.7)	42.7 (32.3-50.2)	1690
Males	11-12	14.3 (13.0-15.6)	14.6 (12.7-16.4)	24.7 (23.1-27.6)	45.7 (40.2-54.9)	71.5 (59.8-88.4)	1259
Males	13-14	11.1 (9.98-12.3)	11.6 (10.6-12.5)	19.3 (17.1-22.3)	35.1 (29.3-44.0)	50.7 (47.4-58.4)	1285
Males	15-16	9.36 (8.42-10.4)	9.60 (8.40-11.0)	17.8 (15.9-20.6)	31.0 (25.8-35.0)	47.6 (34.2-54.7)	1474
Females	11-12	11.8 (10.8-12.9)	12.4 (11.2-13.7)	25.6 (23.4-26.6)	42.3 (37.4-49.5)	64.9 (54.4-76.8)	1230
Females	13-14	10.1 (9.05-11.2)	10.2 (8.90-11.7)	20.6 (18.4-23.2)	36.9 (31.5-41.8)	51.7 (41.3-64.9)	1400
Females	15-16	8.35 (7.62-9.15)	8.40 (7.70-9.30)	16.4 (14.1-18.6)	27.8 (22.1-33.7)	42.4 (34.6-49.7)	1501
Mexican Americans	11-12	15.8 (12.7-19.6)	14.9 (12.7-18.3)	28.1 (22.6-34.3)	51.3 (42.5-71.3)	72.6 (56.6-109)	316
Mexican Americans	13-14	13.4 (11.0-16.2)	13.1 (12.1-14.2)	23.4 (18.0-30.2)	44.4 (31.8-67.9)	67.9 (42.0-95.0)	438
Mexican Americans	15-16	10.4 (9.29-11.7)	10.3 (8.80-11.8)	20.1 (16.6-23.1)	32.8 (26.1-42.5)	53.2 (35.5-76.4)	595
Non-Hispanic blacks	11-12	16.4 (14.5-18.5)	16.2 (14.4-18.8)	30.7 (26.0-36.6)	60.9 (47.5-69.9)	78.1 (68.2-96.7)	665
Non-Hispanic blacks	13-14	11.5 (9.62-13.8)	12.7 (10.4-14.6)	21.5 (18.5-25.6)	36.4 (30.4-48.6)	58.5 (42.1-71.8)	609
Non-Hispanic blacks	15-16	10.7 (8.95-12.7)	10.4 (9.20-12.0)	19.5 (16.5-23.2)	37.4 (27.7-47.1)	58.9 (44.0-79.6)	698
Non-Hispanic whites	11-12	11.8 (10.9-12.9)	12.5 (11.0-14.6)	23.8 (21.8-25.7)	39.9 (34.8-44.2)	55.8 (47.1-76.8)	813
Non-Hispanic whites	13-14	9.81 (8.92-10.8)	10.3 (9.20-11.4)	19.3 (16.5-22.0)	34.1 (28.7-41.0)	49.1 (43.1-54.8)	987
Non-Hispanic whites	15-16	8.07 (7.20-9.04)	8.40 (7.40-9.40)	15.5 (14.0-17.9)	25.7 (21.6-31.4)	39.3 (31.0-47.9)	862
All Hispanics	11-12	16.0 (14.0-18.2)	15.2 (12.9-18.2)	30.1 (24.5-37.8)	59.8 (50.0-68.9)	76.0 (70.2-104)	571
All Hispanics	13-14	13.1 (11.7-14.7)	13.4 (12.3-14.4)	23.1 (20.6-26.5)	41.6 (35.1-54.1)	63.5 (45.5-75.4)	690
All Hispanics	15-16	10.2 (9.16-11.3)	10.1 (9.10-11.5)	20.0 (16.9-22.1)	33.1 (29.3-37.4)	48.8 (38.8-59.4)	971
Asians	11-12	12.0 (10.2-14.2)	11.7 (10.2-13.7)	23.6 (19.5-27.7)	51.1 (36.5-70.0)	80.5 (58.7-138)	352
Asians	13-14	9.01 (7.74-10.5)	9.20 (7.20-11.1)	16.5 (14.3-18.5)	27.3 (22.9-31.4)	39.4 (29.4-63.2)	289
Asians	15-16	9.47 (8.10-11.1)	9.90 (8.10-11.5)	19.4 (16.8-22.7)	41.2 (27.5-48.5)	58.3 (41.2-112)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.400, and 0.400 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP) (creatinine corrected) (2011 - 2016)†

CAS Number 40809-41-4

Metabolite of Di-2-ethylhexyl phthalate (DEHP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	14.7 (13.8-15.7)	14.1 (12.9-15.1)	22.7 (21.1-25.3)	38.9 (34.5-44.3)	59.8 (54.5-63.5)	2487
Total population	13-14	10.6 (9.68-11.6)	10.2 (9.32-11.0)	16.2 (14.5-18.2)	28.5 (25.3-32.0)	40.3 (35.2-46.0)	2684
Total population	15-16	9.14 (8.58-9.74)	8.50 (7.86-9.23)	14.0 (13.2-15.1)	24.3 (22.6-26.9)	39.1 (35.6-45.2)	2974
Age 3-5 years	15-16	35.7 (32.9-38.7)	35.0 (30.8-39.2)	57.5 (50.2-64.1)	94.0 (78.2-111)	122 (98.0-152)	464
Age 6-11 years	11-12	26.8 (23.6-30.3)	26.2 (22.6-29.4)	41.5 (36.5-47.2)	63.5 (57.5-70.7)	84.4 (71.3-107)	395
Age 6-11 years	13-14	23 (20.4-26.0)	21.1 (18.4-24.7)	33.8 (29.6-41.3)	64.7 (41.9-97.3)	97.3 (60.0-180)	409
Age 6-11 years	15-16	18.9 (17.5-20.4)	17.5 (16.6-19.1)	27.3 (24.5-31.6)	48.3 (35.6-57.5)	62.5 (57.0-78.9)	415
Age 12-19 years	11-12	13.9 (11.7-16.5)	12.5 (10.7-15.5)	22.2 (16.5-29.2)	41.4 (30.3-60.8)	70.9 (46.9-92.9)	388
Age 12-19 years	13-14	11 (9.68-12.6)	10.2 (8.77-12.2)	16.9 (14.4-20.5)	28.9 (23.2-35.5)	40.7 (33.8-48.8)	462
Age 12-19 years	15-16	7.29 (6.63-8.00)	6.85 (6.09-7.31)	10.3 (8.92-12.9)	16.5 (14.0-19.8)	23.2 (16.2-31.0)	405
Age 20+ years	11-12	13.9 (13.0-14.8)	13.3 (12.4-14.4)	21.3 (19.5-22.8)	33.9 (30.6-39.0)	53.7 (42.9-63.2)	1704
Age 20+ years	13-14	9.65 (8.80-10.6)	9.62 (8.61-10.4)	14.5 (13.0-16.3)	24.4 (21.0-28.3)	34.2 (28.9-39.6)	1813
Age 20+ years	15-16	8.28 (7.72-8.87)	7.93 (7.39-8.55)	12.7 (11.9-13.4)	20.1 (17.8-22.2)	28.8 (23.1-36.2)	1690
Males	11-12	13.3 (12.6-14.1)	12.5 (11.6-13.3)	20.1 (17.8-21.6)	35.0 (31.0-38.8)	56.4 (46.4-62.4)	1258
Males	13-14	9.32 (8.50-10.2)	9.05 (8.18-9.88)	14.1 (12.6-15.5)	24.7 (21.0-29.0)	37.1 (33.8-41.9)	1284
Males	15-16	8.35 (7.51-9.28)	7.65 (6.79-8.72)	13.1 (11.8-14.8)	22.9 (20.1-27.0)	36.0 (30.8-46.6)	1474
Females	11-12	16.2 (14.6-18.0)	15.8 (14.1-17.7)	25.8 (22.2-29.4)	44.1 (37.6-50.8)	63.2 (54.3-72.4)	1229
Females	13-14	11.9 (10.6-13.4)	11.4 (10.1-12.8)	18.2 (15.9-21.6)	30.1 (27.2-35.2)	42.5 (35.2-57.4)	1400
Females	15-16	9.98 (9.36-10.6)	9.47 (8.55-10.3)	14.6 (13.7-16.3)	26.4 (23.6-29.3)	39.5 (35.4-45.5)	1500
Mexican Americans	11-12	17.8 (14.6-21.6)	15.3 (12.7-19.8)	28.4 (21.9-39.0)	53.4 (44.7-62.9)	80.0 (52.4-115)	316
Mexican Americans	13-14	13.6 (12.1-15.3)	12.1 (11.3-13.6)	22.0 (17.3-27.4)	39.5 (30.0-51.6)	55.9 (41.5-66.7)	438
Mexican Americans	15-16	11.3 (10.4-12.3)	10.8 (9.69-12.0)	17.9 (16.0-19.3)	32.3 (27.3-41.0)	51.2 (41.9-63.8)	595
Non-Hispanic blacks	11-12	12.8 (11.3-14.4)	11.8 (10.6-13.0)	20.8 (18.0-25.0)	40.4 (29.6-50.3)	59.4 (46.2-75.6)	665
Non-Hispanic blacks	13-14	8.51 (7.48-9.68)	8.22 (7.07-9.65)	14.2 (12.1-16.4)	23.9 (20.9-27.1)	35.3 (27.3-41.6)	609
Non-Hispanic blacks	15-16	8.51 (7.60-9.53)	7.81 (6.80-8.91)	14.3 (12.1-16.7)	25.7 (23.2-31.7)	45.2 (35.0-55.3)	697
Non-Hispanic whites	11-12	14.3 (13.1-15.7)	13.9 (12.6-15.2)	21.8 (19.7-24.6)	34.3 (30.1-42.2)	54.9 (42.9-60.9)	811
Non-Hispanic whites	13-14	10.3 (9.23-11.6)	10.0 (9.02-11.1)	15.4 (13.0-18.6)	27.2 (21.6-32.0)	35.9 (30.0-48.2)	987
Non-Hispanic whites	15-16	8.67 (8.02-9.38)	8.04 (7.48-8.82)	13.1 (11.9-14.1)	20.9 (18.1-26.5)	33.6 (27.9-39.5)	862
All Hispanics	11-12	17.9 (16.2-19.7)	15.7 (14.1-18.1)	30.0 (25.8-33.4)	53.4 (44.8-64.0)	80.0 (59.0-107)	571
All Hispanics	13-14	13 (12.0-14.1)	12.1 (11.3-12.9)	20.7 (17.7-23.8)	37.6 (30.9-42.5)	54.1 (42.5-64.4)	690
All Hispanics	15-16	10.7 (10.0-11.5)	10.1 (9.23-11.0)	17.6 (16.3-18.6)	31.7 (27.6-34.6)	48.3 (41.6-58.1)	971
Asians	11-12	16.1 (13.7-18.9)	14.7 (12.3-17.2)	26.4 (21.7-33.0)	51.2 (41.5-76.9)	90.0 (51.0-142)	352
Asians	13-14	11.5 (10.3-12.8)	10.8 (8.94-12.1)	18.2 (15.1-20.9)	30.7 (27.2-38.0)	40.8 (32.2-65.0)	288
Asians	15-16	11.7 (10.2-13.5)	9.60 (8.53-10.8)	20.1 (16.2-22.9)	44.3 (26.5-60.0)	67.8 (45.2-107)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DEHP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(carboxynonyl) phthalate (MCNP) (2011 - 2016)†

CAS Number 1373125-93-9

Metabolite of Di-isodecyl phthalate (DiDP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.49 (2.31-2.68)	2.40 (2.10-2.60)	4.60 (4.20-5.30)	8.90 (8.00-10.6)	15.2 (11.4-20.0)	2489
Total population	13-14	2.81 (2.56-3.10)	2.70 (2.50-2.90)	5.60 (5.00-6.00)	11.1 (9.60-12.5)	17.4 (15.4-20.1)	2685
Total population	15-16	1.75 (1.57-1.95)	1.80 (1.60-2.00)	3.30 (2.90-3.60)	6.00 (5.10-7.20)	9.90 (7.60-12.4)	2975
Age 3-5 years	15-16	2.07 (1.86-2.30)	2.10 (1.80-2.30)	3.50 (3.20-3.90)	7.00 (5.80-8.20)	11.3 (8.20-15.2)	465
Age 6-11 years	11-12	2.51 (2.15-2.93)	2.70 (2.00-3.00)	4.50 (3.80-5.40)	7.60 (6.60-8.90)	12.9 (7.90-15.4)	396
Age 6-11 years	13-14	3.63 (3.21-4.10)	3.50 (2.90-4.20)	6.60 (5.50-7.90)	11.6 (8.80-16.3)	17.6 (11.6-28.5)	409
Age 6-11 years	15-16	2.26 (1.99-2.57)	2.40 (2.00-2.80)	3.90 (3.40-4.50)	6.70 (5.90-8.00)	9.00 (7.50-12.4)	415
Age 12-19 years	11-12	2.65 (2.24-3.13)	2.50 (2.20-3.00)	5.00 (4.00-6.30)	9.10 (7.70-10.5)	12.2 (10.3-18.0)	388
Age 12-19 years	13-14	3.25 (2.81-3.75)	2.90 (2.70-3.50)	5.60 (4.60-7.10)	11.2 (8.30-14.7)	16.7 (12.7-22.5)	462
Age 12-19 years	15-16	2.18 (1.86-2.54)	2.30 (1.90-2.60)	3.70 (3.20-4.00)	6.10 (4.90-7.80)	10.5 (6.90-14.6)	405
Age 20+ years	11-12	2.46 (2.24-2.71)	2.30 (2.10-2.60)	4.60 (4.10-5.30)	9.00 (7.70-11.4)	16.9 (11.4-22.2)	1705
Age 20+ years	13-14	2.68 (2.41-2.98)	2.60 (2.30-2.80)	5.40 (4.70-6.00)	10.7 (9.00-12.6)	17.5 (15.0-21.1)	1814
Age 20+ years	15-16	1.63 (1.45-1.84)	1.60 (1.40-1.90)	3.00 (2.70-3.50)	5.70 (4.70-7.80)	10.0 (7.00-12.9)	1690
Males	11-12	2.81 (2.52-3.14)	2.60 (2.30-3.10)	5.40 (4.60-6.20)	9.80 (8.10-14.3)	18.8 (10.7-22.9)	1259
Males	13-14	3.14 (2.80-3.53)	3.00 (2.70-3.30)	6.00 (5.10-6.80)	11.8 (10.4-14.2)	18.9 (15.5-23.0)	1285
Males	15-16	1.92 (1.66-2.22)	2.00 (1.70-2.30)	3.50 (3.10-3.80)	6.40 (5.30-8.60)	11.0 (8.00-12.9)	1474
Females	11-12	2.21 (2.03-2.40)	2.20 (1.90-2.40)	4.10 (3.70-4.60)	8.50 (7.70-9.90)	12.0 (10.8-13.7)	1230
Females	13-14	2.53 (2.24-2.85)	2.50 (2.10-2.80)	5.10 (4.40-5.70)	9.80 (8.50-11.7)	16.0 (12.8-20.4)	1400
Females	15-16	1.59 (1.41-1.80)	1.60 (1.40-1.90)	3.00 (2.60-3.30)	5.60 (4.40-7.20)	8.90 (6.40-15.2)	1501
Mexican Americans	11-12	2.22 (1.87-2.64)	2.10 (1.70-2.30)	3.70 (3.10-4.30)	7.20 (4.80-11.0)	17.8 (7.90-28.5)	316
Mexican Americans	13-14	2.48 (2.18-2.83)	2.50 (2.20-2.90)	4.30 (3.70-5.00)	7.50 (6.30-8.90)	10.2 (8.30-15.5)	438
Mexican Americans	15-16	1.64 (1.47-1.83)	1.70 (1.50-1.90)	2.90 (2.50-3.30)	5.10 (4.40-5.90)	6.80 (6.20-8.10)	595
Non-Hispanic blacks	11-12	3.02 (2.82-3.25)	2.90 (2.70-3.20)	6.00 (5.00-7.20)	10.2 (8.90-12.5)	17.3 (12.5-21.0)	665
Non-Hispanic blacks	13-14	3.05 (2.77-3.36)	2.90 (2.60-3.20)	5.60 (4.50-6.60)	10.9 (9.50-11.9)	16.7 (11.7-21.5)	609
Non-Hispanic blacks	15-16	2.21 (1.84-2.67)	2.10 (1.60-2.70)	4.40 (3.50-5.40)	8.80 (7.10-10.0)	14.6 (10.0-18.3)	698
Non-Hispanic whites	11-12	2.55 (2.31-2.82)	2.50 (2.10-2.80)	4.80 (4.10-5.60)	9.00 (7.70-11.4)	15.2 (10.3-20.8)	813
Non-Hispanic whites	13-14	2.88 (2.55-3.25)	2.80 (2.50-3.00)	5.70 (4.90-6.50)	11.4 (9.30-13.8)	17.1 (15.4-20.1)	987
Non-Hispanic whites	15-16	1.76 (1.54-2.00)	1.80 (1.50-2.10)	3.30 (2.90-3.60)	6.00 (5.00-8.10)	10.5 (7.20-13.1)	862
All Hispanics	11-12	2.27 (2.04-2.53)	2.10 (1.80-2.40)	3.80 (3.40-4.50)	7.90 (6.30-10.4)	16.1 (10.8-21.0)	571
All Hispanics	13-14	2.65 (2.38-2.95)	2.60 (2.30-2.90)	4.90 (4.30-5.40)	8.90 (7.70-11.0)	15.0 (11.0-21.1)	690
All Hispanics	15-16	1.66 (1.48-1.85)	1.70 (1.50-1.90)	3.00 (2.70-3.50)	5.10 (4.50-5.70)	6.70 (6.20-7.40)	971
Asians	11-12	1.56 (1.33-1.83)	1.40 (1.20-1.50)	2.90 (2.30-4.10)	7.30 (5.90-8.50)	11.2 (8.10-20.0)	352
Asians	13-14	1.82 (1.54-2.15)	1.70 (1.40-2.00)	3.80 (2.80-4.50)	7.10 (5.00-14.0)	14.0 (7.10-29.2)	289
Asians	15-16	1.13 (.917-1.39)	1.10 (.900-1.50)	2.20 (1.90-2.80)	4.60 (2.70-7.80)	7.80 (3.90-19.6)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.200, and 0.200 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiDP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(carboxynonyl) phthalate (MCNP) (creatinine corrected) (2011 - 2016)†

CAS Number 1373125-93-9

Metabolite of Di-isodecyl phthalate (DiDP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	2.83 (2.57-3.11)	2.50 (2.28-2.80)	4.59 (4.13-5.29)	9.36 (7.85-11.1)	14.6 (11.9-16.8)	2487
Total population	13-14	2.82 (2.65-3.00)	2.62 (2.45-2.83)	4.60 (4.29-5.12)	8.85 (8.01-10.0)	14.4 (12.9-16.0)	2684
Total population	15-16	1.81 (1.67-1.96)	1.73 (1.54-1.88)	2.96 (2.69-3.30)	5.17 (4.63-5.86)	8.33 (6.73-9.60)	2974
Age 3-5 years	15-16	4.94 (4.53-5.38)	4.70 (4.17-5.28)	7.54 (6.82-8.40)	12.6 (10.4-16.1)	20.0 (15.6-23.7)	464
Age 6-11 years	11-12	3.55 (3.13-4.03)	3.16 (2.73-3.94)	5.25 (4.55-6.45)	9.15 (6.64-14.3)	14.7 (10.0-16.8)	395
Age 6-11 years	13-14	4.59 (4.06-5.18)	4.33 (3.69-4.75)	7.33 (5.75-8.95)	13.1 (8.40-17.7)	18.9 (13.1-31.1)	409
Age 6-11 years	15-16	2.92 (2.65-3.21)	2.75 (2.50-3.04)	4.46 (3.78-5.10)	6.67 (5.94-8.30)	9.51 (7.02-14.8)	415
Age 12-19 years	11-12	2.58 (2.16-3.09)	2.34 (1.96-3.04)	4.67 (3.38-6.13)	7.74 (5.97-11.3)	12.0 (7.74-15.6)	388
Age 12-19 years	13-14	2.64 (2.38-2.91)	2.43 (2.07-2.79)	4.02 (3.57-4.79)	7.73 (5.73-9.22)	12.0 (8.10-19.0)	462
Age 12-19 years	15-16	1.69 (1.54-1.86)	1.58 (1.32-1.82)	2.59 (2.21-2.96)	4.61 (4.15-5.65)	6.24 (5.37-9.62)	405
Age 20+ years	11-12	2.79 (2.51-3.10)	2.43 (2.21-2.77)	4.46 (4.02-5.27)	9.73 (7.85-11.7)	14.9 (11.8-17.5)	1704
Age 20+ years	13-14	2.7 (2.50-2.91)	2.52 (2.34-2.78)	4.38 (3.93-5.00)	8.62 (7.62-9.77)	14.0 (12.2-15.4)	1813
Age 20+ years	15-16	1.67 (1.53-1.81)	1.55 (1.37-1.77)	2.71 (2.42-3.00)	4.62 (3.88-5.41)	7.44 (5.68-9.61)	1690
Males	11-12	2.63 (2.42-2.86)	2.37 (2.17-2.54)	4.43 (3.83-4.92)	8.49 (6.61-10.0)	12.5 (9.58-15.5)	1258
Males	13-14	2.64 (2.43-2.87)	2.49 (2.32-2.75)	4.20 (3.79-5.00)	8.20 (7.50-9.77)	13.5 (11.2-17.4)	1284
Males	15-16	1.71 (1.53-1.92)	1.61 (1.41-1.82)	2.76 (2.40-3.40)	5.00 (4.43-5.68)	6.96 (5.86-8.89)	1474
Females	11-12	3.03 (2.65-3.46)	2.70 (2.30-3.21)	4.82 (4.18-5.80)	10.7 (8.66-12.1)	15.6 (12.3-17.6)	1229
Females	13-14	3 (2.72-3.31)	2.74 (2.47-3.06)	5.16 (4.51-5.69)	9.60 (8.10-11.7)	15.4 (12.7-17.7)	1400
Females	15-16	1.9 (1.73-2.10)	1.80 (1.61-1.97)	3.06 (2.75-3.40)	5.50 (4.62-6.60)	9.62 (7.37-12.7)	1500
Mexican Americans	11-12	2.5 (2.21-2.83)	2.18 (2.02-2.42)	3.73 (3.00-4.38)	8.00 (5.46-10.7)	13.2 (8.49-18.8)	316
Mexican Americans	13-14	2.53 (2.32-2.76)	2.39 (2.31-2.58)	3.75 (3.51-4.13)	6.80 (5.61-7.89)	9.44 (7.65-11.5)	438
Mexican Americans	15-16	1.79 (1.61-1.99)	1.71 (1.47-1.95)	2.76 (2.56-2.97)	4.92 (4.16-6.04)	7.27 (6.00-9.33)	595
Non-Hispanic blacks	11-12	2.35 (2.19-2.53)	2.20 (2.06-2.39)	3.99 (3.56-4.38)	6.95 (6.17-8.18)	12.1 (9.30-15.7)	665
Non-Hispanic blacks	13-14	2.25 (2.11-2.41)	2.10 (1.93-2.37)	3.68 (3.26-4.29)	7.27 (6.21-8.16)	11.6 (8.69-15.3)	609
Non-Hispanic blacks	15-16	1.76 (1.57-1.98)	1.64 (1.44-1.88)	3.11 (2.61-3.71)	5.68 (5.07-6.87)	9.68 (8.33-11.8)	697
Non-Hispanic whites	11-12	3.09 (2.75-3.47)	2.75 (2.36-3.25)	5.05 (4.35-5.89)	10.4 (8.08-12.3)	15.3 (11.9-17.6)	811
Non-Hispanic whites	13-14	3.03 (2.80-3.28)	2.86 (2.61-3.08)	5.07 (4.43-5.65)	9.51 (8.19-11.1)	15.4 (12.5-17.7)	987
Non-Hispanic whites	15-16	1.89 (1.72-2.07)	1.79 (1.56-1.94)	3.04 (2.64-3.46)	5.29 (4.46-6.34)	8.99 (6.40-10.4)	862
All Hispanics	11-12	2.54 (2.37-2.73)	2.25 (2.06-2.42)	3.92 (3.54-4.41)	8.20 (6.72-9.71)	13.9 (10.0-16.8)	571
All Hispanics	13-14	2.63 (2.45-2.82)	2.47 (2.37-2.60)	4.01 (3.70-4.57)	7.50 (6.78-8.85)	11.5 (8.85-14.1)	690
All Hispanics	15-16	1.75 (1.58-1.93)	1.71 (1.44-1.94)	2.80 (2.58-3.13)	4.82 (4.02-5.67)	6.69 (5.90-7.66)	971
Asians	11-12	2.09 (1.76-2.49)	1.95 (1.70-2.19)	3.75 (3.04-4.44)	6.36 (5.53-7.89)	9.02 (7.50-17.9)	352
Asians	13-14	2.29 (1.97-2.67)	1.91 (1.69-2.27)	4.10 (3.24-5.38)	8.89 (5.46-19.2)	19.2 (8.50-41.1)	288
Asians	15-16	1.4 (1.23-1.59)	1.25 (1.07-1.53)	2.35 (1.94-2.75)	4.90 (3.10-7.70)	7.70 (5.17-12.7)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiDP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-isononyl phthalate (MiNP) (2011 - 2016)†

CAS Number 297182-83-3

Metabolite of Di-isononyl phthalate (DiNP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.800 (.600-.900)	2.60 (2.00-3.20)	8.80 (6.80-12.5)	18.6 (13.3-28.3)	2489
Total population	13-14	*	<LOD	1.80 (1.60-2.10)	5.70 (4.60-7.00)	12.3 (9.10-16.3)	2685
Total population	15-16	*	<LOD	<LOD	2.20 (1.50-3.80)	5.30 (3.10-9.80)	2975
Age 3-5 years	15-16	*	<LOD	<LOD	1.60 (1.30-2.20)	2.90 (1.90-9.10)	465
Age 6-11 years	11-12	*	.700 (<LOD-1.10)	1.90 (1.50-2.50)	4.40 (2.50-6.20)	6.20 (4.40-11.4)	396
Age 6-11 years	13-14	*	<LOD	2.10 (1.70-3.00)	6.50 (4.10-10.1)	11.0 (8.70-17.9)	409
Age 6-11 years	15-16	*	<LOD	1.00 (<LOD-1.30)	2.30 (1.40-4.80)	5.00 (3.40-10.2)	415
Age 12-19 years	11-12	1.36 (1.12-1.65)	.900 (.800-1.20)	2.80 (2.20-4.00)	13.1 (5.90-23.4)	24.9 (17.8-90.6)	388
Age 12-19 years	13-14	*	<LOD	2.80 (1.60-3.70)	8.80 (5.00-16.3)	17.6 (8.70-25.5)	462
Age 12-19 years	15-16	*	<LOD	1.10 (<LOD-1.30)	2.20 (1.50-4.20)	4.80 (2.20-14.3)	405
Age 20+ years	11-12	*	.700 (.600-.800)	2.70 (2.00-3.40)	9.60 (7.30-13.0)	18.4 (13.1-32.1)	1705
Age 20+ years	13-14	*	<LOD	1.70 (1.40-2.10)	5.10 (4.10-6.70)	11.8 (8.80-15.8)	1814
Age 20+ years	15-16	*	<LOD	<LOD	2.30 (1.50-3.80)	5.60 (3.10-10.0)	1690
Males	11-12	1.26 (1.12-1.42)	.900 (.800-1.10)	3.10 (2.60-3.70)	9.30 (7.20-12.8)	20.0 (12.5-39.6)	1259
Males	13-14	*	<LOD	1.90 (1.50-2.50)	6.50 (4.60-7.40)	12.3 (7.70-17.6)	1285
Males	15-16	*	<LOD	1.00 (<LOD-1.30)	2.60 (1.90-4.70)	6.10 (3.80-11.1)	1474
Females	11-12	*	.700 (<LOD-.800)	2.10 (1.70-2.80)	8.20 (4.50-14.4)	18.4 (14.9-26.9)	1230
Females	13-14	*	<LOD	1.70 (1.40-2.10)	5.50 (4.20-7.70)	12.6 (8.70-17.9)	1400
Females	15-16	*	<LOD	<LOD	1.90 (1.30-3.10)	3.80 (2.00-10.0)	1501
Mexican Americans	11-12	*	.700 (<LOD-1.10)	2.30 (1.50-3.20)	5.30 (3.70-7.70)	16.8 (5.60-31.2)	316
Mexican Americans	13-14	*	<LOD	1.50 (1.00-2.00)	5.00 (3.90-7.60)	10.1 (6.60-13.4)	438
Mexican Americans	15-16	*	<LOD	1.00 (<LOD-1.20)	2.90 (2.00-4.40)	7.70 (3.20-10.6)	595
Non-Hispanic blacks	11-12	1.40 (1.19-1.65)	1.00 (.900-1.20)	3.20 (2.40-4.30)	13.1 (7.70-19.5)	24.1 (15.3-36.8)	665
Non-Hispanic blacks	13-14	*	<LOD	2.20 (1.60-2.90)	6.80 (4.30-9.20)	14.3 (8.70-18.4)	609
Non-Hispanic blacks	15-16	*	<LOD	1.10 (<LOD-1.60)	2.80 (1.60-7.20)	7.30 (2.70-20.5)	698
Non-Hispanic whites	11-12	*	.700 (<LOD-.900)	2.60 (1.90-3.40)	9.20 (6.30-12.6)	17.5 (13.0-33.5)	813
Non-Hispanic whites	13-14	*	<LOD	1.70 (1.40-2.10)	5.40 (4.10-7.10)	11.3 (8.70-15.8)	987
Non-Hispanic whites	15-16	*	<LOD	<LOD	2.10 (1.40-3.10)	4.80 (2.40-9.60)	862
All Hispanics	11-12	*	.800 (.600-1.00)	2.40 (1.80-3.30)	6.20 (4.40-9.30)	17.9 (10.4-24.9)	571
All Hispanics	13-14	*	<LOD	1.80 (1.40-2.60)	5.80 (4.70-8.80)	13.1 (8.70-18.5)	690
All Hispanics	15-16	*	<LOD	1.10 (<LOD-1.30)	3.00 (1.90-5.00)	7.70 (4.50-10.6)	971
Asians	11-12	*	.700 (<LOD-.800)	2.30 (1.40-3.60)	6.50 (5.30-9.80)	19.1 (7.80-25.9)	352
Asians	13-14	*	<LOD	1.70 (1.20-2.20)	3.80 (2.80-6.50)	7.90 (4.80-19.6)	289
Asians	15-16	*	<LOD	1.10 (<LOD-1.70)	2.70 (1.50-4.20)	4.20 (2.50-20.1)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.600, 0.900, and 0.900 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiNP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-isononyl phthalate (MiNP) (creatinine corrected) (2011 - 2016)†

CAS Number 297182-83-3

Metabolite of Di-isononyl phthalate (DiNP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	1.08 (.921-1.25)	2.69 (2.25-3.26)	7.88 (5.88-11.3)	17.6 (11.6-26.6)	2487
Total population	13-14	*	<LOD	2.29 (1.98-2.50)	5.39 (4.83-6.00)	9.64 (8.34-11.7)	2684
Total population	15-16	*	<LOD	<LOD	3.05 (2.60-3.77)	5.33 (4.00-7.11)	2974
Age 3-5 years	15-16	*	<LOD	<LOD	5.82 (4.57-7.11)	8.84 (6.40-12.4)	464
Age 6-11 years	11-12	*	1.13 (<LOD-1.40)	2.44 (1.84-2.98)	4.20 (3.27-7.88)	7.88 (4.00-15.2)	395
Age 6-11 years	13-14	*	<LOD	3.17 (2.47-4.07)	7.14 (5.11-13.2)	14.3 (7.81-17.0)	409
Age 6-11 years	15-16	*	<LOD	2.00 (<LOD-2.46)	3.56 (2.78-5.00)	6.60 (3.94-9.79)	415
Age 12-19 years	11-12	1.33 (1.05-1.68)	1.01 (.818-1.40)	2.72 (1.94-3.89)	10.6 (4.63-17.6)	33.0 (11.8-53.5)	388
Age 12-19 years	13-14	*	<LOD	2.18 (1.60-3.22)	7.33 (4.74-9.72)	11.7 (7.73-22.4)	462
Age 12-19 years	15-16	*	<LOD	1.14 (<LOD-1.28)	1.93 (1.62-2.78)	3.84 (2.07-9.14)	405
Age 20+ years	11-12	*	1.09 (.876-1.30)	2.78 (2.22-3.33)	8.23 (5.95-11.4)	18.1 (11.4-33.8)	1704
Age 20+ years	13-14	*	<LOD	2.21 (1.94-2.46)	4.92 (3.97-6.01)	8.97 (7.29-11.4)	1813
Age 20+ years	15-16	*	<LOD	<LOD	3.05 (2.48-3.92)	5.06 (4.00-6.94)	1690
Males	11-12	1.18 (1.04-1.33)	.982 (.778-1.16)	2.50 (2.15-3.06)	7.88 (5.65-11.4)	15.6 (10.1-24.1)	1258
Males	13-14	*	<LOD	1.84 (1.64-2.13)	4.34 (3.27-6.57)	8.69 (6.81-11.7)	1284
Males	15-16	*	<LOD	1.39 (<LOD-1.58)	2.78 (2.46-3.77)	4.92 (3.77-6.87)	1474
Females	11-12	*	1.21 (<LOD-1.40)	2.86 (2.18-3.88)	7.73 (5.20-13.0)	20.1 (11.4-33.8)	1229
Females	13-14	*	<LOD	2.56 (2.29-2.82)	5.95 (4.83-7.29)	11.7 (8.28-16.1)	1400
Females	15-16	*	<LOD	<LOD	3.20 (2.67-4.03)	5.56 (3.72-8.84)	1500
Mexican Americans	11-12	*	.942 (<LOD-1.13)	2.04 (1.65-2.50)	4.68 (3.19-13.8)	17.1 (8.39-42.6)	316
Mexican Americans	13-14	*	<LOD	1.82 (1.39-2.75)	4.42 (2.79-8.39)	9.41 (5.40-12.1)	438
Mexican Americans	15-16	*	<LOD	1.76 (<LOD-2.13)	3.37 (2.67-5.56)	6.71 (3.56-10.2)	595
Non-Hispanic blacks	11-12	1.09 (.915-1.29)	.896 (.750-1.05)	2.31 (1.73-3.33)	7.45 (5.19-10.7)	15.2 (9.60-22.5)	665
Non-Hispanic blacks	13-14	*	<LOD	1.78 (1.39-2.37)	5.08 (3.72-6.67)	8.86 (7.29-10.6)	609
Non-Hispanic blacks	15-16	*	<LOD	1.30 (<LOD-1.52)	2.82 (1.94-4.92)	5.33 (3.37-10.5)	697
Non-Hispanic whites	11-12	*	1.15 (<LOD-1.38)	3.06 (2.35-3.60)	8.23 (5.91-11.9)	20.1 (11.4-33.8)	811
Non-Hispanic whites	13-14	*	<LOD	2.37 (2.00-2.67)	5.20 (4.23-6.25)	9.20 (7.50-13.2)	987
Non-Hispanic whites	15-16	*	<LOD	<LOD	3.05 (2.46-3.77)	4.92 (3.56-6.85)	862
All Hispanics	11-12	*	1.02 (.875-1.20)	2.18 (1.90-2.46)	6.67 (4.00-9.25)	14.9 (10.1-29.7)	571
All Hispanics	13-14	*	<LOD	2.00 (1.56-2.79)	5.45 (4.21-8.00)	11.7 (8.00-14.9)	690
All Hispanics	15-16	*	<LOD	1.68 (<LOD-2.07)	3.56 (2.80-5.05)	7.11 (4.76-8.56)	971
Asians	11-12	*	1.21 (<LOD-1.49)	2.70 (2.00-3.50)	6.75 (4.62-10.1)	14.9 (8.75-21.5)	352
Asians	13-14	*	<LOD	2.37 (1.86-3.05)	5.88 (3.56-8.66)	11.4 (7.39-22.2)	288
Asians	15-16	*	<LOD	2.10 (<LOD-2.67)	3.70 (2.78-4.79)	5.85 (3.43-13.3)	301

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiNP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-oxoisononyl phthalate (MONP) (2015 - 2016)

CAS Number 297182-83-3

Metabolite of Di-isononyl phthalate (DiNP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	2.12 (1.77-2.54)	1.90 (1.60-2.10)	3.80 (3.20-4.80)	11.3 (7.60-15.7)	21.6 (14.6-34.7)	2970
Age 3-5 years	15-16	2.49 (2.05-3.03)	2.20 (1.90-2.60)	4.60 (3.70-5.40)	9.60 (8.10-13.4)	19.7 (11.0-34.7)	465
Age 6-11 years	15-16	2.86 (2.43-3.36)	2.60 (2.20-3.20)	4.70 (3.90-6.90)	12.7 (8.80-15.2)	18.4 (13.8-36.3)	413
Age 12-19 years	15-16	2.56 (2.00-3.29)	2.20 (1.80-2.70)	4.60 (3.30-6.50)	12.6 (7.70-18.2)	25.1 (12.4-62.7)	403
Age 20+ years	15-16	1.98 (1.64-2.40)	1.80 (1.50-2.00)	3.50 (2.90-4.70)	11.0 (7.00-16.4)	21.6 (13.6-35.7)	1689
Males	15-16	2.32 (1.89-2.85)	2.00 (1.70-2.40)	4.00 (3.30-5.80)	12.2 (8.20-17.9)	25.7 (14.3-43.4)	1472
Females	15-16	1.94 (1.64-2.30)	1.70 (1.50-2.00)	3.60 (3.00-4.50)	10.4 (6.50-15.4)	18.4 (13.6-31.1)	1498
Mexican Americans	15-16	2.22 (1.92-2.57)	2.00 (1.70-2.30)	4.00 (3.40-4.80)	10.3 (7.20-13.3)	22.1 (12.2-32.4)	594
Non-Hispanic blacks	15-16	2.72 (1.97-3.75)	2.40 (1.80-3.30)	5.20 (3.20-9.20)	14.5 (8.30-22.3)	29.3 (16.4-48.3)	697
Non-Hispanic whites	15-16	2.01 (1.66-2.44)	1.80 (1.50-2.10)	3.50 (2.90-4.50)	11.5 (7.00-15.4)	20.9 (13.6-34.7)	861
All Hispanics	15-16	2.28 (1.94-2.68)	2.10 (1.80-2.20)	4.30 (3.40-6.00)	11.0 (8.30-15.7)	26.1 (13.3-35.0)	969
Asians	15-16	1.81 (1.39-2.35)	1.60 (1.30-1.90)	3.80 (2.50-6.00)	10.1 (5.40-25.0)	25.0 (8.50-95.9)	301

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.400.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiNP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-oxoisononyl phthalate (MONP) (creatinine corrected) (2015 - 2016)

CAS Number 297182-83-3

Metabolite of Di-isononyl phthalate (DiNP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	2.19 (1.89-2.54)	1.77 (1.54-2.03)	3.65 (2.99-4.33)	10.3 (7.41-14.4)	19.2 (13.3-27.2)	2969
Age 3-5 years	15-16	5.94 (5.02-7.03)	5.15 (4.29-6.25)	9.00 (7.27-11.9)	17.2 (11.9-40.4)	41.6 (22.7-55.6)	464
Age 6-11 years	15-16	3.7 (3.22-4.25)	3.20 (2.90-3.64)	5.65 (4.51-7.00)	13.3 (9.00-25.5)	27.8 (14.4-37.9)	413
Age 12-19 years	15-16	1.99 (1.63-2.44)	1.61 (1.36-2.00)	3.20 (2.39-4.58)	8.05 (4.78-13.8)	16.2 (8.01-40.5)	403
Age 20+ years	15-16	2.02 (1.73-2.36)	1.62 (1.44-1.87)	3.06 (2.50-3.72)	9.44 (6.47-14.4)	18.5 (12.7-25.0)	1689
Males	15-16	2.07 (1.72-2.48)	1.59 (1.37-2.00)	3.57 (2.79-4.65)	10.7 (7.27-14.2)	17.4 (12.6-27.1)	1472
Females	15-16	2.32 (2.04-2.65)	1.89 (1.69-2.11)	3.67 (3.03-4.41)	9.78 (6.67-15.2)	21.3 (13.8-27.2)	1497
Mexican Americans	15-16	2.42 (2.12-2.76)	2.05 (1.79-2.20)	4.00 (3.48-4.89)	10.4 (7.78-14.6)	18.6 (12.4-26.3)	594
Non-Hispanic blacks	15-16	2.17 (1.67-2.82)	1.76 (1.41-2.40)	3.93 (2.69-6.65)	10.6 (6.67-14.4)	16.8 (12.0-34.4)	696
Non-Hispanic whites	15-16	2.17 (1.87-2.51)	1.72 (1.52-1.92)	3.54 (2.92-4.11)	10.0 (6.67-14.8)	18.8 (11.4-28.1)	861
All Hispanics	15-16	2.4 (2.05-2.83)	2.00 (1.78-2.23)	4.19 (3.33-5.31)	11.3 (7.94-15.2)	21.1 (15.0-26.1)	969
Asians	15-16	2.24 (1.74-2.87)	1.82 (1.47-2.12)	3.68 (2.64-5.97)	12.5 (6.76-25.0)	27.2 (12.1-50.4)	301

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiNP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(carboxyoctyl) phthalate (MCOP) (2011 - 2016)†

CAS Number 898544-09-7

Metabolite of Di-isononyl phthalates (DiNP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	19.7 (17.4-22.3)	18.7 (15.6-21.3)	50.0 (43.0-61.8)	123 (98.3-160)	214 (180-275)	2489
Total population	13-14	21.3 (19.5-23.3)	19.8 (17.8-21.5)	54.8 (48.1-58.9)	136 (122-159)	247 (213-272)	2685
Total population	15-16	8.26 (6.46-10.6)	7.40 (5.70-9.30)	17.5 (12.9-22.7)	47.0 (31.9-74.5)	93.8 (63.8-144)	2975
Age 3-5 years	15-16	9.05 (7.37-11.1)	8.00 (6.40-10.0)	15.6 (12.7-22.2)	35.4 (29.4-59.9)	69.2 (35.4-127)	465
Age 6-11 years	11-12	18.3 (15.7-21.4)	17.0 (14.7-19.8)	35.2 (30.2-46.4)	88.2 (63.1-108)	144 (90.7-249)	396
Age 6-11 years	13-14	27.6 (22.9-33.1)	26.4 (18.7-36.1)	60.8 (51.1-82.1)	150 (110-209)	272 (152-428)	409
Age 6-11 years	15-16	11.1 (9.15-13.4)	10.2 (8.50-12.0)	19.9 (15.3-27.4)	51.9 (34.3-71.5)	94.7 (63.3-137)	415
Age 12-19 years	11-12	21.7 (17.2-27.3)	20.7 (16.0-25.8)	51.4 (35.9-68.0)	160 (80.4-261)	289 (174-421)	388
Age 12-19 years	13-14	28.1 (23.6-33.4)	23.8 (18.7-32.4)	75.7 (54.2-99.3)	167 (137-184)	286 (167-612)	462
Age 12-19 years	15-16	10.3 (7.72-13.7)	9.00 (6.50-12.6)	19.4 (15.5-26.7)	55.3 (37.2-101)	120 (54.5-192)	405
Age 20+ years	11-12	19.6 (17.0-22.6)	18.6 (14.7-21.5)	51.4 (43.4-66.1)	127 (103-165)	199 (178-273)	1705
Age 20+ years	13-14	19.9 (18.1-21.9)	18.2 (16.9-20.4)	50.4 (43.2-56.9)	131 (109-150)	239 (211-260)	1814
Age 20+ years	15-16	7.72 (5.95-10.0)	6.90 (5.20-8.50)	16.6 (11.8-22.0)	44.6 (29.1-75.4)	89.3 (54.6-146)	1690
Males	11-12	22.8 (19.9-26.1)	20.2 (16.6-22.1)	59.8 (50.0-67.5)	155 (120-184)	255 (184-379)	1259
Males	13-14	23.4 (20.5-26.6)	21.0 (18.2-23.4)	57.0 (47.7-70.9)	142 (122-184)	256 (215-293)	1285
Males	15-16	9.02 (6.84-11.9)	8.00 (6.10-9.90)	18.5 (13.4-25.6)	51.9 (31.9-84.2)	111 (60.0-192)	1474
Females	11-12	17.1 (14.7-19.9)	16.3 (13.5-20.4)	43.3 (35.3-58.6)	103 (75.4-138)	180 (119-259)	1230
Females	13-14	19.5 (17.4-21.9)	18.5 (15.8-21.4)	49.1 (41.7-57.1)	128 (108-164)	239 (180-262)	1400
Females	15-16	7.58 (5.98-9.62)	6.90 (5.30-8.50)	15.9 (11.7-22.2)	40.5 (31.3-71.5)	86.1 (53.5-125)	1501
Mexican Americans	11-12	17.1 (14.8-19.9)	14.4 (11.5-20.5)	38.1 (33.9-46.6)	96.7 (70.3-133)	174 (98.9-251)	316
Mexican Americans	13-14	17.7 (15.2-20.6)	15.7 (11.6-22.1)	39.9 (27.4-53.1)	100 (63.2-117)	131 (115-184)	438
Mexican Americans	15-16	9.29 (7.73-11.2)	8.10 (6.90-10.2)	16.6 (12.7-25.9)	49.2 (37.1-59.8)	103 (64.2-126)	595
Non-Hispanic blacks	11-12	24.1 (21.0-27.5)	22.4 (19.0-25.1)	58.2 (45.7-75.9)	165 (102-220)	273 (206-306)	665
Non-Hispanic blacks	13-14	22.0 (18.9-25.5)	20.4 (16.9-24.1)	51.4 (41.6-59.6)	126 (80.9-158)	208 (136-322)	609
Non-Hispanic blacks	15-16	9.66 (6.35-14.7)	8.50 (5.70-13.5)	20.5 (10.7-47.3)	64.9 (26.9-118)	108 (75.2-146)	698
Non-Hispanic whites	11-12	20.1 (17.2-23.4)	19.5 (15.6-21.8)	52.8 (43.1-68.0)	123 (94.0-166)	196 (166-275)	813
Non-Hispanic whites	13-14	22.0 (19.6-24.8)	20.6 (17.7-22.8)	56.9 (47.9-66.8)	144 (122-180)	251 (211-272)	987
Non-Hispanic whites	15-16	7.95 (6.15-10.3)	7.20 (5.50-8.90)	16.9 (12.1-21.4)	41.8 (29.7-75.3)	89.3 (50.7-159)	862
All Hispanics	11-12	18.5 (15.3-22.2)	15.8 (11.9-21.1)	42.3 (35.3-55.1)	104 (77.9-153)	221 (133-297)	571
All Hispanics	13-14	20.0 (17.2-23.2)	18.0 (13.7-23.5)	49.4 (39.1-57.1)	115 (79.7-147)	200 (139-293)	690
All Hispanics	15-16	9.72 (7.91-12.0)	8.60 (6.80-11.0)	19.7 (14.5-26.5)	53.8 (38.0-73.6)	103 (67.7-128)	971
Asians	11-12	12.2 (10.0-14.8)	11.0 (8.40-13.8)	36.7 (25.6-47.1)	81.9 (66.1-127)	135 (91.9-204)	352
Asians	13-14	14.9 (11.5-19.3)	12.6 (9.80-19.7)	43.7 (35.6-52.6)	140 (71.3-183)	193 (156-287)	289
Asians	15-16	5.91 (4.26-8.18)	5.20 (4.30-7.10)	13.6 (9.50-24.3)	43.1 (24.3-74.8)	74.8 (32.2-386)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.300, and 0.300 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiNP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(carboxyoctyl) phthalate (MCOP) (creatinine corrected) (2011 - 2016)†

CAS Number 898544-09-7

Metabolite of Di-isononyl phthalates (DiNP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	22.4 (19.4-25.8)	20.4 (17.0-24.4)	54.1 (42.0-62.1)	118 (92.5-144)	194 (144-239)	2487
Total population	13-14	21.4 (19.8-23.1)	19.5 (16.9-22.6)	46.5 (41.9-51.1)	123 (98.0-134)	196 (162-240)	2684
Total population	15-16	8.55 (6.88-10.6)	6.89 (5.61-8.76)	17.2 (12.8-23.0)	43.3 (31.5-62.3)	75.2 (53.3-102)	2974
Age 3-5 years	15-16	21.6 (18.1-25.8)	18.2 (15.2-21.2)	35.3 (24.5-46.7)	75.6 (45.7-151)	151 (85.9-210)	464
Age 6-11 years	11-12	25.9 (22.8-29.6)	22.1 (18.7-25.8)	42.3 (32.7-54.2)	116 (56.9-161)	161 (117-259)	395
Age 6-11 years	13-14	34.8 (29.6-40.9)	33.1 (24.4-42.8)	71.4 (51.4-94.7)	176 (104-254)	278 (176-412)	409
Age 6-11 years	15-16	14.3 (12.0-16.9)	11.5 (9.60-14.3)	23.1 (17.5-33.3)	59.6 (39.6-90.4)	107 (66.9-140)	415
Age 12-19 years	11-12	21.1 (16.6-26.9)	16.9 (13.7-20.2)	45.6 (28.8-63.4)	120 (73.7-209)	238 (117-396)	388
Age 12-19 years	13-14	22.8 (19.2-27.1)	21.7 (15.0-26.8)	50.8 (39.5-63.2)	140 (95.5-193)	208 (160-300)	462
Age 12-19 years	15-16	7.99 (6.21-10.3)	6.27 (4.41-9.13)	16.4 (10.4-19.4)	40.7 (25.7-55.5)	70.2 (41.7-116)	405
Age 20+ years	11-12	22.2 (19.1-25.8)	20.8 (16.7-25.1)	55.3 (42.0-64.5)	118 (92.2-144)	194 (136-250)	1704
Age 20+ years	13-14	20.1 (18.6-21.7)	18.3 (15.9-21.3)	43.2 (38.6-48.5)	111 (87.8-127)	181 (148-218)	1813
Age 20+ years	15-16	7.87 (6.26-9.90)	6.42 (4.88-7.87)	15.3 (10.6-22.1)	39.7 (28.6-62.5)	71.5 (49.4-96.1)	1690
Males	11-12	21.3 (18.9-23.9)	20.0 (16.1-23.2)	54.2 (45.8-58.8)	112 (90.3-144)	189 (136-222)	1258
Males	13-14	19.6 (17.7-21.8)	17.9 (15.1-21.9)	42.4 (37.0-51.2)	111 (86.6-125)	192 (133-245)	1284
Males	15-16	8.05 (6.27-10.3)	6.68 (4.76-9.00)	16.5 (11.6-22.3)	44.7 (29.0-64.4)	75.1 (48.7-97.3)	1474
Females	11-12	23.5 (19.4-28.5)	20.8 (16.6-26.2)	53.7 (38.3-68.5)	121 (86.8-156)	194 (135-290)	1229
Females	13-14	23.2 (20.3-26.5)	20.9 (17.4-24.1)	49.5 (42.5-60.8)	130 (95.7-166)	201 (164-268)	1400
Females	15-16	9.06 (7.39-11.1)	7.17 (6.00-8.95)	17.8 (13.1-23.4)	42.6 (30.2-67.4)	75.2 (52.9-118)	1500
Mexican Americans	11-12	19.3 (16.8-22.2)	16.3 (12.8-20.7)	35.7 (26.8-55.5)	81.9 (70.6-115)	136 (81.1-384)	316
Mexican Americans	13-14	18 (14.7-22.1)	16.1 (12.4-22.6)	36.7 (29.3-45.7)	67.4 (53.3-108)	119 (81.4-152)	438
Mexican Americans	15-16	10.1 (8.48-12.1)	8.29 (6.98-10.5)	19.4 (15.0-25.4)	42.4 (35.1-62.3)	79.3 (60.5-90.6)	595
Non-Hispanic blacks	11-12	18.7 (16.5-21.3)	16.1 (14.1-19.6)	40.0 (32.6-51.6)	102 (76.4-134)	154 (132-201)	665
Non-Hispanic blacks	13-14	16.2 (14.3-18.3)	14.3 (12.2-16.7)	36.6 (29.3-44.0)	86.6 (73.2-104)	128 (107-156)	609
Non-Hispanic blacks	15-16	7.7 (5.36-11.0)	6.33 (4.54-9.36)	15.3 (8.40-29.7)	46.0 (24.5-77.0)	77.0 (55.0-100)	697
Non-Hispanic whites	11-12	24.3 (20.4-29.0)	21.9 (18.1-27.5)	58.8 (48.3-71.3)	127 (101-161)	203 (146-284)	811
Non-Hispanic whites	13-14	23.2 (21.0-25.7)	22.0 (17.7-24.8)	50.0 (42.3-58.2)	127 (99.4-159)	205 (160-276)	987
Non-Hispanic whites	15-16	8.55 (6.89-10.6)	6.78 (5.49-8.66)	16.6 (12.7-22.9)	42.6 (30.0-63.3)	75.2 (49.0-118)	862
All Hispanics	11-12	20.7 (18.0-23.7)	18.3 (15.5-21.7)	38.7 (31.2-53.0)	90.7 (79.3-117)	163 (121-276)	571
All Hispanics	13-14	19.8 (16.9-23.3)	18.1 (14.6-21.7)	42.6 (36.6-47.2)	87.8 (65.5-119)	186 (115-240)	690
All Hispanics	15-16	10.2 (8.32-12.6)	8.24 (6.84-11.0)	20.1 (15.8-26.3)	48.8 (35.0-67.2)	80.1 (60.5-103)	971
Asians	11-12	16.3 (13.7-19.4)	16.5 (11.5-22.3)	37.5 (31.5-51.3)	71.8 (58.5-110)	121 (77.5-172)	352
Asians	13-14	18.8 (15.1-23.4)	17.0 (11.5-23.1)	46.0 (34.8-67.3)	167 (81.3-215)	230 (172-383)	288
Asians	15-16	7.31 (5.59-9.56)	5.60 (4.36-7.62)	19.1 (10.4-24.9)	39.4 (25.9-56.6)	92.5 (38.9-156)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DiNP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-methyl phthalate (MMP) (2011 - 2012)

CAS Number 4376-18-5

Metabolite of Dimethyl phthalate (DMP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	1.00 (.800-1.20)	3.00 (2.60-3.50)	7.00 (6.30-8.10)	11.8 (10.3-14.8)	2489
Age 6-11 years	11-12	2.33 (1.78-3.04)	2.20 (1.50-3.30)	6.40 (5.70-7.70)	15.6 (9.60-24.1)	27.7 (14.8-157)	396
Age 12-19 years	11-12	1.41 (1.09-1.81)	1.10 (.800-1.70)	3.80 (2.20-6.00)	9.90 (5.90-14.0)	14.8 (10.4-28.4)	388
Age 20+ years	11-12	*	.800 (.600-1.10)	2.60 (2.30-2.90)	6.10 (4.90-6.90)	9.80 (8.60-11.7)	1705
Males	11-12	1.34 (1.16-1.55)	1.20 (.900-1.60)	3.40 (2.80-4.10)	8.50 (6.90-9.10)	12.9 (10.1-18.6)	1259
Females	11-12	*	.800 (.600-.900)	2.50 (2.20-2.90)	6.30 (5.00-7.30)	10.5 (8.80-13.6)	1230
Mexican Americans	11-12	1.39 (1.10-1.76)	1.40 (1.00-1.80)	3.80 (2.50-5.40)	6.90 (5.00-9.40)	9.60 (6.90-14.5)	316
Non-Hispanic blacks	11-12	1.51 (1.30-1.77)	1.40 (1.10-1.60)	4.30 (3.10-5.20)	8.90 (6.80-13.0)	16.6 (9.90-24.8)	665
Non-Hispanic whites	11-12	*	.700 (<LOD-1.10)	2.50 (2.00-3.10)	6.30 (4.80-8.20)	10.7 (8.90-16.0)	813
All Hispanics	11-12	1.54 (1.27-1.87)	1.50 (1.20-1.90)	4.00 (2.90-5.70)	8.00 (5.90-10.7)	11.4 (9.40-14.8)	571
Asians	11-12	1.33 (1.13-1.57)	1.20 (.800-1.60)	3.50 (2.90-4.20)	7.50 (5.20-10.6)	14.1 (9.00-20.1)	352

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.500.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DMP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-methyl phthalate (MMP) (creatinine corrected) (2011 - 2012)

CAS Number 4376-18-5

Metabolite of Dimethyl phthalate (DMP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	1.32 (1.16-1.49)	2.84 (2.52-3.24)	6.13 (5.42-7.43)	11.0 (9.44-12.9)	2487
Age 6-11 years	11-12	3.31 (2.57-4.25)	2.97 (2.14-3.89)	7.73 (5.56-8.53)	17.3 (12.4-24.2)	30.2 (17.3-171)	395
Age 12-19 years	11-12	1.37 (1.12-1.68)	1.16 (.959-1.46)	2.86 (1.88-4.29)	7.68 (4.95-10.0)	12.2 (7.68-24.6)	388
Age 20+ years	11-12	*	1.26 (1.05-1.40)	2.57 (2.33-2.82)	5.29 (4.43-5.93)	9.31 (7.26-10.2)	1704
Males	11-12	1.25 (1.09-1.44)	1.23 (.957-1.49)	2.74 (2.35-3.16)	5.88 (5.08-7.73)	10.0 (8.33-12.9)	1258
Females	11-12	*	1.38 (1.23-1.52)	2.92 (2.57-3.29)	6.17 (5.44-8.08)	12.2 (8.98-15.4)	1229
Mexican Americans	11-12	1.57 (1.19-2.06)	1.57 (1.06-2.14)	3.44 (2.44-5.26)	7.26 (4.28-12.2)	11.8 (7.39-22.4)	316
Non-Hispanic blacks	11-12	1.18 (1.01-1.38)	1.20 (.955-1.45)	2.64 (2.19-3.33)	6.50 (4.30-9.78)	11.1 (6.93-18.0)	665
Non-Hispanic whites	11-12	*	1.23 (<LOD-1.45)	2.52 (2.13-3.04)	5.75 (4.69-6.54)	10.0 (8.08-12.9)	811
All Hispanics	11-12	1.73 (1.44-2.08)	1.79 (1.48-2.14)	3.55 (2.82-4.89)	7.73 (5.54-10.9)	12.7 (8.51-19.8)	571
Asians	11-12	1.79 (1.52-2.10)	1.75 (1.50-2.07)	3.91 (3.49-4.37)	8.75 (6.61-10.3)	11.5 (10.0-15.0)	352

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DMP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(3-carboxypropyl) phthalate (MCPP) (2011 - 2016)†

CAS Number 66851- -5

Metabolite of Di-n-octyl phthalate (DOP) and of several high molecular weight phthalates

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.01 (2.59-3.50)	2.70 (2.40-3.10)	6.60 (5.60-7.90)	16.9 (13.1-23.1)	34.4 (21.3-51.8)	2489
Total population	13-14	2.14 (1.97-2.32)	2.00 (1.80-2.20)	4.90 (4.40-5.30)	11.2 (9.60-13.0)	19.5 (16.5-22.3)	2685
Total population	15-16	1.15 (.977-1.35)	1.10 (.900-1.30)	2.30 (1.80-2.80)	5.10 (3.70-7.50)	8.60 (6.70-12.2)	2975
Age 3-5 years	15-16	1.72 (1.48-2.00)	1.70 (1.40-1.90)	3.30 (2.80-4.20)	6.10 (5.00-7.70)	8.80 (7.50-11.0)	465
Age 6-11 years	11-12	3.38 (2.87-3.97)	3.20 (2.70-4.10)	6.80 (5.50-8.50)	11.0 (9.40-14.1)	20.7 (13.7-34.2)	396
Age 6-11 years	13-14	3.11 (2.60-3.70)	3.10 (2.60-3.70)	5.60 (4.70-8.10)	13.0 (9.00-17.6)	21.2 (15.8-29.3)	409
Age 6-11 years	15-16	1.79 (1.57-2.03)	1.80 (1.50-2.00)	3.10 (2.70-3.60)	6.80 (4.70-7.90)	9.80 (7.50-12.7)	415
Age 12-19 years	11-12	3.26 (2.59-4.12)	3.00 (2.20-4.10)	6.80 (5.80-9.90)	22.2 (13.1-38.4)	45.0 (24.6-58.9)	388
Age 12-19 years	13-14	2.53 (2.13-3.02)	2.30 (1.90-3.10)	5.60 (4.30-7.10)	11.8 (7.40-22.5)	25.5 (11.8-58.6)	462
Age 12-19 years	15-16	1.31 (1.03-1.68)	1.30 (1.10-1.60)	2.40 (1.90-3.10)	4.80 (3.20-8.20)	8.40 (4.40-16.0)	405
Age 20+ years	11-12	2.94 (2.46-3.50)	2.60 (2.30-3.00)	6.50 (5.40-7.70)	16.9 (12.8-23.5)	34.4 (19.8-56.3)	1705
Age 20+ years	13-14	2.00 (1.83-2.20)	1.80 (1.70-2.00)	4.70 (4.00-5.20)	10.9 (9.30-12.7)	18.4 (15.8-21.3)	1814
Age 20+ years	15-16	1.06 (.897-1.24)	.900 (.800-1.10)	2.00 (1.60-2.70)	5.10 (3.30-7.50)	8.60 (6.10-12.4)	1690
Males	11-12	3.52 (2.94-4.22)	2.80 (2.50-3.50)	7.30 (5.90-10.0)	18.7 (13.0-33.2)	48.0 (22.1-106)	1259
Males	13-14	2.37 (2.10-2.68)	2.20 (2.00-2.50)	5.10 (4.50-5.80)	11.9 (9.10-16.0)	20.8 (17.3-26.4)	1285
Males	15-16	1.27 (1.06-1.53)	1.20 (1.00-1.50)	2.40 (1.90-3.10)	5.50 (4.00-8.30)	10.4 (6.40-15.4)	1474
Females	11-12	2.58 (2.24-2.97)	2.50 (2.20-2.80)	6.00 (4.80-7.00)	15.5 (11.2-19.8)	27.8 (17.7-40.2)	1230
Females	13-14	1.94 (1.74-2.16)	1.80 (1.60-2.00)	4.70 (4.00-5.30)	10.4 (8.70-12.9)	17.5 (14.2-25.4)	1400
Females	15-16	1.04 (.888-1.22)	1.00 (.800-1.20)	2.10 (1.70-2.60)	4.50 (3.50-6.90)	8.40 (5.50-9.90)	1501
Mexican Americans	11-12	2.58 (2.12-3.13)	2.40 (2.10-2.80)	4.50 (3.60-6.00)	12.2 (6.60-22.2)	22.2 (12.2-50.7)	316
Mexican Americans	13-14	1.75 (1.53-2.01)	1.90 (1.40-2.20)	3.70 (3.10-4.50)	7.60 (6.10-9.10)	14.6 (9.10-19.9)	438
Mexican Americans	15-16	1.15 (1.02-1.30)	1.00 (.900-1.20)	2.10 (1.80-2.60)	5.80 (4.00-7.60)	11.4 (7.20-13.4)	595
Non-Hispanic blacks	11-12	3.55 (3.13-4.02)	3.00 (2.70-3.30)	6.80 (5.60-8.10)	19.7 (13.4-25.0)	30.9 (25.0-39.8)	665
Non-Hispanic blacks	13-14	2.19 (1.88-2.54)	2.00 (1.80-2.50)	4.20 (3.60-5.10)	9.60 (6.40-16.4)	18.3 (11.0-30.0)	609
Non-Hispanic blacks	15-16	1.30 (.987-1.72)	1.20 (.900-1.60)	2.60 (1.80-3.60)	6.10 (3.50-9.40)	10.6 (7.40-15.2)	698
Non-Hispanic whites	11-12	3.03 (2.54-3.62)	2.80 (2.30-3.30)	6.70 (5.50-8.80)	16.9 (12.8-24.4)	37.2 (18.3-51.8)	813
Non-Hispanic whites	13-14	2.23 (2.03-2.43)	2.00 (1.90-2.30)	5.20 (4.80-5.80)	11.7 (10.3-14.5)	19.5 (16.1-25.4)	987
Non-Hispanic whites	15-16	1.15 (.968-1.36)	1.10 (.900-1.30)	2.30 (1.80-2.80)	5.10 (3.50-8.30)	8.60 (6.00-12.6)	862
All Hispanics	11-12	2.79 (2.19-3.56)	2.40 (2.10-2.70)	5.70 (4.20-7.80)	16.3 (9.00-33.7)	35.1 (14.9-115)	571
All Hispanics	13-14	1.95 (1.68-2.27)	2.00 (1.60-2.30)	4.30 (3.70-4.80)	9.10 (6.70-14.6)	17.5 (9.50-27.4)	690
All Hispanics	15-16	1.18 (1.02-1.35)	1.10 (.900-1.20)	2.20 (1.90-2.70)	5.60 (3.80-7.40)	9.90 (7.10-12.3)	971
Asians	11-12	2.24 (1.66-3.01)	2.00 (1.50-2.60)	4.60 (3.60-6.90)	11.5 (7.70-25.7)	33.2 (11.5-74.3)	352
Asians	13-14	1.40 (1.14-1.73)	1.30 (1.00-1.80)	2.90 (2.50-3.20)	5.80 (4.50-8.30)	13.5 (7.00-28.4)	289
Asians	15-16	.891 (.705-1.13)	.700 (.500-1.00)	1.70 (1.40-2.30)	4.50 (2.70-6.80)	6.80 (3.80-38.4)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.200, 0.400, and 0.400 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DOP_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Mono-(3-carboxypropyl) phthalate (MCPP) (creatinine corrected) (2011 - 2016)†

CAS Number 66851- -5

Metabolite of Di-n-octyl phthalate (DOP) and of several high molecular weight phthalates

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.42 (2.93-3.99)	2.86 (2.44-3.33)	6.00 (4.95-7.75)	15.8 (10.8-23.6)	36.6 (18.8-65.9)	2487
Total population	13-14	2.14 (1.95-2.35)	1.88 (1.72-2.14)	3.91 (3.37-4.60)	9.12 (7.96-11.4)	16.7 (14.1-19.1)	2684
Total population	15-16	1.19 (1.04-1.36)	1.05 (.903-1.20)	2.07 (1.72-2.46)	4.38 (3.56-5.83)	7.48 (5.40-9.49)	2974
Age 3-5 years	15-16	4.11 (3.60-4.69)	4.09 (3.43-4.74)	6.67 (5.81-7.35)	10.5 (8.60-13.3)	14.2 (12.4-17.6)	464
Age 6-11 years	11-12	4.79 (4.18-5.49)	4.19 (3.60-4.67)	7.26 (5.81-8.61)	15.7 (8.97-26.7)	28.2 (16.4-39.8)	395
Age 6-11 years	13-14	3.92 (3.36-4.58)	3.44 (2.97-4.11)	6.92 (5.22-8.53)	17.2 (9.57-25.3)	27.8 (13.0-36.6)	409
Age 6-11 years	15-16	2.3 (2.06-2.56)	2.24 (1.79-2.55)	3.64 (3.03-4.05)	6.73 (5.50-7.08)	9.32 (7.08-11.5)	415
Age 12-19 years	11-12	3.18 (2.50-4.04)	2.44 (1.82-3.31)	5.59 (3.85-8.33)	26.6 (8.44-45.7)	45.7 (17.4-80.0)	388
Age 12-19 years	13-14	2.06 (1.72-2.45)	1.76 (1.55-2.29)	3.43 (2.99-4.39)	9.52 (5.96-14.5)	18.6 (10.1-30.0)	462
Age 12-19 years	15-16	1.02 (.837-1.24)	.964 (.757-1.14)	1.71 (1.36-2.13)	3.10 (2.31-4.16)	5.68 (2.93-10.6)	405
Age 20+ years	11-12	3.33 (2.83-3.93)	2.69 (2.34-3.16)	5.97 (4.78-7.89)	15.7 (10.7-22.1)	32.2 (17.1-69.6)	1704
Age 20+ years	13-14	2.02 (1.82-2.24)	1.79 (1.59-2.01)	3.62 (3.07-4.47)	8.54 (7.33-10.7)	16.0 (13.1-18.9)	1813
Age 20+ years	15-16	1.08 (.943-1.23)	.943 (.820-1.08)	1.74 (1.40-2.15)	3.88 (2.81-4.91)	6.74 (4.27-9.49)	1690
Males	11-12	3.29 (2.80-3.86)	2.67 (2.35-3.07)	6.00 (4.86-7.58)	15.7 (10.1-25.0)	41.5 (17.2-89.9)	1258
Males	13-14	1.99 (1.80-2.21)	1.79 (1.57-1.98)	3.67 (3.07-4.55)	8.54 (7.12-10.5)	15.3 (10.7-19.8)	1284
Males	15-16	1.13 (.968-1.33)	.986 (.818-1.18)	2.07 (1.67-2.50)	4.80 (3.40-6.69)	8.09 (5.68-10.0)	1474
Females	11-12	3.55 (2.95-4.27)	3.00 (2.44-3.65)	6.05 (4.80-8.45)	15.8 (9.78-25.7)	33.7 (16.2-65.9)	1229
Females	13-14	2.3 (1.99-2.66)	2.06 (1.74-2.42)	4.21 (3.42-5.20)	10.0 (7.54-14.0)	17.4 (14.0-22.3)	1400
Females	15-16	1.24 (1.09-1.42)	1.10 (.971-1.27)	2.09 (1.71-2.51)	4.08 (3.39-5.32)	6.62 (4.80-9.32)	1500
Mexican Americans	11-12	2.91 (2.34-3.61)	2.50 (2.14-2.92)	4.88 (3.49-6.11)	11.5 (6.42-24.4)	24.4 (9.94-78.7)	316
Mexican Americans	13-14	1.79 (1.62-1.98)	1.64 (1.40-2.03)	3.17 (2.70-3.56)	6.56 (5.36-9.09)	10.7 (6.92-17.8)	438
Mexican Americans	15-16	1.25 (1.10-1.42)	1.12 (.947-1.27)	2.15 (1.92-2.54)	5.04 (4.03-6.19)	8.19 (6.67-10.7)	595
Non-Hispanic blacks	11-12	2.76 (2.42-3.15)	2.27 (1.96-2.65)	4.82 (3.77-6.23)	11.8 (8.36-15.1)	22.9 (15.3-31.9)	665
Non-Hispanic blacks	13-14	1.62 (1.44-1.81)	1.39 (1.18-1.74)	2.96 (2.48-3.40)	7.78 (5.25-10.0)	11.9 (8.28-19.8)	609
Non-Hispanic blacks	15-16	1.04 (.834-1.29)	.896 (.730-1.13)	2.03 (1.47-2.66)	4.29 (3.33-5.85)	7.63 (5.40-10.5)	697
Non-Hispanic whites	11-12	3.67 (3.06-4.42)	3.08 (2.58-3.93)	6.92 (5.14-9.10)	16.3 (11.2-27.0)	36.8 (17.6-69.6)	811
Non-Hispanic whites	13-14	2.34 (2.09-2.63)	2.05 (1.76-2.39)	4.39 (3.49-5.41)	10.0 (8.11-13.8)	17.1 (14.7-20.3)	987
Non-Hispanic whites	15-16	1.23 (1.09-1.40)	1.08 (.966-1.23)	2.14 (1.71-2.59)	4.26 (3.45-5.97)	7.44 (4.51-9.49)	862
All Hispanics	11-12	3.13 (2.50-3.92)	2.45 (2.14-2.73)	5.31 (4.04-6.73)	15.1 (7.09-36.6)	34.6 (11.9-128)	571
All Hispanics	13-14	1.94 (1.70-2.20)	1.76 (1.53-2.07)	3.39 (3.05-4.00)	8.19 (5.70-11.7)	14.7 (8.92-25.7)	690
All Hispanics	15-16	1.24 (1.08-1.43)	1.11 (.946-1.25)	2.07 (1.75-2.48)	5.04 (4.02-6.67)	9.18 (6.79-11.0)	971
Asians	11-12	3 (2.29-3.92)	2.54 (2.08-3.14)	4.64 (3.56-7.40)	14.7 (6.97-38.8)	38.8 (21.3-65.7)	352
Asians	13-14	1.78 (1.51-2.10)	1.55 (1.19-1.93)	2.95 (2.32-4.05)	7.94 (5.88-9.62)	13.8 (8.00-34.1)	288
Asians	15-16	1.1 (.931-1.31)	.966 (.800-1.10)	1.96 (1.42-2.50)	3.88 (2.73-5.31)	6.44 (3.88-23.6)	301

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DOP_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Cyclohexane-1,2-dicarboxylic acid mono hydroxyisononyl ester (MHNCH) (2011 - 2016)†

CAS Number 1637562-52-7

Metabolite of Di(isononyl) cyclohexane-1,2-dicarboxylate (DINCH)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.600 (.500-.800)	1.10 (.900-1.20)	2489
Total population	13-14	*	<LOD	<LOD	.900 (.800-1.00)	1.50 (1.30-1.90)	2685
Total population	15-16	.758 (.680-.846)	.600 (.500-.700)	1.40 (1.20-1.70)	3.60 (2.90-4.80)	7.40 (5.30-10.3)	2975
Age 3-5 years	15-16	1.36 (1.19-1.55)	1.30 (1.10-1.50)	2.70 (2.00-3.30)	4.70 (3.70-6.10)	7.80 (5.20-12.9)	465
Age 6-11 years	11-12	*	<LOD	.800 (.600-1.10)	1.90 (1.20-2.70)	4.10 (1.90-6.00)	396
Age 6-11 years	13-14	.684 (.585-.799)	.600 (.500-.800)	1.10 (1.00-1.60)	2.40 (2.10-3.10)	3.90 (2.80-4.60)	409
Age 6-11 years	15-16	1.15 (.962-1.38)	1.10 (.800-1.30)	2.40 (1.90-2.90)	4.20 (3.10-7.80)	8.70 (4.20-13.2)	415
Age 12-19 years	11-12	*	<LOD	.400 (<LOD-.600)	.900 (.600-1.30)	1.30 (.900-2.50)	388
Age 12-19 years	13-14	*	<LOD	.600 (.500-.700)	1.10 (.800-1.70)	1.70 (1.20-2.50)	462
Age 12-19 years	15-16	.966 (.817-1.14)	.800 (.600-1.00)	1.80 (1.30-2.40)	4.20 (2.90-6.00)	11.3 (5.70-17.1)	405
Age 20+ years	11-12	*	<LOD	<LOD	.500 (.400-.600)	.800 (.700-.900)	1705
Age 20+ years	13-14	*	<LOD	<LOD	.700 (.600-.800)	1.10 (.900-1.40)	1814
Age 20+ years	15-16	*	.500 (.400-.600)	1.20 (1.00-1.50)	3.40 (2.50-4.40)	7.20 (5.00-10.7)	1690
Males	11-12	*	<LOD	<LOD	.700 (.600-1.00)	1.10 (.800-1.70)	1259
Males	13-14	*	<LOD	<LOD	.800 (.700-1.00)	1.40 (1.20-1.70)	1285
Males	15-16	.786 (.702-.879)	.600 (.500-.700)	1.50 (1.20-1.70)	3.90 (2.90-5.30)	7.80 (5.00-11.3)	1474
Females	11-12	*	<LOD	<LOD	.600 (.500-.700)	.900 (.800-1.10)	1230
Females	13-14	*	<LOD	<LOD	.900 (.800-1.10)	1.60 (1.30-1.90)	1400
Females	15-16	*	.500 (.400-.700)	1.30 (1.10-1.70)	3.30 (2.60-4.40)	6.90 (5.30-11.2)	1501
Mexican Americans	11-12	*	<LOD	.400 (<LOD-.500)	.800 (.600-1.10)	1.30 (.800-2.70)	316
Mexican Americans	13-14	*	<LOD	.500 (<LOD-.600)	.900 (.800-1.10)	1.60 (.900-2.50)	438
Mexican Americans	15-16	.861 (.715-1.04)	.700 (.500-.900)	1.50 (1.20-2.00)	4.10 (3.00-5.70)	9.10 (5.40-14.5)	595
Non-Hispanic blacks	11-12	*	<LOD	.500 (<LOD-.500)	.900 (.700-1.10)	1.20 (1.10-1.50)	665
Non-Hispanic blacks	13-14	*	<LOD	.500 (<LOD-.700)	1.10 (.900-1.40)	1.80 (1.40-2.20)	609
Non-Hispanic blacks	15-16	.941 (.803-1.10)	.800 (.600-1.00)	1.70 (1.40-2.30)	4.70 (3.60-6.70)	10.1 (7.80-13.0)	698
Non-Hispanic whites	11-12	*	<LOD	<LOD	.600 (.500-.700)	.900 (.700-1.10)	813
Non-Hispanic whites	13-14	*	<LOD	<LOD	.800 (.600-.900)	1.30 (1.00-1.70)	987
Non-Hispanic whites	15-16	*	.500 (.400-.600)	1.30 (1.00-1.80)	3.40 (2.50-5.00)	7.00 (4.20-11.3)	862
All Hispanics	11-12	*	<LOD	<LOD	.700 (.600-.900)	1.10 (.800-1.60)	571
All Hispanics	13-14	*	<LOD	.500 (<LOD-.600)	.900 (.800-1.10)	1.60 (1.10-2.30)	690
All Hispanics	15-16	.793 (.670-.938)	.600 (.500-.800)	1.40 (1.20-1.70)	3.90 (2.70-5.70)	7.50 (5.80-10.9)	971
Asians	11-12	*	<LOD	<LOD	1.00 (.700-1.50)	2.00 (1.20-5.50)	352
Asians	13-14	*	<LOD	<LOD	1.00 (.600-2.10)	2.90 (1.10-7.80)	289
Asians	15-16	*	.500 (<LOD-.600)	1.10 (.900-1.30)	3.10 (1.70-4.00)	5.10 (3.50-7.60)	301

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.400, 0.400, and 0.400 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DINCH_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Cyclohexane-1,2-dicarboxylic acid mono hydroxyisononyl ester (MHNCH) (creatinine corrected) (2011 - 2016)†

CAS Number 1637562-52-7

Metabolite of Di(isononyl) cyclohexane-1,2-dicarboxylate (DINCH)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	1.12 (1.01-1.22)	1.57 (1.39-1.87)	2487
Total population	13-14	*	<LOD	<LOD	1.17 (1.08-1.26)	1.67 (1.54-1.87)	2684
Total population	15-16	0.785 (.705-.874)	.658 (.571-.755)	1.38 (1.25-1.63)	3.64 (2.87-4.39)	6.67 (5.36-7.53)	2974
Age 3-5 years	15-16	3.22 (2.81-3.69)	2.82 (2.50-3.17)	5.46 (4.55-6.92)	12.1 (8.85-14.9)	21.3 (13.9-23.6)	464
Age 6-11 years	11-12	*	<LOD	1.27 (1.04-1.40)	2.22 (1.65-3.11)	3.81 (2.38-6.64)	395
Age 6-11 years	13-14	0.864 (.750-.995)	.811 (.755-.896)	1.47 (1.25-1.78)	2.82 (2.27-3.21)	4.17 (3.21-5.80)	409
Age 6-11 years	15-16	1.48 (1.29-1.71)	1.37 (1.15-1.60)	2.54 (2.02-3.13)	5.19 (3.81-6.74)	9.29 (6.08-17.1)	415
Age 12-19 years	11-12	*	<LOD	.581 (<LOD-.700)	1.00 (.778-1.33)	1.57 (1.04-2.86)	388
Age 12-19 years	13-14	*	<LOD	.571 (.476-.667)	.966 (.751-1.17)	1.21 (1.04-1.75)	462
Age 12-19 years	15-16	0.751 (.635-.887)	.611 (.491-.757)	1.25 (1.04-1.67)	3.59 (2.14-5.75)	6.94 (4.55-10.1)	405
Age 20+ years	11-12	*	<LOD	<LOD	1.03 (.933-1.12)	1.39 (1.17-1.65)	1704
Age 20+ years	13-14	*	<LOD	<LOD	1.04 (.933-1.17)	1.46 (1.22-1.74)	1813
Age 20+ years	15-16	*	.571 (.500-.682)	1.21 (.973-1.38)	2.86 (2.16-4.20)	5.40 (4.50-6.67)	1690
Males	11-12	*	<LOD	<LOD	.916 (.778-1.08)	1.39 (1.08-1.59)	1258
Males	13-14	*	<LOD	<LOD	.930 (.800-1.08)	1.40 (1.08-1.67)	1284
Males	15-16	0.701 (.624-.788)	.566 (.488-.664)	1.29 (1.08-1.56)	3.11 (2.34-4.39)	5.75 (5.00-6.61)	1474
Females	11-12	*	<LOD	<LOD	1.22 (1.12-1.40)	1.91 (1.47-2.55)	1229
Females	13-14	*	<LOD	<LOD	1.31 (1.17-1.56)	1.96 (1.58-2.50)	1400
Females	15-16	*	.759 (.667-.824)	1.47 (1.33-1.86)	4.04 (3.11-4.67)	7.32 (5.75-9.44)	1500
Mexican Americans	11-12	*	<LOD	.667 (<LOD-.755)	1.22 (.903-1.47)	1.61 (1.27-2.76)	316
Mexican Americans	13-14	*	<LOD	.636 (<LOD-.800)	1.22 (.941-1.61)	1.80 (1.33-2.37)	438
Mexican Americans	15-16	0.937 (.799-1.10)	.778 (.622-.930)	1.82 (1.38-2.36)	4.84 (3.65-6.55)	8.48 (6.49-14.0)	595
Non-Hispanic blacks	11-12	*	<LOD	.449 (<LOD-.528)	.848 (.757-.952)	1.23 (1.02-1.57)	665
Non-Hispanic blacks	13-14	*	<LOD	.517 (<LOD-.596)	.927 (.820-1.02)	1.27 (1.04-1.47)	609
Non-Hispanic blacks	15-16	0.748 (.645-.868)	.646 (.526-.743)	1.46 (1.19-1.82)	3.64 (2.81-4.44)	7.58 (5.29-10.4)	697
Non-Hispanic whites	11-12	*	<LOD	<LOD	1.12 (1.00-1.22)	1.56 (1.22-2.00)	811
Non-Hispanic whites	13-14	*	<LOD	<LOD	1.17 (1.04-1.27)	1.65 (1.40-1.98)	987
Non-Hispanic whites	15-16	*	.651 (.542-.778)	1.37 (1.16-1.75)	3.46 (2.50-4.75)	6.41 (4.62-7.54)	862
All Hispanics	11-12	*	<LOD	<LOD	1.12 (.824-1.47)	1.54 (1.27-1.87)	571
All Hispanics	13-14	*	<LOD	.609 (<LOD-.757)	1.22 (1.02-1.54)	1.87 (1.61-2.31)	690
All Hispanics	15-16	0.835 (.731-.954)	.683 (.596-.783)	1.56 (1.22-2.00)	4.33 (3.21-5.47)	7.18 (5.36-11.3)	971
Asians	11-12	*	<LOD	<LOD	1.89 (1.33-2.22)	3.57 (2.00-7.00)	352
Asians	13-14	*	<LOD	<LOD	1.47 (1.04-2.84)	3.93 (1.47-8.84)	288
Asians	15-16	*	.778 (<LOD-.932)	1.39 (1.16-1.75)	3.56 (2.32-4.55)	6.09 (3.81-7.14)	301

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DINCH_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html

Urinary Cyclohexane-1,2-dicarboxylic acid mono carboxyisooctyl ester (MCOCH) (2015 - 2016)

CAS Number 1637562-51-6

Metabolite of Di(isononyl) cyclohexane-1,2-dicarboxylate (DINCH)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	.500 (.500-.600)	1.00 (.800-1.10)	2.10 (1.80-2.70)	4.00 (3.20-5.00)	2975
Age 3-5 years	15-16	1.02 (.928-1.12)	.900 (.800-1.00)	1.70 (1.40-2.00)	3.40 (2.40-4.00)	4.90 (3.90-6.00)	465
Age 6-11 years	15-16	.894 (.776-1.03)	.800 (.700-.900)	1.40 (1.10-1.60)	3.60 (1.90-5.10)	5.10 (3.70-7.40)	415
Age 12-19 years	15-16	.742 (.656-.838)	.600 (.500-.600)	1.00 (.900-1.20)	2.20 (1.70-3.10)	4.50 (2.60-9.90)	405
Age 20+ years	15-16	*	.500 (<LOD-.600)	.800 (.700-1.00)	2.00 (1.70-2.70)	3.40 (2.80-4.90)	1690
Males	15-16	*	.600 (.500-.600)	1.00 (.900-1.20)	2.30 (1.80-3.00)	3.80 (3.20-4.50)	1474
Females	15-16	*	.500 (.500-.600)	.900 (.800-1.00)	2.00 (1.50-2.70)	4.30 (2.80-5.70)	1501
Mexican Americans	15-16	*	.600 (<LOD-.800)	1.10 (.900-1.30)	2.70 (1.90-3.60)	4.90 (3.50-7.00)	595
Non-Hispanic blacks	15-16	.749 (.663-.847)	.600 (.500-.700)	1.10 (.900-1.40)	3.00 (2.20-3.70)	5.10 (4.30-7.00)	698
Non-Hispanic whites	15-16	*	.500 (.500-.600)	.900 (.800-1.10)	2.00 (1.70-2.70)	3.40 (2.60-5.10)	862
All Hispanics	15-16	*	.600 (<LOD-.700)	1.00 (.800-1.30)	2.10 (1.70-3.10)	4.30 (3.10-5.70)	971
Asians	15-16	*	<LOD	.700 (.600-1.00)	1.60 (1.00-2.50)	2.70 (1.80-5.80)	301

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.500.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DINCH_BiomonitoringSummary.html

Urinary Cyclohexane-1,2-dicarboxylic acid mono carboxyisooctyl ester (MCOCH) (creatinine corrected (2015 - 2016)

CAS Number 1637562-51-6

Metabolite of Di(isononyl) cyclohexane-1,2-dicarboxylate (DINCH)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	.620 (.559-.686)	1.22 (1.07-1.35)	2.40 (2.05-2.87)	3.94 (3.49-4.58)	2974
Age 3-5 years	15-16	2.43 (2.15-2.75)	2.08 (1.85-2.39)	4.06 (3.59-4.71)	7.78 (5.83-9.23)	11.7 (8.75-17.1)	464
Age 6-11 years	15-16	1.15 (1.02-1.30)	1.03 (.928-1.20)	1.88 (1.53-2.19)	3.42 (2.90-4.58)	5.83 (3.54-9.02)	415
Age 12-19 years	15-16	0.576 (.507-.655)	.500 (.467-.556)	.872 (.682-1.21)	1.94 (1.49-3.19)	3.66 (2.38-5.00)	405
Age 20+ years	15-16	*	.583 (<LOD-.648)	1.08 (.948-1.29)	2.06 (1.72-2.48)	3.32 (2.65-4.08)	1690
Males	15-16	*	.538 (.493-.602)	1.07 (.867-1.29)	1.96 (1.67-2.50)	3.18 (2.86-3.92)	1474
Females	15-16	*	.696 (.625-.778)	1.37 (1.20-1.53)	2.86 (2.33-3.37)	4.46 (3.91-5.00)	1500
Mexican Americans	15-16	*	.686 (<LOD-.814)	1.40 (1.24-1.59)	3.18 (2.59-3.84)	5.83 (3.59-8.66)	595
Non-Hispanic blacks	15-16	0.597 (.518-.688)	.505 (.452-.574)	1.06 (.849-1.31)	2.44 (1.82-3.33)	4.58 (3.51-5.35)	697
Non-Hispanic whites	15-16	*	.648 (.565-.735)	1.22 (1.03-1.38)	2.25 (1.91-2.90)	3.72 (2.92-5.00)	862
All Hispanics	15-16	*	.619 (<LOD-.700)	1.30 (1.05-1.50)	2.86 (2.10-3.75)	5.26 (3.59-6.36)	971
Asians	15-16	*	<LOD	1.32 (1.06-1.46)	2.19 (1.76-3.00)	3.33 (2.50-4.57)	301

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/DINCH_BiomonitoringSummary.html

Urinary Mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP) (2015 - 2016)

CAS Number 1684398-42-2

Metabolite of Di-2-ethylhexyl terephthalate (DEHTP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	19.7 (16.9-23.1)	16.5 (14.2-20.0)	59.8 (50.3-70.6)	196 (155-226)	369 (291-500)	2970
Age 3-5 years	15-16	39.7 (33.8-46.7)	38.6 (30.1-44.8)	72.8 (62.8-98.5)	207 (135-266)	282 (230-450)	465
Age 6-11 years	15-16	41.4 (32.5-52.8)	38.2 (28.5-52.6)	100 (75.3-140)	228 (157-360)	401 (229-708)	413
Age 12-19 years	15-16	38.1 (29.4-49.3)	32.1 (23.5-44.9)	123 (79.4-214)	373 (187-628)	628 (361-846)	403
Age 20+ years	15-16	16.1 (13.6-19.1)	12.7 (11.0-15.4)	50.2 (37.1-64.1)	156 (127-210)	330 (234-502)	1689
Males	15-16	20.7 (17.7-24.3)	17.8 (15.1-23.1)	62.9 (49.1-77.0)	190 (139-244)	374 (292-475)	1472
Females	15-16	18.8 (15.7-22.5)	15.7 (12.6-19.6)	57.9 (47.8-69.0)	198 (151-229)	361 (255-532)	1498
Mexican Americans	15-16	20.3 (14.7-27.9)	19.3 (13.5-30.0)	59.4 (41.6-80.0)	143 (113-192)	288 (186-401)	594
Non-Hispanic blacks	15-16	25.8 (20.5-32.6)	24.1 (19.7-29.9)	73.1 (54.5-95.8)	211 (167-266)	343 (265-502)	697
Non-Hispanic whites	15-16	19.4 (16.0-23.7)	15.6 (12.4-20.3)	60.1 (49.1-78.5)	218 (148-282)	404 (291-600)	861
All Hispanics	15-16	19.1 (14.2-25.9)	17.9 (12.9-25.2)	58.8 (41.9-75.6)	156 (117-192)	288 (192-401)	969
Asians	15-16	17.4 (11.6-26.1)	15.2 (12.1-20.2)	47.6 (33.5-77.1)	145 (78.6-351)	380 (124-665)	301

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.200.

Urinary Mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP) (creatinine corrected) (2015 - 2016)

CAS Number 1684398-42-2

Metabolite of Di-2-ethylhexyl terephthalate (DEHTP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	20.4 (17.5-23.9)	18.1 (14.4-21.9)	58.8 (49.5-68.7)	166 (147-199)	361 (277-410)	2969
Age 3-5 years	15-16	95.1 (79.2-114)	86.8 (67.5-107)	175 (143-217)	397 (304-537)	716 (413-1080)	464
Age 6-11 years	15-16	53.5 (44.5-64.3)	49.0 (42.0-60.4)	109 (82.2-138)	253 (183-339)	443 (302-710)	413
Age 12-19 years	15-16	29.6 (23.2-37.8)	23.7 (16.4-35.4)	88.6 (52.3-144)	244 (206-305)	395 (302-455)	403
Age 20+ years	15-16	16.4 (13.8-19.5)	13.8 (11.8-17.2)	45.5 (36.1-57.5)	145 (111-162)	290 (201-395)	1689
Males	15-16	18.5 (15.6-21.8)	15.5 (12.6-19.6)	54.8 (41.8-74.9)	148 (133-192)	302 (218-368)	1472
Females	15-16	22.5 (18.9-26.9)	20.3 (15.6-24.3)	61.1 (56.7-73.5)	182 (149-241)	426 (251-487)	1497
Mexican Americans	15-16	22.1 (15.8-30.9)	22.5 (13.4-36.1)	63.6 (45.0-85.2)	166 (102-220)	294 (174-395)	594
Non-Hispanic blacks	15-16	20.6 (16.9-25.1)	18.4 (13.6-24.4)	58.1 (45.1-77.8)	142 (108-188)	290 (204-364)	696
Non-Hispanic whites	15-16	20.9 (17.1-25.5)	18.5 (14.0-23.2)	59.7 (47.7-76.7)	197 (149-244)	426 (253-494)	861
All Hispanics	15-16	20.2 (15.1-27.0)	19.0 (13.1-27.1)	59.8 (42.8-80.0)	153 (110-212)	282 (180-395)	969
Asians	15-16	21.5 (15.7-29.5)	19.5 (12.9-27.6)	53.0 (30.4-93.7)	159 (80.5-232)	235 (138-602)	301

Urinary Mono-2-ethyl-5-hydroxyhexyl terephthalate (MEHHTP) (2015 - 2016)

CAS Number 1684398-38-6

Metabolite of Di-2-ethylhexyl terephthalate (DEHTP)

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	5.15 (4.41-6.02)	4.60 (3.90-5.30)	13.8 (11.8-16.9)	42.3 (30.0-55.1)	85.7 (61.4-124)	2970
Age 3-5 years	15-16	5.74 (4.90-6.73)	5.20 (4.30-6.30)	10.8 (8.90-14.2)	28.1 (19.4-37.5)	45.2 (30.8-59.2)	465
Age 6-11 years	15-16	7.35 (5.70-9.48)	7.00 (5.20-10.0)	16.0 (12.6-22.5)	34.6 (23.0-63.1)	74.7 (34.6-111)	413
Age 12-19 years	15-16	8.11 (6.24-10.5)	7.30 (5.90-9.50)	23.5 (13.9-35.6)	70.2 (33.1-144)	126 (54.5-209)	403
Age 20+ years	15-16	4.63 (3.90-5.49)	3.80 (3.20-4.80)	12.9 (10.2-16.4)	40.0 (25.6-55.1)	85.7 (58.1-126)	1689
Males	15-16	5.85 (4.89-6.99)	5.20 (4.20-6.60)	16.0 (12.3-20.0)	44.3 (30.0-63.5)	95.0 (65.1-144)	1472
Females	15-16	4.56 (3.88-5.36)	3.80 (3.20-4.70)	12.5 (10.5-15.1)	40.0 (26.8-54.5)	78.4 (52.1-124)	1498
Mexican Americans	15-16	4.75 (3.39-6.65)	4.60 (3.00-6.40)	12.3 (8.10-19.2)	34.0 (21.9-49.3)	58.1 (40.7-98.0)	594
Non-Hispanic blacks	15-16	6.00 (4.78-7.53)	5.90 (4.50-7.40)	15.3 (11.5-20.0)	39.6 (29.4-53.9)	72.4 (56.3-101)	697
Non-Hispanic whites	15-16	5.32 (4.45-6.37)	4.50 (3.60-5.50)	16.0 (12.3-19.9)	46.5 (30.0-76.0)	111 (71.1-156)	861
All Hispanics	15-16	4.56 (3.39-6.13)	4.40 (3.10-5.80)	11.9 (8.50-15.7)	30.8 (22.9-47.6)	58.1 (44.5-94.4)	969
Asians	15-16	4.30 (2.90-6.38)	3.90 (2.90-5.30)	10.8 (6.30-15.0)	27.1 (14.2-87.9)	68.6 (24.6-187)	301

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.400.

Urinary Mono-2-ethyl-5-hydroxyhexyl terephthalate (MEHHTP) (creatinine corrected) (2015 - 2016)

CAS Number 1684398-38-6

Metabolite of Di-2-ethylhexyl terephthalate (DEHTP)

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	5.33 (4.58-6.21)	4.47 (3.72-5.39)	12.3 (10.3-15.6)	34.6 (26.9-46.4)	67.5 (52.8-84.1)	2969
Age 3-5 years	15-16	13.7 (11.4-16.6)	12.5 (10.6-14.6)	24.5 (19.5-28.9)	58.6 (36.4-81.9)	89.2 (60.2-118)	464
Age 6-11 years	15-16	9.5 (7.72-11.7)	8.86 (7.13-11.2)	16.9 (14.1-20.6)	41.5 (27.6-57.8)	64.3 (47.3-123)	413
Age 12-19 years	15-16	6.3 (5.00-7.95)	5.66 (3.54-7.99)	16.9 (10.7-25.5)	44.2 (27.6-59.5)	59.5 (44.3-71.8)	403
Age 20+ years	15-16	4.72 (3.97-5.60)	3.76 (3.22-4.68)	10.5 (8.07-14.6)	30.9 (23.6-44.6)	67.5 (50.2-84.1)	1689
Males	15-16	5.22 (4.38-6.21)	4.66 (3.63-5.69)	12.0 (9.32-16.0)	33.1 (25.2-46.4)	64.9 (47.2-81.9)	1472
Females	15-16	5.45 (4.66-6.39)	4.39 (3.67-5.56)	13.4 (10.5-15.9)	36.1 (26.3-51.5)	73.4 (47.1-95.4)	1497
Mexican Americans	15-16	5.18 (3.66-7.33)	4.77 (2.78-8.42)	12.3 (8.67-18.8)	27.6 (21.4-41.4)	52.0 (27.0-123)	594
Non-Hispanic blacks	15-16	4.78 (4.04-5.65)	4.18 (3.29-5.67)	10.8 (8.60-13.2)	26.7 (21.4-34.8)	50.7 (34.0-69.9)	696
Non-Hispanic whites	15-16	5.72 (4.79-6.84)	4.88 (3.81-5.92)	14.1 (10.2-18.8)	44.3 (32.4-52.5)	79.8 (57.8-101)	861
All Hispanics	15-16	4.81 (3.62-6.38)	4.32 (2.93-6.58)	11.5 (8.28-16.9)	27.8 (21.4-40.2)	50.2 (33.1-85.9)	969
Asians	15-16	5.33 (3.95-7.17)	4.30 (3.03-5.76)	11.1 (8.12-17.2)	31.8 (17.7-59.5)	59.5 (30.5-118)	301

Polycyclic Aromatic Hydrocarbon Metabolites

Urinary 2-Hydroxyfluorene (2011 - 2014)

CAS Number 2443-58-5

Metabolite of Flourene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	240 (219-263)	215 (199-231)	498 (444-576)	1380 (1110-1570)	2340 (1920-2620)	2492
Total population	13-14	181 (165-197)	158 (146-174)	375 (319-431)	1020 (810-1260)	1650 (1430-1960)	2650
Age 6-11 years	11-12	161 (146-177)	176 (166-194)	301 (259-332)	485 (390-595)	615 (522-736)	397
Age 6-11 years	13-14	119 (108-132)	117 (105-131)	217 (191-261)	371 (302-458)	549 (445-682)	399
Age 12-19 years	11-12	233 (198-274)	224 (180-275)	476 (386-567)	888 (679-1100)	1370 (1030-1950)	389
Age 12-19 years	13-14	172 (139-212)	175 (128-227)	335 (285-424)	696 (531-860)	1140 (708-1430)	449
Age 20+ years	11-12	252 (227-279)	217 (201-242)	574 (474-637)	1530 (1320-1830)	2420 (2180-2920)	1706
Age 20+ years	13-14	190 (172-209)	161 (145-182)	410 (338-491)	1180 (951-1430)	1820 (1570-2140)	1802
Males	11-12	280 (245-320)	244 (210-286)	584 (457-689)	1460 (1180-1830)	2390 (2050-3100)	1258
Males	13-14	201 (184-220)	180 (160-195)	400 (338-462)	1060 (810-1280)	1670 (1270-2150)	1315
Females	11-12	207 (182-236)	180 (157-209)	425 (360-525)	1210 (810-1580)	2260 (1620-2420)	1234
Females	13-14	162 (146-180)	138 (121-158)	333 (283-423)	984 (716-1240)	1610 (1290-2160)	1335
Mexican Americans	11-12	238 (184-307)	220 (180-252)	475 (306-747)	1030 (584-1780)	1510 (829-2920)	317
Mexican Americans	13-14	154 (147-161)	146 (132-167)	298 (250-320)	500 (377-756)	857 (505-1100)	450
Non-Hispanic blacks	11-12	342 (306-381)	321 (304-349)	641 (549-734)	1480 (1150-1890)	2390 (1970-3040)	664
Non-Hispanic blacks	13-14	303 (264-347)	248 (220-294)	676 (569-820)	1630 (1210-2150)	2500 (1790-2930)	578
Non-Hispanic whites	11-12	227 (210-246)	199 (173-221)	480 (386-580)	1410 (1110-1620)	2350 (1790-2920)	814
Non-Hispanic whites	13-14	176 (155-198)	153 (135-174)	380 (306-480)	1060 (804-1290)	1770 (1440-2070)	979
All Hispanics	11-12	251 (210-301)	228 (204-260)	514 (421-646)	1050 (785-1510)	1810 (1260-2410)	573
All Hispanics	13-14	162 (148-177)	153 (135-178)	298 (259-333)	572 (412-853)	991 (694-1240)	698
Asians	11-12	154 (126-190)	137 (111-175)	326 (217-408)	563 (467-903)	1100 (691-1490)	352
Asians	13-14	103 (82.0-130)	100 (84.0-120)	172 (137-244)	322 (229-741)	741 (322-1150)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 10.0 and 8.00 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Fluorene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2-Hydroxyfluorene (creatinine corrected) (2011 - 2014)

CAS Number 2443-58-5

Metabolite of Flourene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	273 (255-292)	211 (196-228)	439 (374-495)	1340 (1120-1570)	2110 (1930-2250)	2490
Total population	13-14	209 (194-226)	167 (155-182)	319 (283-359)	942 (768-1130)	1460 (1280-1650)	2649
Age 6-11 years	11-12	231 (213-251)	222 (201-243)	309 (268-371)	474 (379-567)	584 (515-702)	396
Age 6-11 years	13-14	179 (164-196)	175 (153-196)	242 (215-289)	354 (316-373)	456 (366-659)	399
Age 12-19 years	11-12	225 (205-248)	205 (180-242)	307 (266-368)	733 (454-877)	966 (733-1150)	389
Age 12-19 years	13-14	156 (140-173)	136 (120-152)	208 (191-245)	416 (313-661)	767 (502-1270)	449
Age 20+ years	11-12	286 (266-309)	211 (195-229)	484 (420-615)	1630 (1320-1820)	2230 (2000-2630)	1705
Age 20+ years	13-14	222 (205-241)	173 (157-188)	355 (315-417)	1070 (845-1270)	1610 (1350-1810)	1801
Males	11-12	262 (233-296)	201 (183-228)	439 (342-576)	1320 (1060-1630)	2040 (1710-2200)	1257
Males	13-14	202 (186-218)	163 (152-182)	323 (292-364)	806 (626-1100)	1300 (1000-1680)	1314
Females	11-12	284 (255-316)	218 (199-242)	439 (338-527)	1370 (920-1820)	2220 (1820-2570)	1233
Females	13-14	217 (197-238)	172 (155-185)	316 (261-386)	1070 (845-1260)	1550 (1320-1810)	1335
Mexican Americans	11-12	267 (222-322)	221 (183-264)	440 (283-647)	1020 (515-1500)	1350 (937-2460)	317
Mexican Americans	13-14	176 (163-191)	149 (137-167)	261 (220-321)	468 (377-710)	832 (474-1230)	450
Non-Hispanic blacks	11-12	266 (241-294)	228 (203-244)	461 (339-619)	971 (841-1090)	1460 (1090-1930)	664
Non-Hispanic blacks	13-14	231 (206-260)	178 (155-225)	451 (383-576)	1110 (892-1160)	1460 (1190-1520)	578
Non-Hispanic whites	11-12	276 (260-293)	208 (189-228)	445 (374-501)	1600 (1310-1820)	2220 (1950-2630)	812
Non-Hispanic whites	13-14	217 (197-240)	172 (154-188)	325 (278-394)	1070 (785-1320)	1640 (1340-1860)	978
All Hispanics	11-12	281 (248-319)	225 (199-255)	445 (337-553)	1110 (642-1460)	1550 (1170-2180)	573
All Hispanics	13-14	182 (165-200)	159 (141-177)	265 (220-323)	512 (424-724)	943 (752-1220)	698
Asians	11-12	207 (174-246)	185 (156-233)	299 (262-351)	532 (401-828)	996 (643-1420)	352
Asians	13-14	162 (136-192)	150 (120-178)	238 (189-336)	435 (290-755)	755 (414-847)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Fluorene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 3-Hydroxyfluorene (2011 - 2014)

CAS Number 6344-67-8

Metabolite of Flourene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	93.6 (85.2-103)	77.0 (70.0-85.0)	195 (166-226)	688 (505-851)	1240 (946-1690)	2488
Total population	13-14	79.9 (72.5-88.0)	69.0 (61.0-74.0)	166 (143-207)	577 (479-675)	1010 (782-1300)	2650
Age 6-11 years	11-12	69.9 (63.1-77.3)	77.0 (66.0-91.0)	132 (118-145)	203 (178-229)	244 (224-270)	397
Age 6-11 years	13-14	57.7 (51.9-64.3)	58.0 (51.0-63.0)	98.0 (85.0-115)	177 (149-227)	266 (215-394)	399
Age 12-19 years	11-12	91.7 (77.7-108)	86.0 (73.0-109)	182 (153-208)	398 (269-681)	801 (473-1050)	389
Age 12-19 years	13-14	79.9 (65.4-97.7)	76.0 (59.0-99.0)	154 (123-183)	337 (220-564)	611 (337-1000)	449
Age 20+ years	11-12	97.0 (87.0-108)	76.0 (67.0-85.0)	221 (172-271)	809 (614-968)	1410 (1090-1810)	1702
Age 20+ years	13-14	82.6 (74.0-92.3)	69.0 (60.0-75.0)	186 (149-242)	660 (532-782)	1210 (941-1440)	1802
Males	11-12	112 (95.1-132)	92.0 (78.0-108)	225 (167-302)	857 (517-1030)	1630 (969-1990)	1257
Males	13-14	93.6 (84.4-104)	79.0 (72.0-87.0)	187 (157-242)	613 (480-774)	1070 (767-1450)	1315
Females	11-12	78.8 (68.1-91.1)	66.0 (58.0-76.0)	166 (135-205)	556 (399-715)	1030 (804-1340)	1231
Females	13-14	68.5 (61.6-76.3)	56.0 (50.0-65.0)	142 (116-185)	532 (393-666)	999 (680-1320)	1335
Mexican Americans	11-12	86.4 (64.9-115)	75.0 (58.0-95.0)	176 (114-289)	426 (229-949)	835 (311-1640)	315
Mexican Americans	13-14	62.4 (57.6-67.5)	59.0 (52.0-69.0)	116 (98.0-132)	213 (193-283)	422 (247-544)	450
Non-Hispanic blacks	11-12	143 (128-159)	122 (109-137)	281 (220-335)	879 (639-1140)	1600 (1190-1980)	663
Non-Hispanic blacks	13-14	155 (133-181)	122 (99.0-152)	369 (283-522)	1250 (716-1820)	1940 (1390-2430)	578
Non-Hispanic whites	11-12	88.9 (82.3-96.0)	70.0 (63.0-78.0)	183 (155-223)	700 (515-837)	1220 (857-1930)	813
Non-Hispanic whites	13-14	77.2 (67.4-88.4)	63.0 (57.0-73.0)	170 (132-226)	583 (464-760)	1010 (767-1320)	979
All Hispanics	11-12	92.6 (75.9-113)	77.0 (68.0-97.0)	199 (148-258)	473 (300-835)	946 (543-1330)	571
All Hispanics	13-14	66.6 (59.4-74.8)	62.0 (53.0-75.0)	118 (102-137)	283 (182-497)	561 (293-804)	698
Asians	11-12	57.8 (47.9-69.8)	49.0 (41.0-64.0)	126 (96.0-151)	230 (184-373)	555 (295-781)	352
Asians	13-14	43.0 (34.1-54.1)	42.0 (33.0-50.0)	74.0 (56.0-103)	156 (102-317)	317 (156-618)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 10.0 and 8.00 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Fluorene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 3-Hydroxyfluorene (creatinine corrected) (2011 - 2014)

CAS Number 6344-67-8

Metabolite of Flourene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	107 (99.8-114)	80.6 (76.7-83.3)	185 (155-225)	753 (588-826)	1170 (1040-1330)	2486
Total population	13-14	92.6 (85.1-101)	69.9 (65.0-76.5)	155 (131-184)	563 (452-680)	933 (881-1080)	2649
Age 6-11 years	11-12	100 (90.6-111)	93.3 (86.2-106)	138 (120-168)	210 (176-256)	281 (220-349)	396
Age 6-11 years	13-14	86.6 (77.8-96.5)	84.7 (69.7-98.8)	120 (105-149)	182 (162-218)	277 (193-327)	399
Age 12-19 years	11-12	88.6 (78.9-99.5)	79.4 (70.0-88.4)	122 (109-173)	273 (223-392)	519 (329-698)	389
Age 12-19 years	13-14	72.4 (65.6-80.0)	63.6 (49.4-72.1)	103 (91.7-121)	241 (173-426)	501 (266-778)	449
Age 20+ years	11-12	110 (102-119)	78.3 (73.1-83.1)	220 (177-262)	832 (754-1030)	1230 (1100-1530)	1701
Age 20+ years	13-14	96.7 (87.9-106)	69.8 (64.0-77.3)	176 (143-236)	662 (531-825)	1060 (921-1140)	1801
Males	11-12	105 (90.1-122)	78.7 (70.5-86.7)	195 (137-279)	754 (493-1010)	1200 (894-1470)	1256
Males	13-14	93.7 (85.2-103)	72.7 (65.0-81.0)	166 (134-204)	519 (385-691)	933 (676-1120)	1314
Females	11-12	108 (94.7-123)	81.8 (75.0-88.9)	181 (144-235)	702 (439-964)	1130 (960-1380)	1230
Females	13-14	91.5 (82.7-101)	68.6 (63.8-74.3)	140 (117-176)	602 (467-706)	937 (882-1140)	1335
Mexican Americans	11-12	96.7 (77.8-120)	78.0 (63.7-91.3)	149 (121-220)	535 (219-765)	765 (510-1110)	315
Mexican Americans	13-14	71.5 (64.2-79.6)	59.6 (53.9-64.4)	112 (91.6-134)	252 (163-363)	439 (271-563)	450
Non-Hispanic blacks	11-12	111 (101-121)	86.8 (81.3-95.1)	217 (183-267)	610 (456-758)	932 (753-1100)	663
Non-Hispanic blacks	13-14	119 (104-136)	87.9 (71.7-101)	262 (180-402)	837 (643-930)	1100 (942-1240)	578
Non-Hispanic whites	11-12	108 (102-114)	80.0 (75.0-85.4)	199 (163-230)	822 (644-1040)	1230 (1100-1560)	811
Non-Hispanic whites	13-14	95.5 (85.3-107)	71.4 (64.7-79.1)	162 (126-214)	611 (452-825)	1060 (891-1200)	978
All Hispanics	11-12	103 (89.2-120)	82.9 (73.1-94.6)	163 (130-219)	554 (301-749)	839 (610-1110)	571
All Hispanics	13-14	74.6 (66.6-83.5)	60.8 (55.4-71.1)	115 (97.6-133)	295 (188-395)	563 (358-871)	698
Asians	11-12	77.5 (65.6-91.5)	71.0 (60.6-77.8)	114 (93.8-143)	236 (178-363)	474 (317-694)	352
Asians	13-14	67.4 (57.2-79.5)	57.1 (52.6-68.4)	109 (77.8-155)	211 (151-336)	345 (212-643)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Fluorene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 9-Hydroxyfluorene (2011 - 2012)

CAS Number 1689-64-1

Metabolite of Flourene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	245 (226-265)	244 (226-259)	501 (447-560)	1080 (934-1190)	1550 (1310-1840)	2491
Age 6-11 years	11-12	147 (124-176)	140 (119-161)	308 (235-441)	661 (471-845)	1030 (684-1350)	397
Age 12-19 years	11-12	210 (176-249)	213 (163-270)	428 (318-576)	796 (619-961)	1010 (856-1340)	388
Age 20+ years	11-12	265 (244-287)	257 (236-284)	537 (472-613)	1180 (1040-1310)	1700 (1330-2140)	1706
Males	11-12	278 (254-304)	270 (248-296)	566 (481-672)	1150 (978-1310)	1650 (1310-2280)	1258
Females	11-12	217 (193-244)	212 (187-243)	438 (386-511)	966 (786-1220)	1440 (1140-1860)	1233
Mexican Americans	11-12	204 (155-268)	194 (152-228)	391 (277-508)	853 (528-1620)	1650 (538-14400)	317
Non-Hispanic blacks	11-12	356 (311-406)	357 (310-398)	677 (579-847)	1350 (1030-1660)	1940 (1570-2420)	664
Non-Hispanic whites	11-12	238 (219-260)	244 (221-262)	492 (436-564)	1070 (886-1190)	1400 (1230-1710)	814
All Hispanics	11-12	225 (190-267)	208 (184-239)	455 (373-528)	914 (719-1310)	1560 (940-2090)	572
Asians	11-12	168 (135-209)	164 (127-197)	304 (230-427)	762 (469-988)	1200 (790-1820)	352

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 10.0.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Fluorene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 9-Hydroxyfluorene (creatinine corrected) (2011 - 2012)

CAS Number 1689-64-1

Metabolite of Flourene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	279 (261-298)	248 (229-270)	490 (431-544)	934 (875-1010)	1370 (1140-1660)	2489
Age 6-11 years	11-12	212 (183-247)	191 (163-225)	328 (274-365)	544 (413-928)	1000 (688-1450)	396
Age 12-19 years	11-12	203 (182-225)	188 (173-207)	323 (273-380)	538 (430-644)	804 (595-876)	388
Age 20+ years	11-12	301 (279-325)	271 (244-301)	561 (480-620)	1030 (918-1140)	1480 (1180-2010)	1705
Males	11-12	260 (241-281)	226 (205-251)	450 (395-540)	908 (794-1010)	1260 (1000-1650)	1257
Females	11-12	297 (269-329)	270 (229-322)	505 (436-581)	984 (914-1100)	1480 (1140-1850)	1232
Mexican Americans	11-12	229 (186-283)	187 (162-235)	376 (311-430)	750 (430-1630)	1480 (511-5650)	317
Non-Hispanic blacks	11-12	277 (244-314)	256 (231-294)	447 (399-540)	823 (640-1040)	1240 (918-1460)	664
Non-Hispanic whites	11-12	290 (268-314)	257 (227-290)	542 (451-614)	961 (875-1080)	1350 (1130-1660)	812
All Hispanics	11-12	252 (217-293)	220 (186-267)	415 (343-492)	1000 (520-1330)	1390 (787-3250)	572
Asians	11-12	224 (188-268)	200 (166-273)	381 (310-451)	647 (500-865)	914 (697-1430)	352

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Fluorene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 1-Hydroxyphenanthrene (2011 - 2014)

CAS Number 2433-56-9

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	126 (117-135)	126 (115-134)	240 (219-254)	426 (365-463)	565 (493-682)	2492
Total population	13-14	93.0 (87.9-98.4)	92.0 (86.0-100)	173 (159-188)	296 (270-323)	426 (374-490)	2650
Age 6-11 years	11-12	98.6 (87.8-111)	100 (89.0-115)	199 (144-240)	323 (270-405)	473 (327-549)	397
Age 6-11 years	13-14	68.2 (59.9-77.7)	68.0 (58.0-77.0)	125 (107-151)	208 (166-277)	302 (219-449)	399
Age 12-19 years	11-12	119 (103-138)	132 (108-157)	219 (192-252)	332 (284-365)	438 (344-505)	389
Age 12-19 years	13-14	92.9 (78.1-110)	99.0 (77.0-132)	179 (147-211)	291 (243-356)	381 (320-422)	449
Age 20+ years	11-12	130 (121-140)	128 (119-138)	248 (221-270)	450 (372-499)	589 (495-759)	1706
Age 20+ years	13-14	96.1 (90.6-102)	94.0 (87.0-103)	179 (160-196)	311 (272-344)	454 (377-533)	1802
Males	11-12	133 (121-146)	132 (115-149)	246 (221-271)	434 (365-476)	589 (466-781)	1258
Males	13-14	97.5 (91.3-104)	96.0 (88.0-105)	175 (154-204)	298 (264-339)	440 (361-545)	1315
Females	11-12	119 (109-131)	117 (107-128)	232 (212-249)	408 (334-471)	557 (465-682)	1234
Females	13-14	88.8 (82.6-95.5)	91.0 (78.0-100)	171 (161-182)	296 (257-347)	395 (354-488)	1335
Mexican Americans	11-12	115 (91.3-146)	112 (94.0-131)	214 (156-260)	371 (260-572)	572 (284-1390)	317
Mexican Americans	13-14	80.2 (73.9-86.9)	82.0 (75.0-91.0)	136 (124-155)	239 (178-274)	293 (253-361)	450
Non-Hispanic blacks	11-12	141 (129-155)	140 (129-156)	244 (221-268)	439 (366-503)	609 (495-849)	664
Non-Hispanic blacks	13-14	118 (104-135)	116 (98.0-137)	215 (182-241)	366 (285-412)	480 (372-589)	578
Non-Hispanic whites	11-12	126 (117-136)	128 (114-141)	245 (219-261)	428 (352-475)	557 (456-733)	814
Non-Hispanic whites	13-14	94.0 (87.2-101)	94.0 (83.0-103)	179 (159-196)	317 (272-360)	475 (384-550)	979
All Hispanics	11-12	125 (108-146)	123 (105-138)	239 (207-260)	391 (321-502)	544 (439-826)	573
All Hispanics	13-14	84.7 (77.5-92.7)	86.0 (75.0-99.0)	146 (131-169)	245 (208-286)	310 (275-349)	698
Asians	11-12	91.3 (75.3-111)	88.0 (65.0-114)	173 (134-238)	303 (260-387)	447 (315-597)	352
Asians	13-14	59.8 (48.9-73.2)	62.0 (50.0-69.0)	105 (81.0-130)	178 (118-296)	274 (155-403)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 10.0 and 9.00 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 1-Hydroxyphenanthrene (creatinine corrected) (2011 - 2014)

CAS Number 2433-56-9

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	143 (134-153)	134 (126-143)	218 (200-247)	357 (320-410)	519 (473-554)	2490
Total population	13-14	108 (103-113)	104 (97.1-110)	164 (157-170)	260 (242-273)	355 (320-379)	2649
Age 6-11 years	11-12	142 (131-155)	137 (123-150)	206 (175-217)	292 (255-363)	450 (272-678)	396
Age 6-11 years	13-14	102 (91.2-115)	102 (87.1-122)	136 (127-164)	225 (185-267)	302 (252-336)	399
Age 12-19 years	11-12	115 (101-132)	117 (87.0-144)	172 (153-213)	254 (215-303)	310 (254-359)	389
Age 12-19 years	13-14	84.2 (79.0-89.7)	85.7 (76.1-93.0)	127 (111-139)	179 (153-214)	226 (189-320)	449
Age 20+ years	11-12	148 (138-159)	137 (128-146)	232 (206-260)	377 (337-459)	543 (500-583)	1705
Age 20+ years	13-14	113 (108-118)	108 (103-115)	171 (164-184)	268 (255-286)	364 (336-389)	1801
Males	11-12	125 (118-132)	117 (107-124)	188 (172-207)	297 (272-360)	437 (364-522)	1257
Males	13-14	97.8 (92.4-104)	94.1 (88.6-101)	148 (139-157)	235 (212-250)	289 (264-346)	1314
Females	11-12	163 (148-180)	152 (138-175)	250 (217-281)	406 (340-494)	549 (500-664)	1233
Females	13-14	119 (112-126)	116 (106-123)	182 (168-196)	286 (256-316)	387 (323-482)	1335
Mexican Americans	11-12	130 (111-152)	117 (102-133)	191 (148-235)	373 (231-676)	497 (337-837)	317
Mexican Americans	13-14	91.9 (84.5-99.9)	90.1 (77.4-102)	139 (126-156)	225 (179-258)	265 (236-318)	450
Non-Hispanic blacks	11-12	110 (100-121)	110 (96.1-122)	168 (147-197)	273 (238-319)	387 (322-453)	664
Non-Hispanic blacks	13-14	90.2 (81.0-100)	92.4 (78.8-105)	141 (122-170)	216 (189-253)	280 (251-358)	578
Non-Hispanic whites	11-12	154 (143-165)	143 (133-154)	234 (207-265)	368 (335-450)	543 (478-593)	812
Non-Hispanic whites	13-14	116 (111-123)	112 (103-118)	170 (163-187)	281 (261-303)	379 (325-467)	978
All Hispanics	11-12	140 (125-157)	128 (117-141)	214 (184-244)	357 (274-481)	504 (383-792)	573
All Hispanics	13-14	94.8 (87.4-103)	93.0 (81.7-102)	140 (128-159)	226 (203-246)	265 (246-318)	698
Asians	11-12	122 (106-141)	119 (100-136)	191 (165-222)	286 (260-341)	429 (336-571)	352
Asians	13-14	93.8 (78.4-112)	90.0 (75.9-115)	151 (124-184)	226 (176-298)	298 (226-376)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2-Hydroxyphenanthrene (2011 - 2012)

CAS Number 605-55-0

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	60.8 (56.8-65.2)	60.0 (56.0-65.0)	113 (105-123)	214 (187-242)	288 (263-317)	2489
Age 6-11 years	11-12	39.6 (34.3-45.6)	39.0 (33.0-46.0)	78.0 (61.0-96.0)	133 (109-153)	173 (133-237)	397
Age 12-19 years	11-12	56.5 (49.8-64.1)	62.0 (53.0-70.0)	105 (88.0-114)	162 (134-183)	212 (169-248)	389
Age 20+ years	11-12	64.5 (60.0-69.4)	64.0 (57.0-68.0)	121 (107-132)	233 (198-263)	311 (271-340)	1703
Males	11-12	70.3 (63.9-77.4)	69.0 (63.0-77.0)	130 (115-143)	246 (198-288)	339 (277-384)	1257
Females	11-12	53.0 (48.7-57.5)	52.0 (50.0-56.0)	100 (89.0-109)	184 (158-210)	259 (216-282)	1232
Mexican Americans	11-12	56.3 (43.9-72.1)	56.0 (46.0-69.0)	97.0 (79.0-140)	180 (128-276)	276 (175-508)	317
Non-Hispanic blacks	11-12	78.9 (72.3-86.2)	75.0 (68.0-81.0)	145 (122-166)	246 (212-297)	368 (286-436)	663
Non-Hispanic whites	11-12	58.3 (54.7-62.2)	58.0 (53.0-64.0)	109 (100-121)	204 (169-243)	282 (247-312)	812
All Hispanics	11-12	62.2 (52.7-73.4)	62.0 (53.0-75.0)	112 (99.0-134)	202 (175-248)	268 (214-416)	573
Asians	11-12	50.3 (40.5-62.4)	50.0 (39.0-58.0)	96.0 (78.0-118)	187 (126-240)	257 (193-338)	352

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 10.0.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2-Hydroxyphenanthrene (creatinine corrected) (2011 - 2012)

CAS Number 605-55-0

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	69.2 (65.5-73.1)	62.2 (59.1-66.9)	106 (97.4-116)	182 (167-202)	248 (218-293)	2487
Age 6-11 years	11-12	56.8 (50.8-63.6)	54.7 (48.8-60.0)	78.9 (68.8-95.3)	121 (105-148)	180 (131-200)	396
Age 12-19 years	11-12	54.6 (49.9-59.6)	52.4 (44.9-64.0)	81.4 (70.8-92.6)	112 (103-147)	163 (121-203)	389
Age 20+ years	11-12	73.3 (69.2-77.7)	65.3 (60.9-70.0)	116 (105-127)	200 (178-215)	280 (221-336)	1702
Males	11-12	65.9 (61.8-70.3)	58.2 (54.6-61.2)	104 (96.9-113)	181 (159-202)	248 (192-385)	1256
Females	11-12	72.5 (66.9-78.6)	67.9 (62.7-73.4)	108 (94.7-125)	187 (165-206)	248 (213-293)	1231
Mexican Americans	11-12	63.3 (53.1-75.4)	55.2 (47.3-66.7)	93.2 (78.0-108)	173 (116-237)	243 (166-600)	317
Non-Hispanic blacks	11-12	61.4 (56.1-67.1)	59.2 (52.6-65.4)	90.8 (84.4-98.9)	162 (124-192)	227 (187-272)	663
Non-Hispanic whites	11-12	70.9 (67.0-74.9)	64.0 (59.3-68.8)	110 (101-120)	187 (167-203)	248 (206-293)	810
All Hispanics	11-12	69.6 (61.1-79.3)	61.2 (53.1-70.4)	104 (91.3-123)	180 (144-237)	256 (202-455)	573
Asians	11-12	67.4 (56.5-80.3)	65.2 (50.0-82.4)	105 (88.6-130)	162 (140-200)	231 (171-313)	352

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 3-Hydroxyphenanthrene (2011 - 2012)

CAS Number 605-87-8

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	61.9 (57.2-67.0)	62.0 (57.0-66.0)	127 (115-136)	235 (201-280)	377 (289-479)	2491
Age 6-11 years	11-12	55.3 (48.4-63.2)	60.0 (48.0-73.0)	104 (92.0-122)	192 (169-248)	287 (214-413)	397
Age 12-19 years	11-12	63.6 (55.1-73.5)	65.0 (57.0-76.0)	125 (115-144)	198 (169-235)	296 (200-389)	389
Age 20+ years	11-12	62.4 (57.2-68.1)	61.0 (54.0-67.0)	130 (111-144)	251 (206-296)	413 (295-499)	1705
Males	11-12	72.3 (63.9-81.7)	68.0 (60.0-78.0)	145 (127-168)	273 (205-392)	475 (296-651)	1258
Females	11-12	53.4 (48.3-59.0)	55.0 (48.0-59.0)	105 (93.0-126)	207 (175-235)	297 (251-364)	1233
Mexican Americans	11-12	54.8 (42.1-71.2)	54.0 (46.0-69.0)	103 (79.0-139)	197 (128-364)	308 (139-1270)	317
Non-Hispanic blacks	11-12	92.6 (84.3-102)	98.0 (84.0-105)	185 (164-202)	348 (261-441)	519 (428-611)	664
Non-Hispanic whites	11-12	58.2 (54.3-62.4)	58.0 (50.0-64.0)	119 (102-132)	221 (184-265)	325 (265-475)	813
All Hispanics	11-12	61.3 (51.2-73.3)	61.0 (54.0-72.0)	123 (101-149)	230 (172-308)	377 (244-452)	573
Asians	11-12	50.0 (39.8-62.9)	47.0 (37.0-59.0)	106 (69.0-141)	213 (136-278)	282 (215-400)	352

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 10.0.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 3-Hydroxyphenanthrene (creatinine corrected) (2011 - 2012)

CAS Number 605-87-8

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	70.5 (66.7-74.6)	62.6 (58.5-67.3)	118 (104-128)	226 (201-247)	325 (271-366)	2489
Age 6-11 years	11-12	79.6 (71.8-88.3)	73.9 (65.0-84.2)	116 (100-131)	170 (140-220)	238 (168-383)	396
Age 12-19 years	11-12	61.5 (56.0-67.6)	55.7 (47.0-69.0)	89.0 (83.2-101)	150 (121-196)	229 (173-243)	389
Age 20+ years	11-12	71 (66.9-75.4)	61.6 (58.3-67.0)	123 (110-139)	246 (209-258)	334 (278-409)	1704
Males	11-12	67.8 (61.9-74.2)	60.4 (52.2-68.5)	117 (99.1-130)	222 (188-246)	320 (243-474)	1257
Females	11-12	73.2 (67.0-80.0)	64.2 (59.7-72.1)	120 (99.2-138)	238 (187-271)	325 (276-362)	1232
Mexican Americans	11-12	61.6 (50.6-75.0)	54.2 (44.9-66.7)	91.4 (75.2-118)	204 (110-343)	303 (195-556)	317
Non-Hispanic blacks	11-12	72.1 (66.5-78.1)	68.3 (60.5-77.5)	117 (106-134)	202 (163-245)	311 (239-388)	664
Non-Hispanic whites	11-12	70.8 (66.7-75.2)	62.0 (56.8-67.4)	121 (105-131)	238 (200-254)	325 (258-383)	811
All Hispanics	11-12	68.6 (60.2-78.1)	61.8 (54.3-73.2)	104 (88.1-126)	206 (150-291)	343 (225-500)	573
Asians	11-12	67 (55.6-80.7)	60.8 (50.5-79.6)	107 (82.1-144)	178 (150-206)	255 (184-354)	352

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2- & 3-Hydroxyphenanthrene (2013 - 2014)

CAS Number 605-55-0

Metabolites of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	115 (108-123)	112 (104-120)	214 (193-232)	389 (350-432)	544 (493-613)	2650
Age 6-11 years	13-14	90.4 (80.7-101)	85.0 (76.0-95.0)	166 (126-188)	262 (222-349)	378 (266-619)	399
Age 12-19 years	13-14	122 (101-149)	137 (100-168)	231 (184-285)	351 (298-450)	536 (358-614)	449
Age 20+ years	13-14	117 (109-125)	113 (103-123)	218 (195-237)	409 (361-467)	554 (503-673)	1802
Males	13-14	129 (120-139)	128 (116-138)	230 (200-252)	426 (361-502)	593 (502-713)	1315
Females	13-14	102 (94.6-111)	98.0 (86.0-109)	197 (181-219)	355 (312-409)	498 (416-599)	1335
Mexican Americans	13-14	96.4 (90.4-103)	97.0 (88.0-109)	170 (149-191)	272 (238-311)	347 (290-426)	450
Non-Hispanic blacks	13-14	180 (162-201)	164 (145-188)	331 (270-396)	566 (476-687)	742 (632-1040)	578
Non-Hispanic whites	13-14	111 (102-121)	107 (94.0-121)	214 (188-234)	386 (338-446)	544 (477-628)	979
All Hispanics	13-14	102 (93.3-111)	102 (92.0-115)	180 (151-204)	289 (248-321)	369 (321-426)	698
Asians	13-14	88.4 (71.2-110)	81.0 (70.0-110)	148 (118-178)	236 (170-499)	493 (216-749)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 10.0.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2- & 3-Hydroxyphenanthrene (creatinine corrected) (2013 - 2014)

CAS Number 605-55-0

Metabolites of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	133 (127-140)	126 (119-133)	197 (188-210)	333 (303-375)	458 (424-507)	2649
Age 6-11 years	13-14	136 (123-150)	133 (116-152)	188 (164-205)	316 (241-375)	422 (358-435)	399
Age 12-19 years	13-14	111 (101-122)	100 (91.4-109)	158 (138-172)	253 (194-340)	373 (294-454)	449
Age 20+ years	13-14	137 (130-144)	129 (123-137)	206 (195-217)	348 (309-386)	484 (431-525)	1801
Males	13-14	130 (122-137)	123 (113-134)	193 (184-209)	324 (272-369)	439 (386-507)	1314
Females	13-14	137 (128-146)	128 (120-140)	202 (190-214)	345 (305-406)	482 (420-557)	1335
Mexican Americans	13-14	110 (102-120)	104 (94.0-112)	166 (147-188)	241 (211-310)	364 (265-452)	450
Non-Hispanic blacks	13-14	138 (125-152)	131 (113-148)	208 (183-245)	363 (294-427)	477 (406-543)	578
Non-Hispanic whites	13-14	137 (129-147)	130 (123-141)	202 (188-216)	359 (309-413)	483 (431-514)	978
All Hispanics	13-14	114 (105-123)	107 (96.9-117)	171 (151-190)	255 (231-299)	333 (304-391)	698
Asians	13-14	139 (115-167)	139 (118-161)	206 (170-246)	296 (226-458)	458 (275-616)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 4-Hydroxyphenanthrene (2011 - 2012)

CAS Number 7657-86-7

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	20.5 (19.3-21.8)	19.0 (18.0-21.0)	36.0 (34.0-40.0)	74.0 (62.0-82.0)	99.0 (88.0-114)	2487
Age 6-11 years	11-12	17.1 (15.6-18.8)	16.0 (13.0-19.0)	32.0 (25.0-37.0)	54.0 (46.0-59.0)	72.0 (56.0-96.0)	397
Age 12-19 years	11-12	20.4 (18.1-23.0)	18.0 (17.0-23.0)	34.0 (31.0-42.0)	57.0 (47.0-75.0)	84.0 (57.0-120)	389
Age 20+ years	11-12	21.0 (19.6-22.4)	20.0 (18.0-21.0)	38.0 (35.0-42.0)	78.0 (69.0-87.0)	101 (89.0-128)	1701
Males	11-12	21.6 (19.8-23.7)	22.0 (18.0-24.0)	38.0 (34.0-43.0)	74.0 (63.0-83.0)	99.0 (85.0-124)	1255
Females	11-12	19.5 (18.1-21.1)	18.0 (16.0-19.0)	36.0 (33.0-40.0)	74.0 (59.0-82.0)	98.0 (87.0-114)	1232
Mexican Americans	11-12	19.7 (16.2-24.0)	18.0 (15.0-22.0)	34.0 (27.0-45.0)	65.0 (40.0-96.0)	91.0 (53.0-130)	317
Non-Hispanic blacks	11-12	28.4 (26.0-31.0)	28.0 (25.0-31.0)	50.0 (44.0-57.0)	90.0 (75.0-109)	122 (103-136)	662
Non-Hispanic whites	11-12	19.4 (18.3-20.5)	18.0 (16.0-20.0)	35.0 (32.0-38.0)	73.0 (57.0-81.0)	94.0 (82.0-114)	812
All Hispanics	11-12	21.0 (18.5-23.8)	20.0 (17.0-23.0)	38.0 (32.0-46.0)	68.0 (52.0-88.0)	91.0 (69.0-122)	573
Asians	11-12	16.8 (14.7-19.1)	15.0 (13.0-17.0)	30.0 (25.0-33.0)	55.0 (37.0-86.0)	91.0 (53.0-110)	351

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 10.0.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 4-Hydroxyphenanthrene (creatinine corrected) (2011 - 2012)

CAS Number 7657-86-7

Metabolite of Phenanthrene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	23.3 (22.4-24.2)	22.0 (20.9-22.9)	36.9 (33.8-40.0)	65.0 (60.0-76.3)	106 (85.9-121)	2485
Age 6-11 years	11-12	24.4 (22.1-26.9)	23.7 (21.5-25.9)	36.2 (31.9-39.1)	55.0 (47.9-69.7)	78.9 (57.1-126)	396
Age 12-19 years	11-12	19.7 (17.7-21.9)	19.7 (17.2-21.7)	28.4 (26.3-34.7)	46.6 (38.5-57.9)	64.9 (46.1-78.9)	389
Age 20+ years	11-12	23.8 (22.6-25.0)	22.1 (20.9-23.3)	38.4 (34.2-43.8)	70.5 (60.0-88.8)	115 (91.4-136)	1700
Males	11-12	20.3 (19.3-21.4)	19.4 (18.5-20.6)	31.4 (28.4-35.4)	57.7 (53.3-63.8)	79.6 (63.8-111)	1254
Females	11-12	26.6 (24.9-28.5)	24.5 (22.9-26.2)	41.8 (37.4-46.6)	78.9 (66.7-88.8)	117 (95.7-142)	1231
Mexican Americans	11-12	22.2 (19.1-25.8)	20.9 (19.2-23.6)	35.5 (29.6-42.1)	59.7 (43.2-67.6)	67.6 (48.0-183)	317
Non-Hispanic blacks	11-12	22.1 (20.3-24.0)	21.3 (19.7-23.4)	34.9 (30.8-38.8)	53.5 (49.0-61.3)	74.5 (63.7-84.7)	662
Non-Hispanic whites	11-12	23.5 (22.1-24.9)	22.0 (20.3-23.4)	37.3 (32.3-43.7)	70.5 (60.0-81.6)	111 (88.8-142)	810
All Hispanics	11-12	23.5 (21.2-25.9)	22.9 (20.7-25.5)	37.4 (33.0-41.8)	60.1 (45.5-79.6)	90.7 (60.1-133)	573
Asians	11-12	22.5 (20.2-25.1)	21.5 (17.9-24.5)	34.9 (32.3-40.1)	60.8 (50.5-71.0)	85.1 (64.2-102)	351

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Phenanthrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 1-Hydroxypyrene (2011 - 2014)

CAS Number 5315-79-7

Metabolite of Pyrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	111 (101-123)	113 (99.0-124)	217 (196-254)	437 (373-501)	635 (538-784)	2487
Total population	13-14	132 (124-140)	119 (111-127)	226 (209-235)	433 (381-495)	650 (544-733)	2650
Age 6-11 years	11-12	130 (111-153)	127 (107-160)	252 (202-301)	386 (362-462)	521 (431-693)	397
Age 6-11 years	13-14	131 (118-145)	125 (111-142)	218 (191-259)	376 (276-495)	544 (461-615)	399
Age 12-19 years	11-12	131 (110-156)	141 (117-159)	247 (199-331)	451 (331-547)	555 (454-716)	387
Age 12-19 years	13-14	160 (133-192)	165 (127-191)	276 (225-352)	432 (352-666)	748 (432-849)	449
Age 20+ years	11-12	107 (96.2-119)	104 (95.0-118)	208 (181-244)	443 (373-504)	685 (543-882)	1703
Age 20+ years	13-14	128 (120-137)	113 (105-122)	215 (200-232)	438 (374-497)	656 (514-773)	1802
Males	11-12	122 (107-139)	121 (103-131)	231 (198-276)	494 (380-606)	756 (547-1020)	1255
Males	13-14	134 (124-146)	122 (110-136)	225 (207-244)	450 (363-511)	621 (544-690)	1315
Females	11-12	102 (92.6-113)	104 (92.0-117)	209 (183-243)	384 (340-447)	543 (443-652)	1232
Females	13-14	129 (121-138)	115 (106-125)	226 (206-238)	429 (376-494)	665 (518-773)	1335
Mexican Americans	11-12	127 (104-157)	129 (112-157)	225 (191-262)	435 (262-685)	685 (342-1060)	316
Mexican Americans	13-14	125 (117-133)	121 (112-132)	204 (174-212)	295 (251-386)	428 (348-519)	450
Non-Hispanic blacks	11-12	140 (123-160)	138 (117-168)	292 (246-335)	476 (384-685)	779 (596-1070)	662
Non-Hispanic blacks	13-14	182 (168-198)	170 (150-192)	358 (305-393)	576 (484-690)	836 (633-1020)	578
Non-Hispanic whites	11-12	104 (94.6-113)	102 (94.0-116)	199 (176-231)	447 (349-513)	606 (504-803)	812
Non-Hispanic whites	13-14	128 (118-138)	111 (101-124)	222 (194-237)	450 (374-511)	656 (544-773)	979
All Hispanics	11-12	131 (114-152)	136 (119-156)	248 (209-279)	416 (329-501)	654 (440-873)	572
All Hispanics	13-14	129 (120-139)	124 (114-141)	209 (196-225)	328 (276-398)	450 (398-556)	698
Asians	11-12	85.6 (72.3-101)	78.0 (65.0-94.0)	175 (124-218)	301 (243-359)	373 (325-571)	352
Asians	13-14	93.2 (83.6-104)	83.0 (72.0-101)	137 (120-146)	227 (166-310)	312 (263-426)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 10.0 and 70.0 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Pyrene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 1-Hydroxypyrene (creatinine corrected) (2011 - 2014)

CAS Number 5315-79-7

Metabolite of Pyrene

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	127 (119-137)	119 (110-128)	215 (193-241)	395 (356-449)	542 (464-703)	2485
Total population	13-14	153 (145-162)	146 (137-155)	245 (226-263)	400 (377-441)	549 (503-570)	2649
Age 6-11 years	11-12	187 (165-212)	181 (153-213)	276 (232-317)	415 (356-477)	500 (450-671)	396
Age 6-11 years	13-14	197 (175-222)	190 (160-236)	303 (261-345)	443 (374-491)	538 (456-654)	399
Age 12-19 years	11-12	126 (110-144)	121 (102-143)	194 (156-256)	313 (252-396)	409 (325-480)	387
Age 12-19 years	13-14	145 (131-159)	140 (114-152)	215 (177-245)	378 (253-550)	550 (380-571)	449
Age 20+ years	11-12	122 (114-131)	112 (103-122)	207 (189-227)	411 (356-464)	589 (466-793)	1702
Age 20+ years	13-14	150 (142-159)	143 (132-154)	243 (225-263)	399 (379-440)	543 (503-593)	1801
Males	11-12	114 (103-127)	106 (95.0-115)	196 (170-230)	378 (296-452)	506 (394-804)	1254
Males	13-14	135 (126-144)	128 (117-138)	222 (198-238)	372 (344-405)	520 (476-570)	1314
Females	11-12	141 (130-154)	133 (124-143)	232 (209-262)	422 (364-464)	589 (464-748)	1231
Females	13-14	173 (161-185)	165 (151-182)	263 (242-291)	422 (380-484)	554 (491-625)	1335
Mexican Americans	11-12	143 (123-166)	136 (116-153)	225 (176-270)	385 (267-525)	512 (374-829)	316
Mexican Americans	13-14	143 (131-156)	136 (119-155)	212 (188-249)	327 (271-413)	447 (337-549)	450
Non-Hispanic blacks	11-12	109 (94.8-126)	114 (95.2-138)	191 (166-233)	330 (276-396)	453 (411-556)	662
Non-Hispanic blacks	13-14	139 (125-156)	138 (115-157)	236 (200-287)	411 (354-479)	531 (493-634)	578
Non-Hispanic whites	11-12	127 (117-138)	113 (104-126)	218 (192-249)	415 (356-465)	580 (464-793)	810
Non-Hispanic whites	13-14	158 (147-170)	150 (137-166)	257 (230-283)	422 (386-469)	554 (507-601)	978
All Hispanics	11-12	147 (133-162)	144 (127-158)	244 (200-262)	395 (295-458)	525 (436-600)	572
All Hispanics	13-14	144 (134-155)	138 (127-151)	219 (198-249)	345 (298-406)	452 (379-517)	698
Asians	11-12	115 (101-130)	113 (96.3-131)	173 (156-191)	263 (228-326)	437 (303-601)	352
Asians	13-14	146 (132-162)	143 (116-165)	219 (189-261)	354 (293-450)	495 (390-618)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Pyrene_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 1-Hydroxynapthalene (1-Naphthol) (2011 - 2014)

CAS Number 90-15-3

Metabolite of Napthalene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.67 (1.52-1.84)	1.41 (1.26-1.59)	3.90 (3.25-5.05)	13.1 (10.9-15.7)	22.1 (19.0-26.6)	2492
Total population	13-14	1.52 (1.37-1.68)	1.16 (1.03-1.28)	3.25 (2.92-3.82)	11.7 (9.55-15.2)	21.3 (17.1-28.7)	2640
Age 6-11 years	11-12	.960 (.803-1.15)	.970 (.727-1.20)	2.01 (1.63-2.51)	4.02 (3.11-7.07)	7.99 (5.05-12.6)	397
Age 6-11 years	13-14	.798 (.694-.917)	.678 (.595-.848)	1.44 (1.21-1.70)	2.98 (2.32-4.05)	5.12 (3.64-9.16)	399
Age 12-19 years	11-12	1.16 (.895-1.50)	1.04 (.843-1.33)	2.34 (1.77-3.34)	8.38 (3.43-15.0)	14.6 (8.38-22.4)	389
Age 12-19 years	13-14	1.06 (.900-1.26)	.894 (.760-1.02)	1.79 (1.43-2.52)	6.62 (3.54-10.4)	10.5 (7.62-18.2)	449
Age 20+ years	11-12	1.88 (1.71-2.06)	1.59 (1.40-1.73)	5.05 (3.98-5.82)	14.7 (12.4-17.9)	23.7 (19.8-34.2)	1706
Age 20+ years	13-14	1.71 (1.52-1.92)	1.29 (1.16-1.44)	3.98 (3.33-4.66)	13.9 (10.9-18.0)	25.4 (18.8-32.6)	1792
Males	11-12	1.89 (1.66-2.15)	1.62 (1.36-1.78)	4.57 (3.25-5.91)	13.5 (10.6-19.0)	22.9 (16.7-36.7)	1258
Males	13-14	1.69 (1.46-1.96)	1.30 (1.19-1.50)	3.37 (2.92-4.31)	12.0 (8.42-17.4)	22.3 (13.8-36.5)	1312
Females	11-12	1.49 (1.20-1.84)	1.21 (.997-1.52)	3.51 (2.67-5.12)	12.9 (8.54-16.4)	21.1 (17.7-24.6)	1234
Females	13-14	1.36 (1.23-1.51)	.989 (.882-1.13)	3.00 (2.30-3.82)	11.0 (9.19-15.1)	20.9 (16.5-27.4)	1328
Mexican Americans	11-12	1.27 (.962-1.68)	1.15 (.805-1.46)	2.92 (1.79-4.58)	7.97 (4.82-13.3)	14.2 (7.97-20.2)	317
Mexican Americans	13-14	.960 (.884-1.04)	.823 (.726-.929)	1.83 (1.44-1.99)	4.12 (2.75-7.50)	9.47 (5.22-15.7)	450
Non-Hispanic blacks	11-12	2.14 (1.85-2.47)	1.78 (1.51-2.01)	5.17 (3.73-6.71)	14.9 (11.2-19.5)	22.8 (16.8-42.9)	664
Non-Hispanic blacks	13-14	2.44 (1.97-3.01)	1.75 (1.51-2.31)	6.40 (4.54-9.08)	19.2 (11.5-23.4)	30.8 (22.7-36.5)	577
Non-Hispanic whites	11-12	1.70 (1.53-1.90)	1.47 (1.28-1.65)	4.20 (3.15-5.43)	13.6 (10.9-17.4)	22.4 (17.7-33.4)	814
Non-Hispanic whites	13-14	1.58 (1.36-1.84)	1.16 (1.00-1.33)	3.36 (2.99-4.16)	13.1 (9.55-17.9)	25.6 (18.0-36.9)	973
All Hispanics	11-12	1.35 (1.12-1.64)	1.13 (.896-1.41)	3.17 (2.39-4.46)	9.30 (6.34-11.6)	16.1 (11.3-20.9)	573
All Hispanics	13-14	1.02 (.922-1.13)	.864 (.784-.940)	1.88 (1.69-2.14)	5.22 (3.21-7.86)	10.6 (6.62-13.1)	696
Asians	11-12	1.29 (1.01-1.66)	1.16 (.885-1.50)	3.00 (2.02-4.61)	8.61 (5.33-11.5)	15.5 (10.6-21.9)	352
Asians	13-14	1.11 (.884-1.40)	.859 (.737-1.01)	1.91 (1.29-3.71)	7.99 (3.48-19.5)	19.5 (6.51-38.6)	290

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.044 and 0.060 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Naphthalene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 1-Hydroxynapthalene (1-Naphthol) (creatinine corrected) (2011 - 2014)

CAS Number 90-15-3

Metabolite of Napthalene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	1.9 (1.73-2.10)	1.51 (1.35-1.67)	4.15 (3.49-5.23)	13.4 (10.4-15.6)	20.4 (15.8-26.7)	2490
Total population	13-14	1.76 (1.61-1.93)	1.28 (1.20-1.35)	3.42 (2.94-4.02)	11.5 (9.43-14.2)	20.8 (18.3-23.9)	2639
Age 6-11 years	11-12	1.38 (1.18-1.61)	1.21 (.971-1.58)	2.36 (1.96-2.83)	4.78 (3.72-6.59)	8.90 (5.68-10.0)	396
Age 6-11 years	13-14	1.2 (1.07-1.34)	1.00 (.892-1.21)	1.83 (1.56-2.28)	3.40 (2.46-5.64)	6.63 (4.14-9.10)	399
Age 12-19 years	11-12	1.12 (.927-1.35)	.936 (.729-1.21)	2.02 (1.43-3.03)	5.22 (3.42-7.72)	8.11 (5.61-17.2)	389
Age 12-19 years	13-14	0.964 (.859-1.08)	.792 (.642-.926)	1.32 (1.12-1.72)	4.46 (2.85-7.92)	8.98 (4.46-19.0)	449
Age 20+ years	11-12	2.14 (1.93-2.36)	1.69 (1.49-1.87)	5.35 (4.44-6.53)	15.3 (13.0-17.5)	22.4 (16.4-38.0)	1705
Age 20+ years	13-14	2 (1.82-2.21)	1.45 (1.33-1.57)	4.31 (3.68-5.10)	13.6 (10.9-16.6)	23.9 (19.3-26.8)	1791
Males	11-12	1.77 (1.53-2.05)	1.43 (1.16-1.69)	3.80 (2.92-5.93)	12.2 (9.34-14.7)	18.8 (14.2-25.5)	1257
Males	13-14	1.7 (1.46-1.98)	1.23 (1.07-1.37)	3.36 (2.63-4.21)	10.5 (7.22-16.0)	19.9 (13.5-25.0)	1311
Females	11-12	2.04 (1.68-2.47)	1.62 (1.30-1.90)	4.42 (3.31-6.05)	15.3 (12.4-18.0)	21.6 (18.0-30.0)	1233
Females	13-14	1.82 (1.66-2.00)	1.33 (1.23-1.41)	3.59 (2.65-4.57)	13.0 (10.2-15.4)	22.7 (18.6-26.6)	1328
Mexican Americans	11-12	1.43 (1.14-1.80)	1.18 (.841-1.71)	3.03 (1.94-4.75)	7.88 (5.68-10.6)	11.8 (8.45-18.9)	317
Mexican Americans	13-14	1.1 (.989-1.22)	.927 (.823-1.06)	1.82 (1.52-2.28)	4.38 (3.41-5.85)	8.82 (5.13-13.0)	450
Non-Hispanic blacks	11-12	1.66 (1.46-1.90)	1.29 (1.11-1.47)	4.01 (3.05-5.22)	10.5 (8.56-12.7)	16.4 (12.2-25.5)	664
Non-Hispanic blacks	13-14	1.86 (1.58-2.19)	1.35 (1.12-1.76)	4.86 (3.53-6.19)	12.3 (10.2-14.4)	17.1 (14.0-19.3)	577
Non-Hispanic whites	11-12	2.07 (1.87-2.30)	1.66 (1.47-1.81)	4.97 (3.58-6.10)	15.0 (12.7-17.5)	22.4 (15.8-39.3)	812
Non-Hispanic whites	13-14	1.96 (1.71-2.24)	1.38 (1.26-1.56)	3.87 (3.02-5.20)	13.8 (9.28-18.8)	23.9 (19.0-31.0)	972
All Hispanics	11-12	1.51 (1.27-1.81)	1.21 (.961-1.59)	3.35 (2.33-4.61)	9.08 (6.82-11.3)	15.1 (10.7-20.1)	573
All Hispanics	13-14	1.14 (1.02-1.28)	.948 (.878-1.05)	1.75 (1.52-2.20)	4.83 (3.41-7.65)	9.16 (5.97-15.2)	696
Asians	11-12	1.73 (1.37-2.20)	1.31 (1.00-1.72)	3.74 (2.64-4.72)	8.92 (6.47-14.1)	22.8 (9.03-56.6)	352
Asians	13-14	1.74 (1.40-2.18)	1.27 (1.02-1.63)	3.62 (2.09-5.47)	7.95 (5.10-24.2)	24.2 (7.39-37.0)	290

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Naphthalene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2-Hydroxynapthalene (2-Naphthol) (2011 - 2014)

CAS Number 135-19-3

Metabolite of Napthalene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.14 (3.73-4.61)	4.18 (3.83-4.76)	9.74 (8.22-10.8)	19.7 (17.7-21.2)	28.1 (24.1-30.3)	2492
Total population	13-14	4.22 (3.95-4.50)	4.11 (3.67-4.61)	9.80 (9.33-10.4)	19.7 (17.9-21.6)	30.0 (28.7-31.1)	2641
Age 6-11 years	11-12	3.13 (2.66-3.69)	3.34 (2.75-4.53)	6.49 (5.77-8.10)	11.9 (11.1-16.5)	20.3 (14.8-26.5)	397
Age 6-11 years	13-14	3.03 (2.57-3.59)	2.97 (2.51-3.62)	5.94 (4.76-7.58)	12.9 (9.34-16.2)	18.6 (13.3-29.0)	399
Age 12-19 years	11-12	4.33 (3.47-5.40)	4.03 (3.18-5.36)	9.34 (7.14-11.7)	20.8 (14.7-26.6)	27.3 (20.8-61.5)	389
Age 12-19 years	13-14	5.09 (4.17-6.23)	5.41 (3.76-7.43)	10.6 (8.67-13.8)	20.6 (15.7-26.2)	28.6 (23.0-31.4)	449
Age 20+ years	11-12	4.25 (3.78-4.77)	4.26 (3.84-4.96)	10.4 (8.45-11.4)	20.0 (17.7-22.2)	28.5 (23.6-31.2)	1706
Age 20+ years	13-14	4.24 (3.92-4.59)	4.18 (3.56-4.80)	9.98 (9.40-10.9)	20.2 (18.4-22.6)	30.3 (28.8-33.3)	1793
Males	11-12	4.26 (3.82-4.76)	4.20 (3.62-5.09)	8.93 (7.61-10.7)	18.3 (14.7-22.4)	27.7 (21.0-32.9)	1258
Males	13-14	4.14 (3.71-4.61)	4.05 (3.37-4.74)	9.11 (8.45-10.2)	17.5 (15.3-22.0)	28.5 (22.2-32.8)	1310
Females	11-12	4.03 (3.50-4.65)	4.16 (3.72-4.83)	10.4 (8.56-11.9)	20.5 (17.8-23.0)	28.3 (24.1-31.2)	1234
Females	13-14	4.29 (3.96-4.65)	4.22 (3.81-4.73)	10.7 (9.71-12.1)	21.1 (19.0-24.2)	30.3 (27.6-35.2)	1331
Mexican Americans	11-12	5.86 (5.13-6.70)	5.41 (4.82-6.55)	12.7 (9.57-16.6)	22.5 (17.5-25.1)	27.5 (22.7-37.3)	317
Mexican Americans	13-14	5.36 (4.74-6.06)	5.43 (4.58-6.22)	11.0 (9.07-13.2)	17.5 (13.9-28.4)	28.4 (16.5-46.4)	449
Non-Hispanic blacks	11-12	6.65 (5.66-7.80)	6.87 (5.70-8.56)	14.0 (11.8-15.1)	23.6 (20.3-28.4)	37.0 (25.4-47.1)	664
Non-Hispanic blacks	13-14	7.53 (6.60-8.60)	7.74 (6.54-8.76)	14.9 (13.0-17.8)	25.7 (20.7-31.5)	34.5 (30.0-48.0)	576
Non-Hispanic whites	11-12	3.54 (3.17-3.96)	3.59 (3.09-4.06)	7.55 (6.80-9.06)	17.8 (13.4-20.5)	26.2 (20.5-29.2)	814
Non-Hispanic whites	13-14	3.68 (3.33-4.06)	3.39 (2.85-3.94)	9.07 (8.05-9.94)	18.6 (16.9-23.0)	30.0 (26.8-31.4)	975
All Hispanics	11-12	5.69 (4.90-6.61)	5.49 (4.60-6.61)	12.6 (10.1-15.7)	22.8 (18.4-24.7)	27.9 (23.0-42.3)	573
All Hispanics	13-14	5.42 (4.89-6.00)	5.44 (4.87-6.07)	11.1 (9.40-12.7)	19.4 (14.7-27.6)	28.5 (19.8-38.7)	695
Asians	11-12	2.91 (2.37-3.56)	2.97 (2.06-3.86)	6.33 (5.29-8.33)	13.5 (10.8-17.0)	20.6 (14.2-26.6)	352
Asians	13-14	2.60 (2.02-3.34)	2.24 (1.83-2.86)	4.90 (3.48-8.26)	12.5 (6.39-25.3)	20.2 (11.7-34.4)	291

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 0.042 and 0.090 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Naphthalene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Urinary 2-Hydroxynapthalene (2-Naphthol) (creatinine corrected) (2011 - 2014)

CAS Number 135-19-3

Metabolite of Napthalene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.72 (4.39-5.08)	4.32 (4.00-4.78)	9.30 (8.40-10.1)	17.6 (15.5-18.7)	23.4 (20.2-25.9)	2490
Total population	13-14	4.9 (4.67-5.13)	4.77 (4.40-5.09)	9.43 (9.01-9.81)	16.1 (15.1-17.5)	22.0 (19.9-24.3)	2640
Age 6-11 years	11-12	4.5 (3.93-5.16)	4.18 (3.68-4.96)	7.81 (6.44-9.37)	14.6 (11.2-17.1)	19.2 (15.3-22.6)	396
Age 6-11 years	13-14	4.55 (3.93-5.27)	4.19 (3.34-5.20)	7.50 (6.01-9.56)	11.9 (9.89-15.9)	18.7 (12.8-25.2)	399
Age 12-19 years	11-12	4.19 (3.61-4.86)	3.82 (3.26-4.63)	6.97 (5.26-8.92)	12.9 (9.70-14.9)	20.5 (12.9-32.1)	389
Age 12-19 years	13-14	4.62 (4.14-5.15)	4.45 (3.73-5.55)	8.20 (6.52-9.59)	13.0 (11.0-16.8)	17.3 (13.6-22.8)	449
Age 20+ years	11-12	4.84 (4.48-5.22)	4.50 (4.07-4.98)	9.88 (9.07-11.0)	18.1 (16.4-19.4)	24.0 (20.8-26.7)	1705
Age 20+ years	13-14	4.98 (4.69-5.28)	4.91 (4.32-5.32)	9.86 (9.28-10.5)	17.1 (15.8-18.4)	22.6 (20.6-25.3)	1792
Males	11-12	4.01 (3.61-4.44)	3.71 (3.23-4.19)	7.61 (6.50-8.89)	14.2 (12.1-15.8)	19.6 (17.4-22.3)	1257
Males	13-14	4.16 (3.83-4.51)	3.88 (3.56-4.32)	7.90 (6.98-8.43)	13.8 (11.6-16.5)	19.1 (15.1-24.3)	1309
Females	11-12	5.53 (5.01-6.11)	5.22 (4.62-5.94)	11.4 (9.85-12.8)	19.1 (17.4-22.6)	25.9 (21.6-31.0)	1233
Females	13-14	5.74 (5.39-6.11)	5.77 (5.29-6.28)	10.8 (9.79-12.3)	18.4 (16.6-19.9)	23.2 (21.5-26.1)	1331
Mexican Americans	11-12	6.59 (5.61-7.75)	6.22 (5.54-7.60)	11.6 (9.38-14.3)	20.1 (14.3-26.3)	26.3 (18.5-44.9)	317
Mexican Americans	13-14	6.17 (5.65-6.73)	5.97 (5.49-6.58)	10.1 (9.08-11.3)	17.0 (13.4-22.8)	23.9 (17.0-35.2)	449
Non-Hispanic blacks	11-12	5.17 (4.58-5.85)	5.26 (4.59-6.16)	9.33 (8.09-10.7)	15.3 (13.5-17.3)	19.6 (17.9-22.0)	664
Non-Hispanic blacks	13-14	5.75 (5.29-6.24)	5.55 (4.99-6.43)	9.68 (8.83-10.8)	14.9 (13.9-16.1)	19.1 (15.8-24.2)	576
Non-Hispanic whites	11-12	4.32 (3.96-4.70)	3.81 (3.40-4.21)	8.89 (7.40-10.0)	17.6 (14.5-18.7)	21.9 (18.7-27.7)	812
Non-Hispanic whites	13-14	4.56 (4.27-4.87)	4.16 (3.83-4.70)	9.14 (8.21-9.86)	16.8 (14.5-18.4)	21.7 (19.1-25.3)	974
All Hispanics	11-12	6.37 (5.80-7.00)	6.04 (5.65-6.77)	11.6 (9.85-13.3)	19.2 (15.8-23.8)	25.9 (21.9-30.4)	573
All Hispanics	13-14	6.08 (5.58-6.63)	6.02 (5.53-6.35)	10.5 (9.28-11.6)	17.6 (13.8-22.8)	23.9 (18.8-28.3)	695
Asians	11-12	3.89 (3.22-4.71)	3.91 (3.08-4.86)	6.94 (5.70-8.22)	12.9 (8.67-19.0)	19.1 (13.7-23.1)	352
Asians	13-14	4.07 (3.33-4.98)	3.90 (2.92-5.16)	7.94 (6.18-9.44)	13.4 (9.87-19.3)	20.5 (12.8-27.4)	291

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Naphthalene_BiomonitoringSummary.html

Factsheet: https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html

Heterocyclic Amines

Urinary 3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole (Trp-P-1) (2013 - 2014)

CAS Number 62450-06-0

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2569
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	374
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1756
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1287
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1282
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	945
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	681
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.790.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole (Trp-P-1) (creatinine corrected) (2013 - 2014)

CAS Number 62450-06-0

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2568
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	374
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1755
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1286
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1282
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	944
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	681
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-3-methyl-9H-pyriodo[2,3-b]indole (MeA-α-C) (2013 - 2014)

CAS Number 68006-83-7

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	1.19 (.670-1.76)	3.11 (2.27-3.95)	2569
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	1.51 (<LOD-3.95)	439
Age 20+ years	13-14	*	<LOD	<LOD	1.56 (1.03-2.06)	3.51 (2.67-4.41)	1755
Males	13-14	*	<LOD	<LOD	1.39 (.880-2.00)	3.78 (2.66-4.50)	1286
Females	13-14	*	<LOD	<LOD	.970 (.370-1.74)	2.43 (1.74-3.61)	1283
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.520 (<LOD-1.47)	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	2.84 (1.83-4.02)	4.62 (3.63-6.39)	554
Non-Hispanic whites	13-14	*	<LOD	<LOD	1.37 (.580-2.04)	3.41 (2.02-4.44)	944
All Hispanics	13-14	*	<LOD	<LOD	.330 (<LOD-.870)	.980 (.490-2.04)	683
Asians	13-14	*	<LOD	<LOD	<LOD	.820 (<LOD-2.09)	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.330.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-3-methyl-9H-pyriodo[2,3-b]indole (MeA-α-C) (2013 - 2014)

CAS Number 68006-83-7

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	1.64 (1.28-2.24)	3.36 (2.44-4.97)	2568
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	1.28 (<LOD-3.27)	439
Age 20+ years	13-14	*	<LOD	<LOD	2.04 (1.44-2.56)	4.27 (2.87-5.26)	1754
Males	13-14	*	<LOD	<LOD	1.61 (1.15-2.30)	3.92 (2.30-5.26)	1285
Females	13-14	*	<LOD	<LOD	1.77 (1.35-2.09)	3.20 (2.42-4.59)	1283
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	1.28 (<LOD-2.83)	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	2.43 (1.49-3.03)	4.84 (2.86-6.20)	554
Non-Hispanic whites	13-14	*	<LOD	<LOD	1.98 (1.35-2.56)	4.27 (2.55-5.88)	943
All Hispanics	13-14	*	<LOD	<LOD	.885 (<LOD-1.21)	1.66 (1.05-2.87)	683
Asians	13-14	*	<LOD	<LOD	<LOD	1.78 (<LOD-2.09)	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) (2013 - 2014)

CAS Number 105650-23-5

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	.460 (.390-.530)	1.88 (1.53-2.30)	7.10 (5.89-8.63)	15.8 (13.9-18.9)	2569
Age 6-11 years	13-14	*	<LOD	.810 (.530-1.33)	2.45 (1.39-3.99)	5.00 (2.45-6.12)	375
Age 12-19 years	13-14	.775 (.673-.892)	.610 (.390-.800)	1.53 (1.10-2.16)	4.90 (3.75-7.77)	11.5 (7.69-20.8)	438
Age 20+ years	13-14	*	.470 (.400-.550)	2.12 (1.64-2.74)	7.97 (6.58-10.5)	17.3 (14.3-20.8)	1756
Males	13-14	*	.530 (.460-.620)	2.08 (1.61-2.69)	7.89 (5.68-11.3)	17.3 (11.3-25.2)	1285
Females	13-14	*	.380 (<LOD-.490)	1.70 (1.30-2.10)	6.78 (4.89-8.55)	14.3 (9.67-20.8)	1284
Mexican Americans	13-14	.976 (.807-1.18)	.670 (.510-.860)	2.69 (1.70-3.83)	8.71 (6.21-10.4)	14.2 (8.76-35.0)	440
Non-Hispanic blacks	13-14	.993 (.890-1.11)	.750 (.630-.930)	2.31 (1.90-2.91)	6.60 (5.10-8.49)	17.4 (9.87-20.8)	554
Non-Hispanic whites	13-14	*	.390 (<LOD-.450)	1.61 (1.14-2.30)	6.90 (4.94-9.77)	16.8 (12.9-20.7)	945
All Hispanics	13-14	.967 (.815-1.15)	.650 (.520-.850)	2.61 (1.78-3.55)	8.66 (7.10-10.3)	14.6 (10.6-19.2)	683
Asians	13-14	*	<LOD	.980 (.560-1.44)	4.72 (2.58-7.91)	13.4 (6.07-15.5)	284

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.340.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) (creatinine corrected) (2013 - 2014)

CAS Number 105650-23-5

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	.706 (.653-.750)	2.02 (1.76-2.39)	8.07 (6.58-9.66)	15.4 (12.2-18.5)	2568
Age 6-11 years	13-14	*	<LOD	1.33 (.942-1.76)	3.84 (2.00-7.13)	7.55 (4.20-13.7)	375
Age 12-19 years	13-14	0.709 (.592-.850)	.574 (.437-.755)	1.22 (.984-2.00)	4.71 (2.84-6.52)	10.6 (5.12-13.6)	438
Age 20+ years	13-14	*	.727 (.676-.777)	2.21 (1.91-2.69)	9.20 (7.78-10.6)	16.0 (13.1-19.9)	1755
Males	13-14	*	.667 (.595-.709)	2.00 (1.71-2.59)	7.55 (5.51-10.8)	13.5 (10.1-18.5)	1284
Females	13-14	*	.739 (<LOD-.841)	2.04 (1.73-2.40)	8.49 (6.52-10.6)	16.0 (12.4-25.1)	1284
Mexican Americans	13-14	1.13 (.980-1.29)	.881 (.750-1.01)	2.93 (2.04-3.97)	11.1 (5.15-12.9)	13.9 (11.5-23.4)	440
Non-Hispanic blacks	13-14	0.776 (.690-.873)	.677 (.571-.796)	1.76 (1.44-2.05)	4.74 (3.32-6.28)	8.59 (6.29-11.7)	554
Non-Hispanic whites	13-14	*	.686 (<LOD-.774)	1.91 (1.67-2.64)	8.36 (6.56-10.1)	15.9 (12.9-22.1)	944
All Hispanics	13-14	1.09 (.962-1.23)	.800 (.698-.919)	2.84 (2.04-3.55)	10.2 (6.25-12.4)	16.0 (12.4-20.1)	683
Asians	13-14	*	<LOD	1.59 (1.09-2.59)	6.07 (3.64-10.1)	13.7 (7.51-24.7)	284

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-9H-pyrido[2,3-b]indole (A-α-C) (2013 - 2014)

CAS Number 26148-68-5

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	.630 (<LOD-.720)	2.30 (1.65-3.39)	23.9 (16.9-32.9)	58.2 (46.0-73.9)	2568
Age 6-11 years	13-14	*	<LOD	.850 (.720-.930)	1.43 (1.13-1.83)	2.07 (1.54-3.12)	375
Age 12-19 years	13-14	*	<LOD	1.21 (.960-1.39)	4.18 (2.27-19.9)	27.9 (3.43-58.2)	438
Age 20+ years	13-14	*	.680 (<LOD-.790)	3.72 (2.24-5.30)	29.1 (20.3-42.1)	65.2 (51.8-79.7)	1755
Males	13-14	*	.740 (<LOD-.840)	2.91 (1.97-4.44)	26.3 (17.8-36.8)	61.4 (48.0-77.9)	1285
Females	13-14	*	<LOD	1.73 (1.28-2.95)	20.1 (12.0-34.8)	54.5 (32.3-73.6)	1283
Mexican Americans	13-14	*	.620 (<LOD-.720)	1.43 (1.13-1.73)	5.01 (3.02-7.90)	18.5 (5.45-31.0)	440
Non-Hispanic blacks	13-14	*	.760 (.620-.970)	6.63 (3.38-10.8)	49.1 (30.7-73.1)	79.8 (62.8-97.2)	554
Non-Hispanic whites	13-14	*	.620 (<LOD-.760)	2.69 (1.59-4.44)	27.4 (15.0-47.5)	60.5 (47.6-83.1)	943
All Hispanics	13-14	*	.630 (<LOD-.720)	1.63 (1.16-2.36)	7.63 (3.55-20.9)	23.9 (10.9-40.4)	683
Asians	13-14	*	<LOD	.980 (.760-1.34)	2.96 (1.36-16.1)	16.1 (2.96-36.8)	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.620.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-9H-pyrido[2,3-b]indole (A-α-C) (2013 - 2014)

CAS Number 26148-68-5

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	1.00 (<LOD-1.16)	2.88 (2.32-4.00)	26.6 (17.0-35.8)	63.3 (43.0-81.3)	2567
Age 6-11 years	13-14	*	<LOD	1.53 (1.33-1.76)	2.44 (2.10-2.93)	3.21 (2.59-4.00)	375
Age 12-19 years	13-14	*	<LOD	1.33 (1.07-1.55)	5.35 (1.89-14.5)	20.9 (5.10-66.8)	438
Age 20+ years	13-14	*	1.12 (<LOD-1.29)	4.00 (2.88-5.51)	32.7 (23.0-43.3)	69.3 (49.7-92.3)	1754
Males	13-14	*	.912 (<LOD-1.02)	3.06 (2.31-4.05)	26.6 (17.0-34.2)	57.1 (37.2-81.7)	1284
Females	13-14	*	<LOD	2.71 (2.13-4.00)	28.3 (14.4-43.1)	67.1 (39.1-91.2)	1283
Mexican Americans	13-14	*	.957 (<LOD-1.07)	1.73 (1.48-1.97)	5.47 (3.67-6.86)	14.9 (5.57-49.8)	440
Non-Hispanic blacks	13-14	*	.772 (.638-.929)	4.00 (2.18-7.83)	35.8 (24.6-49.7)	65.7 (45.7-82.8)	554
Non-Hispanic whites	13-14	*	1.10 (<LOD-1.29)	3.51 (2.46-4.89)	30.2 (17.0-49.7)	74.8 (43.9-102)	942
All Hispanics	13-14	*	.945 (<LOD-1.10)	1.84 (1.57-2.67)	6.50 (3.74-17.8)	28.1 (9.99-61.6)	683
Asians	13-14	*	<LOD	1.85 (1.57-2.44)	6.29 (2.48-19.0)	19.0 (5.27-43.6)	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-3-methyl-3H-imidazo[4,5-f]quinolone (IQ) (2013 - 2014)

CAS Number 76180-96-6

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2572
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1758
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1287
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	946
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.370.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-3-methyl-3H-imidazo[4,5-f]quinolone (IQ) (creatinine corrected) (2013 - 2014)

CAS Number 76180-96-6

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2571
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1757
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1286
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	945
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-6-methyldipyrido[1,2-a:3',2'-d]imidazole (Glu-P-1) (2013 - 2014)

CAS Number 67730-11-4

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2572
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1758
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1287
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	946
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.310.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Amino-6-methyldipyrido[1,2-a:3',2'-d]imidazole (Glu-P-1) (creatinine corrected) (2013 - 2014)

CAS Number 67730-11-4

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2571
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1757
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1286
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	945
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Aminodipyrido[1,2-a:3',2'-d] imidazole (GLU-P-2) (2013 - 2014)

CAS Number 67730-10-3

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2572
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1758
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1287
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	946
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.830.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Aminodipyrido[1,2-a:3',2'-d] imidazole (GLU-P-2) (creatinine corrected) (2013 - 2014)

CAS Number 67730-10-3

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2571
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1757
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1286
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	945
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 1-Methyl-9H-pyrido[3,4-b]indole (Harman) (2013 - 2014)

CAS Number 486-84-0

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	139 (129-151)	125 (115-141)	253 (230-279)	553 (508-603)	863 (762-957)	2571
Age 6-11 years	13-14	131 (115-150)	124 (104-142)	229 (178-266)	437 (371-511)	660 (511-768)	375
Age 12-19 years	13-14	140 (114-173)	144 (99.2-180)	231 (206-288)	471 (352-711)	850 (497-1540)	439
Age 20+ years	13-14	140 (130-150)	124 (115-138)	263 (235-291)	562 (535-637)	893 (759-1080)	1757
Males	13-14	143 (129-159)	132 (116-149)	251 (215-304)	553 (405-648)	863 (727-1040)	1287
Females	13-14	135 (123-149)	119 (107-138)	256 (223-295)	553 (500-663)	870 (749-1100)	1284
Mexican Americans	13-14	85.6 (74.7-98.1)	80.1 (66.2-91.4)	135 (114-168)	259 (185-484)	555 (310-939)	440
Non-Hispanic blacks	13-14	165 (143-191)	168 (143-196)	307 (244-374)	577 (443-691)	762 (618-900)	555
Non-Hispanic whites	13-14	150 (132-170)	138 (115-159)	270 (236-316)	598 (538-727)	956 (768-1370)	945
All Hispanics	13-14	91.4 (82.6-101)	84.0 (77.1-94.5)	155 (135-174)	296 (236-367)	522 (354-861)	683
Asians	13-14	145 (126-165)	122 (107-138)	283 (230-395)	666 (488-1040)	1110 (608-1570)	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 4.59.

Urinary 1-Methyl-9H-pyrido[3,4-b]indole (Harman) (2013 - 2014)

CAS Number 486-84-0

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	164 (155-174)	146 (132-160)	289 (276-306)	614 (574-671)	1030 (870-1110)	2570
Age 6-11 years	13-14	204 (187-223)	191 (173-211)	310 (255-387)	715 (451-814)	826 (720-1030)	375
Age 12-19 years	13-14	128 (115-143)	118 (100-129)	172 (153-215)	375 (275-504)	685 (436-1280)	439
Age 20+ years	13-14	166 (157-177)	150 (132-167)	304 (285-327)	646 (580-713)	1090 (880-1220)	1756
Males	13-14	145 (134-157)	129 (112-149)	253 (233-276)	543 (459-614)	850 (714-1020)	1286
Females	13-14	186 (170-202)	163 (143-191)	330 (293-375)	713 (595-826)	1140 (866-1280)	1284
Mexican Americans	13-14	98.6 (87.3-111)	85.8 (79.3-94.6)	154 (130-181)	322 (230-405)	535 (328-833)	440
Non-Hispanic blacks	13-14	129 (116-143)	123 (103-138)	238 (191-286)	416 (348-473)	557 (439-659)	555
Non-Hispanic whites	13-14	188 (174-204)	164 (151-185)	330 (294-373)	720 (627-836)	1160 (880-1320)	944
All Hispanics	13-14	103 (95.8-110)	90.6 (86.3-99.1)	159 (146-176)	322 (269-362)	540 (369-740)	683
Asians	13-14	230 (206-257)	218 (179-236)	444 (323-503)	861 (678-1270)	1600 (1010-2030)	285

Urinary 1-Methyl-3-amino-5H-pyrido[4,3-b]indole (Trp-P-2) (2013 - 2014)

CAS Number 62450-07-1

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2571
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1757
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1287
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	945
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.630.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 1-Methyl-3-amino-5H-pyrido[4,3-b]indole (Trp-P-2) (creatinine corrected) (2013 - 2014)

CAS Number 62450-07-1

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2570
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	375
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	439
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1756
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1286
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1284
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	440
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	944
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	285

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urine Norharman (2013 - 2014)

CAS Number 244-63-3

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	333 (317-351)	332 (315-354)	628 (586-673)	1080 (1000-1190)	1470 (1290-1700)	2552
Age 6-11 years	13-14	332 (294-374)	334 (289-398)	646 (490-730)	959 (854-1120)	1190 (980-1360)	374
Age 12-19 years	13-14	324 (279-377)	335 (264-442)	603 (509-693)	905 (770-987)	1080 (907-1460)	439
Age 20+ years	13-14	335 (318-353)	329 (311-351)	630 (581-701)	1120 (1030-1280)	1500 (1350-1720)	1739
Males	13-14	367 (342-394)	367 (335-403)	662 (599-753)	1140 (1010-1310)	1630 (1290-1820)	1277
Females	13-14	303 (282-325)	295 (271-333)	601 (544-655)	1030 (874-1140)	1400 (1130-1530)	1275
Mexican Americans	13-14	283 (255-313)	287 (246-326)	510 (424-639)	1050 (816-1240)	1330 (1130-1520)	437
Non-Hispanic blacks	13-14	370 (322-426)	379 (318-457)	666 (568-777)	1010 (890-1080)	1240 (1040-1580)	554
Non-Hispanic whites	13-14	349 (322-377)	345 (315-377)	650 (589-739)	1120 (1000-1270)	1490 (1280-1720)	931
All Hispanics	13-14	279 (260-299)	287 (265-308)	529 (471-592)	993 (867-1110)	1320 (1140-1470)	679
Asians	13-14	253 (224-285)	243 (200-288)	466 (409-566)	983 (732-1280)	1470 (1010-1780)	285

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 12.6.

Urine Norharman (creatinine corrected) (2013 - 2014)

CAS Number 244-63-3

Geometric mean and selected percentiles of concentrations (in ng/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	394 (377-412)	382 (359-400)	676 (632-727)	1130 (1020-1220)	1500 (1350-1690)	2551
Age 6-11 years	13-14	516 (486-549)	488 (442-529)	820 (713-976)	1350 (1200-1430)	1500 (1350-1950)	374
Age 12-19 years	13-14	297 (276-319)	286 (265-315)	462 (389-533)	695 (583-809)	879 (720-1300)	439
Age 20+ years	13-14	400 (376-424)	388 (358-413)	714 (648-768)	1150 (1030-1250)	1580 (1330-1910)	1738
Males	13-14	372 (354-391)	361 (333-397)	628 (572-678)	1040 (918-1230)	1370 (1170-1690)	1276
Females	13-14	417 (393-442)	398 (375-426)	727 (648-800)	1170 (1080-1280)	1590 (1350-1980)	1275
Mexican Americans	13-14	326 (291-365)	312 (272-336)	561 (427-675)	1060 (806-1360)	1570 (976-2350)	437
Non-Hispanic blacks	13-14	289 (263-318)	294 (237-355)	471 (420-513)	743 (617-852)	937 (860-1040)	554
Non-Hispanic whites	13-14	441 (421-462)	423 (400-453)	756 (713-816)	1180 (1070-1280)	1550 (1350-1910)	930
All Hispanics	13-14	314 (290-340)	301 (267-326)	534 (447-629)	993 (861-1200)	1410 (1150-1800)	679
Asians	13-14	402 (359-449)	388 (332-429)	707 (600-787)	1190 (991-1460)	1680 (1230-2710)	285

Volatile Organic Compounds (VOCs)

Blood 1,1,1-Trichloroethane (Methyl chloroform) (2011 - 2016)

CAS Number 71-55-6

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2662
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3204
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3079
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	500
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	544
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2162
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2605
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2535
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1323
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1546
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1521
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1339
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1658
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1558
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	292
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	505
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	553
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	718
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	639
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	880
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	1000
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	575
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	810
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	966
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	409
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	347

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.010, 0.010, and 0.010 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,1,1,2-Tetrachloroethane (2011 - 2016)

CAS Number 79-34-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2789
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3148
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3082
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	525
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	591
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	545
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2264
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2557
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2537
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1396
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1512
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1524
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1393
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1636
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1558
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	300
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	501
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	556
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	740
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	602
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	638
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	954
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1274
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	1000
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	598
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	802
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	968
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	413
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	360
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.040, 0.040, and 0.040 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,1,2,2-Tetrachloroethane (2011 - 2012)

CAS Number 79-34-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2681
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	505
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2176
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1346
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1335
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	282
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	720
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	913
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	569
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	396

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.010.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,1,2-Trichloroethane (2011 - 2012)

CAS Number 79-00-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2783
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	520
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2263
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1392
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1391
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	298
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	738
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	971
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	588
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	402

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.010.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,2,3-Trichloropropane (2011 - 2016)

CAS Number 96-18-4

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2761
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3177
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3036
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	520
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	592
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	540
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2241
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2585
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2496
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1384
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1535
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1497
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1377
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1642
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1539
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	300
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	494
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	535
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	737
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	635
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	938
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1297
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	994
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	589
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	794
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	935
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	413
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	362
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	346

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.040, 0.040, and 0.040 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,1-Dichloroethane (2011 - 2012)

CAS Number 75-34-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2736
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	507
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2229
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1367
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1369
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	299
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	734
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	928
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	597
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	398

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.010.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,1-Dichloroethene (Vinylidene chloride) (2011 - 2012)

CAS Number 75-35-4

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2804
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	528
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2276
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1406
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1398
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	299
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	739
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	969
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	596
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	416

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 9.00E-03.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,2-Dibromoethane (2011 - 2016)

CAS Number 106-93-4

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2788
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3203
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2986
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	523
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	534
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2265
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2604
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2452
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1400
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1546
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1474
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1388
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1657
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1512
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	300
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	505
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	538
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	742
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	618
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	958
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	968
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	589
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	809
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	943
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	415
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	338

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.015, 0.015, and 0.015 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,2-Dichlorobenzene (o-Dichlorobenzene) (2011 - 2016)

CAS Number 95-50-1

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2697
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3146
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3005
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	502
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	587
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	532
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2195
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2559
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2473
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1340
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1519
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1484
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1357
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1627
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1521
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	289
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	486
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	554
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	687
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	613
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	628
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	942
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	965
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	582
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	784
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	953
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	404
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	359
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	337

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.025, 0.025, and 0.025 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Chlorobenzenes_BiomonitoringSummary.html

Blood 1,2-Dichloroethane (Ethylene dichloride) (2011 - 2016)

CAS Number 107-06-2

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2784
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3203
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3035
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	522
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	532
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2262
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2604
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2503
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1394
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1546
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1498
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1390
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1657
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1537
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	300
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	504
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	555
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	737
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	627
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	953
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	983
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	598
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	809
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	964
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	412
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	337

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.010, 0.010, and 0.010 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood cis-1,2-Dichloroethylene (2011 - 2012)

CAS Number 156-59-2

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2754
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	515
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2239
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1374
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1380
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	297
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	721
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	945
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	592
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	413

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.010.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood trans-1,2-Trichloroethylene (2011 - 2012)

CAS Number 156-60-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2754
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	516
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2238
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1385
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1369
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	295
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	729
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	951
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	581
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	410

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.010.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,2-Dichloropropane (2011 - 2012)

CAS Number 78-87-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2740
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	517
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2223
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1371
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1369
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	295
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	718
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	937
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	589
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	413

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.010.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood 1,3-Dichlorobenzene (m-Dichlorobenzene) (2011 - 2016)

CAS Number 95-50-1

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2743
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3175
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3041
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	510
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	593
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	541
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2233
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2582
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2500
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1378
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1528
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1507
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1365
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1647
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1534
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	297
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	502
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	539
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	698
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	609
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	630
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	961
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1290
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	993
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	590
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	805
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	948
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	411
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	361
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	346

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.025, 0.025, and 0.025 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Chlorobenzenes_BiomonitoringSummary.html

Blood 1,4-Dichlorobenzene (Paradichlorobenzene) (2011 - 2016)

CAS Number 106-46-7

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.143 (.097-.218)	.670 (.383-1.07)	2.13 (1.25-3.64)	2709
Total population	13-14	*	<LOD	.074 (.054-.102)	.301 (.194-.488)	1.07 (.512-2.25)	3172
Total population	15-16	*	<LOD	.098 (.064-.166)	.403 (.247-.821)	1.38 (.647-2.71)	3067
Age 12-19 years	11-12	*	<LOD	.144 (.070-.321)	.543 (.261-1.07)	1.49 (.670-6.56)	501
Age 12-19 years	13-14	*	<LOD	.084 (.054-.183)	.388 (.183-1.42)	1.44 (.363-5.89)	593
Age 12-19 years	15-16	*	<LOD	.127 (.076-.229)	.593 (.270-1.63)	2.08 (.751-6.07)	545
Age 20 + years	11-12	*	<LOD	.143 (.101-.217)	.745 (.376-1.07)	2.16 (1.36-3.62)	2208
Age 20 + years	13-14	*	<LOD	.071 (.052-.098)	.292 (.188-.457)	.949 (.503-2.00)	2579
Age 20 + years	15-16	*	<LOD	.096 (.061-.161)	.384 (.236-.749)	1.23 (.582-2.67)	2522
Males	11-12	*	<LOD	.148 (.095-.237)	.571 (.366-.866)	1.48 (.882-2.41)	1355
Males	13-14	*	<LOD	.077 (.061-.092)	.331 (.197-.479)	.850 (.477-2.45)	1526
Males	15-16	*	<LOD	.100 (.066-.164)	.400 (.252-.900)	1.61 (.900-3.09)	1516
Females	11-12	*	<LOD	.139 (.095-.212)	.823 (.376-1.29)	3.49 (1.25-9.21)	1354
Females	13-14	*	<LOD	.072 (.045-.119)	.286 (.189-.524)	1.14 (.563-2.38)	1646
Females	15-16	*	<LOD	.097 (.058-.181)	.403 (.232-.787)	1.22 (.528-2.71)	1551
Mexican Americans	11-12	*	.045 (<LOD-.114)	.217 (.093-.387)	.870 (.416-2.41)	2.66 (1.25-6.56)	290
Mexican Americans	13-14	*	<LOD	.129 (.067-.277)	.781 (.321-1.88)	2.08 (.971-5.07)	501
Mexican Americans	15-16	.130 (.083-.206)	.071 (<LOD-.183)	.309 (.131-.817)	2.06 (.904-4.35)	6.13 (3.42-15.4)	556
Non-Hispanic blacks	11-12	.188 (.123-.289)	.133 (.075-.230)	.455 (.253-.898)	1.95 (.962-4.42)	7.48 (3.39-18.0)	700
Non-Hispanic blacks	13-14	.129 (.084-.197)	.080 (.040-.143)	.272 (.167-.521)	2.25 (.616-6.23)	6.89 (2.78-16.7)	607
Non-Hispanic blacks	15-16	.191 (.128-.286)	.122 (.077-.201)	.545 (.296-1.01)	3.23 (1.23-9.31)	12.3 (3.27-35.8)	636
Non-Hispanic whites	11-12	*	<LOD	.083 (.061-.122)	.290 (.198-.531)	1.01 (.496-1.57)	946
Non-Hispanic whites	13-14	*	<LOD	.047 (<LOD-.066)	.147 (.097-.200)	.357 (.197-.566)	1290
Non-Hispanic whites	15-16	*	<LOD	.053 (<LOD-.073)	.164 (.109-.246)	.353 (.206-.536)	995
All Hispanics	11-12	.124 (.083-.186)	.071 (<LOD-.182)	.294 (.182-.586)	1.46 (.882-2.41)	4.50 (2.02-8.83)	576
All Hispanics	13-14	*	<LOD	.126 (.077-.252)	.757 (.346-1.94)	2.53 (.946-6.19)	804
All Hispanics	15-16	.131 (.089-.195)	.076 (.040-.139)	.322 (.171-.638)	2.01 (.815-4.97)	7.17 (2.06-19.3)	962
Asians	11-12	*	.050 (<LOD-.100)	.223 (.102-.666)	1.36 (.706-2.33)	3.39 (1.49-12.0)	405
Asians	13-14	*	<LOD	.116 (.085-.163)	.503 (.240-.992)	1.50 (.754-2.70)	361
Asians	15-16	*	<LOD	.120 (.067-.232)	.503 (.202-1.66)	1.68 (.511-4.21)	347

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.040, 0.040, and 0.040 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Chlorobenzenes_BiomonitoringSummary.html

Blood 1,4-Dioxane (2011 - 2016)

CAS Number 123-91-1

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2793
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3125
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2950
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	521
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	593
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	526
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2272
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2532
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2424
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1398
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1505
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1459
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1395
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1620
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1491
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	300
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	503
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	512
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	734
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	626
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	975
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1260
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	974
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	585
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	802
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	887
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	415
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	356
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	340

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.500, 0.500, and 0.500 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood 2,5-Dimethylfuran (2011 - 2016)

CAS Number 625-86-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.081 (.053-.099)	.142 (.129-.166)	2812
Total population	13-14	*	<LOD	<LOD	.086 (.068-.103)	.148 (.124-.167)	3203
Total population	15-16	*	<LOD	<LOD	.074 (.048-.097)	.152 (.118-.172)	3083
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	.028 (<LOD-.039)	527
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.031 (<LOD-.106)	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Age 20 + years	11-12	*	<LOD	<LOD	.095 (.074-.110)	.152 (.136-.178)	2285
Age 20 + years	13-14	*	<LOD	<LOD	.092 (.080-.108)	.155 (.133-.174)	2604
Age 20 + years	15-16	*	<LOD	<LOD	.088 (.061-.114)	.160 (.130-.191)	2537
Males	11-12	*	<LOD	<LOD	.082 (.054-.099)	.134 (.122-.163)	1406
Males	13-14	*	<LOD	<LOD	.088 (.054-.113)	.153 (.115-.181)	1545
Males	15-16	*	<LOD	<LOD	.091 (.057-.126)	.160 (.129-.188)	1526
Females	11-12	*	<LOD	<LOD	.077 (.048-.101)	.148 (.117-.210)	1406
Females	13-14	*	<LOD	<LOD	.085 (.062-.104)	.142 (.116-.158)	1658
Females	15-16	*	<LOD	<LOD	.057 (.035-.079)	.130 (.101-.165)	1557
Mexican Americans	11-12	*	<LOD	<LOD	.025 (<LOD-.049)	.061 (.037-.095)	300
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.031 (.019-.058)	505
Mexican Americans	15-16	*	<LOD	<LOD	.021 (<LOD-.041)	.062 (.037-.126)	555
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.073 (.046-.093)	.114 (.095-.145)	740
Non-Hispanic blacks	13-14	*	<LOD	.020 (<LOD-.040)	.107 (.087-.125)	.157 (.127-.184)	614
Non-Hispanic blacks	15-16	*	<LOD	.017 (<LOD-.032)	.106 (.085-.128)	.165 (.138-.206)	640
Non-Hispanic whites	11-12	*	<LOD	<LOD	.100 (.081-.125)	.168 (.139-.198)	974
Non-Hispanic whites	13-14	*	<LOD	<LOD	.097 (.075-.122)	.165 (.142-.189)	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	.086 (.036-.131)	.163 (.130-.229)	999
All Hispanics	11-12	*	<LOD	<LOD	.022 (<LOD-.037)	.065 (.043-.099)	598
All Hispanics	13-14	*	<LOD	<LOD	.016 (<LOD-.035)	.062 (.032-.101)	810
All Hispanics	15-16	*	<LOD	<LOD	.019 (<LOD-.042)	.071 (.041-.107)	968
Asians	11-12	*	<LOD	<LOD	<LOD	.025 (<LOD-.051)	416
Asians	13-14	*	<LOD	<LOD	<LOD	.039 (<LOD-.101)	364
Asians	15-16	*	<LOD	<LOD	<LOD	.056 (<LOD-.117)	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.011, 0.011, and 0.011 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/25-Dimethylfuran_BiomonitoringSummary.html

Blood Benzene (2011 - 2016)

CAS Number 71-43-2

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.027 (<LOD-.036)	.159 (.121-.206)	.277 (.225-.328)	2671
Total population	13-14	*	<LOD	.027 (<LOD-.042)	.180 (.159-.200)	.285 (.239-.310)	3094
Total population	15-16	*	<LOD	.045 (.037-.054)	.148 (.120-.172)	.251 (.215-.294)	3038
Age 12-19 years	11-12	*	<LOD	<LOD	.043 (.029-.058)	.086 (.052-.143)	501
Age 12-19 years	13-14	*	<LOD	<LOD	.057 (.030-.088)	.148 (.059-.216)	589
Age 12-19 years	15-16	*	<LOD	.029 (.025-.037)	.054 (.041-.068)	.071 (.059-.089)	538
Age 20 + years	11-12	*	<LOD	.031 (<LOD-.045)	.178 (.137-.221)	.284 (.238-.348)	2170
Age 20 + years	13-14	*	<LOD	.033 (<LOD-.052)	.194 (.167-.214)	.295 (.250-.315)	2505
Age 20 + years	15-16	*	<LOD	.048 (.039-.059)	.169 (.132-.199)	.271 (.230-.340)	2500
Males	11-12	*	<LOD	.033 (<LOD-.056)	.162 (.128-.202)	.272 (.227-.310)	1340
Males	13-14	*	<LOD	.032 (<LOD-.043)	.195 (.166-.217)	.298 (.236-.339)	1494
Males	15-16	*	<LOD	.050 (.040-.062)	.171 (.129-.209)	.262 (.230-.340)	1508
Females	11-12	*	<LOD	<LOD	.150 (.106-.214)	.279 (.198-.398)	1331
Females	13-14	*	<LOD	<LOD	.162 (.145-.186)	.259 (.232-.295)	1600
Females	15-16	*	<LOD	.040 (.031-.052)	.127 (.099-.144)	.216 (.178-.310)	1530
Mexican Americans	11-12	*	<LOD	<LOD	.080 (.055-.110)	.138 (.074-.222)	282
Mexican Americans	13-14	*	<LOD	<LOD	.039 (<LOD-.068)	.107 (.038-.199)	502
Mexican Americans	15-16	*	<LOD	.045 (.033-.059)	.079 (.062-.105)	.154 (.094-.188)	537
Non-Hispanic blacks	11-12	*	<LOD	.034 (<LOD-.065)	.146 (.113-.175)	.244 (.175-.301)	715
Non-Hispanic blacks	13-14	*	<LOD	.074 (.039-.107)	.210 (.182-.249)	.327 (.250-.444)	595
Non-Hispanic blacks	15-16	*	<LOD	.062 (.045-.087)	.222 (.172-.259)	.357 (.252-.449)	632
Non-Hispanic whites	11-12	*	<LOD	.031 (<LOD-.056)	.198 (.148-.239)	.310 (.232-.383)	908
Non-Hispanic whites	13-14	*	<LOD	.036 (<LOD-.071)	.205 (.165-.244)	.299 (.253-.339)	1239
Non-Hispanic whites	15-16	*	<LOD	.045 (.036-.057)	.166 (.119-.208)	.275 (.215-.347)	989
All Hispanics	11-12	*	<LOD	<LOD	.070 (.048-.095)	.138 (.091-.206)	572
All Hispanics	13-14	*	<LOD	<LOD	.049 (.029-.123)	.150 (.108-.203)	800
All Hispanics	15-16	*	<LOD	.045 (.033-.054)	.079 (.063-.111)	.154 (.105-.184)	947
Asians	11-12	*	<LOD	<LOD	.030 (<LOD-.038)	.053 (.034-.115)	396
Asians	13-14	*	<LOD	<LOD	.035 (<LOD-.078)	.084 (.036-.139)	357
Asians	15-16	*	<LOD	.025 (<LOD-.046)	.064 (.045-.077)	.091 (.064-.154)	344

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.024, 0.024, and 0.024 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Benzene_BiomonitoringSummary.html

Blood Benzonitrile (2015 - 2016)

CAS Number 100-47-0

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3028
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	537
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	.150 (<LOD-.180)	2491
Males	15-16	*	<LOD	<LOD	<LOD	.162 (<LOD-.221)	1500
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1528
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	532
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.198 (<LOD-.270)	.322 (.223-.568)	634
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	988
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	935
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	345

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.150.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Chlorobenzene (Monochlorobenzene) (2011 - 2016)

CAS Number 108-90-7

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2797
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3203
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3070
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	525
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	543
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2272
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2604
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2527
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1402
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1545
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1516
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1395
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1658
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1554
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	294
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	504
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	557
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	743
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	629
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	970
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	996
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	589
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	809
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	970
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	411
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.011, 0.011, and 0.011 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Chlorobenzenes_BiomonitoringSummary.html

Blood Chloroethane (2013 - 2016)

CAS Number 75-00-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3194
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3042
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	597
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	532
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2597
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2510
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1539
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1510
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1655
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1532
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	504
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	614
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	633
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1299
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	983
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	809
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	957
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	362
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	345

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.045 and 0.045 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Cyclohexane (2013 - 2016)

CAS Number 110-82-7

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3004
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2965
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	559
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	528
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2445
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2437
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1458
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1471
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1546
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1494
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	442
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	526
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	585
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	632
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1249
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	958
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	727
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	908
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	338
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	343

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.020 and 0.020 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Dibromomethane (2011 - 2012)

CAS Number 74-95-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2750
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	508
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2242
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1369
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1381
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	298
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	732
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	947
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	588
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	400

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.030.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood Dichloromethane (Methylene chloride) (2011 - 2016)

CAS Number 75-09-2

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2559
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3143
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3027
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	489
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	588
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	540
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2070
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2555
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2487
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1294
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1515
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1494
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1265
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1628
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1533
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	281
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	501
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	674
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	608
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	628
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	879
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1269
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	985
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	526
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	798
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	948
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	400
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	359
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	339

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.250, 0.250, and 0.250 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Blood Diethyl Ether (2013 - 2016)

CAS Number 60-29-7

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3042
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3029
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	565
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	527
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2477
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2502
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1472
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1503
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1570
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1526
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	479
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	557
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	573
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	620
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1247
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	980
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	774
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	968
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	340
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	338

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.040 and 0.040 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Ethyl Acetate (2013 - 2016)

CAS Number 141-78-6

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3140
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2965
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	588
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	524
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2552
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2441
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1512
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1471
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1628
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1494
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	482
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	508
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	605
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	624
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1292
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	972
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	784
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	908
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	351
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	337

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.158 and 0.158 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Ethylbenzene (2011 - 2016)

CAS Number 100-41-4

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.029 (.025-.034)	.074 (.059-.090)	.115 (.102-.125)	2657
Total population	13-14	*	<LOD	.029 (<LOD-.034)	.074 (.065-.083)	.118 (.098-.143)	3077
Total population	15-16	*	<LOD	.028 (.024-.031)	.077 (.066-.087)	.114 (.104-.125)	3059
Age 12-19 years	11-12	*	<LOD	<LOD	.040 (.036-.044)	.046 (.044-.070)	502
Age 12-19 years	13-14	*	<LOD	<LOD	.032 (.025-.041)	.060 (.034-.095)	576
Age 12-19 years	15-16	*	<LOD	<LOD	.029 (.025-.036)	.048 (.036-.057)	541
Age 20 + years	11-12	*	<LOD	.030 (.026-.036)	.080 (.067-.095)	.117 (.104-.140)	2155
Age 20 + years	13-14	*	<LOD	.032 (.026-.038)	.079 (.069-.092)	.124 (.106-.150)	2501
Age 20 + years	15-16	*	<LOD	.029 (.026-.035)	.083 (.070-.094)	.120 (.112-.135)	2518
Males	11-12	*	<LOD	.034 (.029-.039)	.080 (.067-.095)	.117 (.106-.145)	1331
Males	13-14	*	<LOD	.031 (.027-.036)	.079 (.063-.101)	.135 (.106-.159)	1486
Males	15-16	*	<LOD	.032 (.028-.038)	.086 (.073-.097)	.126 (.111-.153)	1513
Females	11-12	*	<LOD	.025 (<LOD-.030)	.064 (.051-.085)	.107 (.085-.125)	1326
Females	13-14	*	<LOD	<LOD	.068 (.062-.077)	.107 (.092-.124)	1591
Females	15-16	*	<LOD	<LOD	.067 (.052-.081)	.109 (.088-.119)	1546
Mexican Americans	11-12	*	<LOD	.024 (<LOD-.030)	.050 (.031-.068)	.078 (.041-.415)	276
Mexican Americans	13-14	*	<LOD	<LOD	.040 (.032-.051)	.064 (.047-.092)	491
Mexican Americans	15-16	*	<LOD	<LOD	.051 (.036-.058)	.085 (.057-.096)	556
Non-Hispanic blacks	11-12	*	<LOD	.029 (.025-.035)	.063 (.054-.076)	.097 (.076-.113)	688
Non-Hispanic blacks	13-14	*	<LOD	.044 (.032-.055)	.088 (.074-.095)	.125 (.102-.143)	590
Non-Hispanic blacks	15-16	*	<LOD	.038 (.030-.054)	.094 (.069-.120)	.130 (.109-.155)	632
Non-Hispanic whites	11-12	*	<LOD	.031 (.027-.038)	.085 (.071-.097)	.118 (.108-.140)	937
Non-Hispanic whites	13-14	*	<LOD	.032 (.025-.040)	.083 (.066-.106)	.140 (.107-.169)	1241
Non-Hispanic whites	15-16	*	<LOD	.029 (.024-.034)	.084 (.070-.095)	.117 (.108-.144)	991
All Hispanics	11-12	*	<LOD	<LOD	.049 (.035-.062)	.086 (.051-.124)	552
All Hispanics	13-14	*	<LOD	<LOD	.046 (.033-.060)	.072 (.062-.092)	789
All Hispanics	15-16	*	<LOD	<LOD	.055 (.039-.067)	.093 (.068-.100)	961
Asians	11-12	*	<LOD	<LOD	.030 (.026-.037)	.042 (.034-.055)	400
Asians	13-14	*	<LOD	<LOD	.036 (.025-.052)	.054 (.036-.076)	351
Asians	15-16	*	<LOD	<LOD	.029 (<LOD-.042)	.047 (.032-.070)	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.024, 0.024, and 0.024 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Ethylbenzene_BiomonitoringSummary.html

Blood Furan (2011 - 2016)

CAS Number 110-00-9

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.044 (.031-.060)	.088 (.074-.105)	2616
Total population	13-14	*	<LOD	<LOD	.050 (.037-.063)	.091 (.074-.103)	3203
Total population	15-16	*	<LOD	<LOD	.042 (.032-.057)	.080 (.069-.097)	3089
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	.026 (<LOD-.046)	494
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.032 (<LOD-.066)	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Age 20 + years	11-12	*	<LOD	<LOD	.049 (.036-.066)	.097 (.080-.108)	2122
Age 20 + years	13-14	*	<LOD	<LOD	.056 (.044-.068)	.095 (.082-.106)	2604
Age 20 + years	15-16	*	<LOD	<LOD	.050 (.037-.067)	.091 (.076-.110)	2543
Males	11-12	*	<LOD	<LOD	.045 (.033-.065)	.087 (.067-.105)	1306
Males	13-14	*	<LOD	<LOD	.052 (.032-.070)	.092 (.070-.114)	1545
Males	15-16	*	<LOD	<LOD	.053 (.036-.069)	.091 (.072-.105)	1527
Females	11-12	*	<LOD	<LOD	.043 (.026-.058)	.088 (.064-.116)	1310
Females	13-14	*	<LOD	<LOD	.050 (.036-.064)	.091 (.066-.108)	1658
Females	15-16	*	<LOD	<LOD	.034 (<LOD-.048)	.079 (.056-.107)	1562
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	.036 (<LOD-.051)	285
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	504
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	.034 (<LOD-.066)	558
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.034 (.028-.046)	.070 (.046-.079)	699
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.068 (.052-.073)	.093 (.074-.109)	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.067 (.049-.080)	.100 (.080-.123)	641
Non-Hispanic whites	11-12	*	<LOD	<LOD	.060 (.038-.074)	.109 (.088-.121)	896
Non-Hispanic whites	13-14	*	<LOD	<LOD	.058 (.042-.075)	.103 (.083-.119)	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	.051 (.031-.070)	.091 (.072-.116)	1001
All Hispanics	11-12	*	<LOD	<LOD	<LOD	.042 (<LOD-.060)	555
All Hispanics	13-14	*	<LOD	<LOD	<LOD	.042 (<LOD-.054)	809
All Hispanics	15-16	*	<LOD	<LOD	<LOD	.039 (<LOD-.067)	971
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	386
Asians	13-14	*	<LOD	<LOD	<LOD	.028 (<LOD-.054)	364
Asians	15-16	*	<LOD	<LOD	<LOD	.027 (<LOD-.049)	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.025, 0.025, and 0.025 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Heptane (2013 - 2016)

CAS Number 142-82-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3099
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2991
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	575
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	531
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2524
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2460
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1497
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1474
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1602
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1517
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	471
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	531
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	592
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	634
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1279
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	954
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	769
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	938
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	350
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	340

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Hexachloroethane (2011 - 2012)

CAS Number 67-72-1

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2788
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	523
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2265
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1399
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1389
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	300
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	741
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	959
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	589
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	415

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 0.011.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Hexachloroethane_BiomonitoringSummary.html

Blood Hexane (2011 - 2016)

CAS Number 110-54-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2640
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2927
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2840
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	500
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	549
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	504
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2140
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2378
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2336
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1319
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1423
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1408
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1321
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1504
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1432
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	271
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	444
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	508
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	708
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	568
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	586
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	909
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1208
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	934
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	563
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	722
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	869
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	381
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	331
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	330

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.122, 0.122, and 0.122 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Isobutyronitrile (2015 - 2016)

CAS Number 78-82-0

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	.053 (.042-.065)	3008
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	533
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	.056 (.044-.071)	2475
Males	15-16	*	<LOD	<LOD	<LOD	.056 (.044-.074)	1496
Females	15-16	*	<LOD	<LOD	<LOD	.049 (<LOD-.064)	1512
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	515
Non-Hispanic blacks	15-16	*	<LOD	<LOD	.047 (<LOD-.054)	.077 (.055-.106)	627
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	.056 (.042-.075)	993
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	920
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	342

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.040.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Isopropylbenzene (Cumene) (2011 - 2016)

CAS Number 98-82-8

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2762
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3204
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3058
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	521
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	541
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2241
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2605
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2517
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1387
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1546
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1513
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1375
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1658
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1545
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	294
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	505
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	549
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	735
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	628
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	953
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	995
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	587
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	810
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	961
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	406
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	348

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.040, 0.040, and 0.040 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Methyl-tert-butyl ether (MTBE) (2011 - 2016)

CAS Number 1634-04-4

Geometric mean and selected percentiles of concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	1.62 (<LOD-2.11)	3.50 (2.98-4.12)	4.63 (4.05-5.63)	2509
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3027
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2858
Age 12-19 years	11-12	*	<LOD	<LOD	3.21 (2.53-3.49)	3.83 (3.38-4.43)	455
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	555
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	502
Age 20 + years	11-12	*	<LOD	1.70 (<LOD-2.14)	3.60 (3.07-4.15)	4.77 (4.12-5.96)	2054
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2472
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2356
Males	11-12	*	<LOD	1.77 (<LOD-2.18)	3.62 (3.15-4.28)	4.85 (4.15-5.96)	1286
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1458
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1407
Females	11-12	*	<LOD	1.49 (<LOD-2.11)	3.29 (2.53-4.12)	4.49 (3.72-5.55)	1223
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1569
Females	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-12.0)	1451
Mexican Americans	11-12	*	<LOD	1.94 (<LOD-2.50)	3.66 (2.70-4.33)	4.66 (3.05-17.6)	271
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	494
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-18.0)	499
Non-Hispanic blacks	11-12	*	<LOD	<LOD	2.42 (1.90-2.96)	3.55 (2.89-4.31)	639
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	571
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-13.0)	574
Non-Hispanic whites	11-12	*	<LOD	1.77 (<LOD-2.37)	3.71 (3.15-4.41)	4.80 (4.10-5.96)	891
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1208
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	941
All Hispanics	11-12	*	<LOD	1.80 (<LOD-2.23)	3.24 (2.51-4.01)	4.21 (3.25-6.09)	548
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	792
All Hispanics	15-16	*	<LOD	<LOD	<LOD	10.0 (<LOD-14.0)	885
Asians	11-12	*	<LOD	<LOD	2.33 (1.41-3.89)	3.89 (2.01-6.85)	356
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	353
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	339

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.40, 10.0, and 10.0 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/MTBE_BiomonitoringSummary.html

Blood Methylcyclopentane (2013 - 2016)

CAS Number 96-37-7

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3143
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2899
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	583
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	512
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2560
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2387
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1524
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1436
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1619
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1463
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	483
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	512
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	603
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	624
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1295
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	924
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	781
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	886
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	355
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	342

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.020 and 0.020 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Nitrobenzene (2011 - 2016)

CAS Number 98-95-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2710
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3180
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3037
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	500
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	593
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	537
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2210
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2587
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2500
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1362
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1531
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1503
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1348
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1649
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1534
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	292
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	505
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	542
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	715
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	634
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	934
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	986
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	580
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	810
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	947
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	403
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	363
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	345

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.320, 0.320, and 0.320 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Nitrobenzene_BiomonitoringSummary.html

Blood Nitromethane (2011 - 2012)

CAS Number 75-52-5

Geometric mean and selected percentiles of concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	680 (646-716)	653 (626-694)	847 (799-892)	1110 (1030-1240)	1400 (1290-1500)	2284
Age 12-19 years	11-12	574 (534-617)	567 (532-624)	714 (646-753)	851 (783-969)	974 (858-1080)	423
Age 20 + years	11-12	697 (663-732)	670 (637-708)	868 (816-914)	1170 (1060-1300)	1430 (1300-1530)	1861
Males	11-12	668 (634-704)	641 (610-681)	821 (785-867)	1090 (1000-1200)	1340 (1190-1500)	1137
Females	11-12	691 (653-732)	663 (630-721)	866 (806-921)	1140 (1050-1310)	1430 (1310-1550)	1147
Mexican Americans	11-12	722 (649-805)	728 (626-794)	891 (807-1030)	1220 (932-1460)	1460 (1150-1660)	233
Non-Hispanic blacks	11-12	751 (691-815)	716 (654-790)	933 (867-1050)	1360 (1200-1550)	1730 (1550-1850)	629
Non-Hispanic whites	11-12	655 (623-690)	635 (610-663)	799 (760-852)	1060 (967-1180)	1320 (1170-1450)	806
All Hispanics	11-12	692 (619-773)	694 (608-779)	851 (788-940)	1110 (942-1320)	1330 (1150-1570)	483
Asians	11-12	825 (773-881)	813 (768-847)	1020 (941-1100)	1330 (1140-1510)	1530 (1400-1800)	303

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 is 65.0.

Blood Octane (2013 - 2016)

CAS Number 111-65-9

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3125
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3000
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	584
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	539
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2541
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2461
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1510
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1478
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1615
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1522
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	478
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	544
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	609
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	968
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	775
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	950
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	349
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	342

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.100 and 0.100 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Tetrachloroethene (Perchloroethylene) (2011 - 2016)

CAS Number 127-18-4

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.066 (.057-.091)	.125 (.097-.152)	2636
Total population	13-14	*	<LOD	<LOD	<LOD	.083 (.064-.104)	2970
Total population	15-16	*	<LOD	<LOD	<LOD	.075 (<LOD-.111)	3089
Age 12-19 years	11-12	*	<LOD	<LOD	.055 (<LOD-.121)	.121 (.055-.201)	500
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	.053 (<LOD-.069)	556
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Age 20 + years	11-12	*	<LOD	<LOD	.067 (.061-.089)	.125 (.098-.159)	2136
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	.086 (.066-.127)	2414
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	.084 (<LOD-.123)	2543
Males	11-12	*	<LOD	<LOD	.083 (.055-.111)	.139 (.107-.271)	1327
Males	13-14	*	<LOD	<LOD	.049 (<LOD-.063)	.091 (.062-.169)	1439
Males	15-16	*	<LOD	<LOD	<LOD	.080 (<LOD-.115)	1527
Females	11-12	*	<LOD	<LOD	.062 (.053-.082)	.109 (.073-.139)	1309
Females	13-14	*	<LOD	<LOD	<LOD	.076 (.050-.103)	1531
Females	15-16	*	<LOD	<LOD	<LOD	.066 (<LOD-.111)	1562
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	.072 (.050-.192)	294
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.056 (<LOD-.064)	481
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	.068 (<LOD-.115)	558
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.067 (.054-.086)	.112 (.082-.201)	674
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.066 (<LOD-.108)	549
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	641
Non-Hispanic whites	11-12	*	<LOD	<LOD	.077 (.059-.109)	.128 (.097-.165)	935
Non-Hispanic whites	13-14	*	<LOD	<LOD	.050 (<LOD-.066)	.091 (.070-.169)	1198
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	.092 (<LOD-.182)	1001
All Hispanics	11-12	*	<LOD	<LOD	.053 (<LOD-.065)	.088 (.065-.145)	543
All Hispanics	13-14	*	<LOD	<LOD	<LOD	.061 (<LOD-.096)	775
All Hispanics	15-16	*	<LOD	<LOD	<LOD	.086 (<LOD-.117)	971
Asians	11-12	*	<LOD	<LOD	.057 (<LOD-.103)	.100 (.057-.182)	401
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	345
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.048, 0.048, and 0.048 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Blood Tetrachloromethane (Carbon tetrachloride) (2011 - 2016)

CAS Number 56-23-5

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2720
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3199
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3067
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	511
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	598
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	544
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2209
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2601
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2523
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1357
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1543
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1514
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1363
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1656
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1553
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	295
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	505
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	558
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	738
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	614
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	628
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	916
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1304
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	993
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	580
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	808
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	971
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	405
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 5.00E-03, 5.00E-03, and 5.00E-03 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/OtherHalogenatedSolvents_BiomonitoringSummary.html

Blood Tetrahydrofuran (2013 - 2016)

CAS Number 109-99-9

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3077
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2979
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	579
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	523
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2498
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2456
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1489
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1466
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1588
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1513
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	482
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	536
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	592
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	633
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1260
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	962
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	772
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	941
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	347
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	327

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.125 and 0.125 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Toluene (2013 - 2016)

CAS Number 108-88-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.087 (.080-.094)	.066 (.061-.072)	.132 (.117-.149)	.440 (.390-.501)	.707 (.625-.813)	3103
Total population	15-16	.092 (.082-.103)	.073 (.062-.083)	.147 (.125-.174)	.441 (.367-.524)	.738 (.648-.825)	3078
Age 12-19 years	13-14	.064 (.056-.073)	.056 (.050-.062)	.087 (.071-.106)	.164 (.125-.261)	.395 (.164-.874)	587
Age 12-19 years	15-16	.065 (.059-.072)	.060 (.052-.070)	.094 (.084-.102)	.162 (.129-.206)	.255 (.174-.310)	545
Age 20 + years	13-14	.091 (.084-.099)	.069 (.062-.075)	.144 (.128-.172)	.480 (.430-.531)	.726 (.653-.833)	2516
Age 20 + years	15-16	.096 (.085-.109)	.075 (.064-.087)	.161 (.134-.200)	.489 (.383-.596)	.794 (.680-.877)	2533
Males	13-14	.094 (.085-.104)	.070 (.064-.077)	.146 (.128-.177)	.489 (.378-.593)	.801 (.650-.929)	1499
Males	15-16	.102 (.090-.115)	.081 (.066-.090)	.179 (.144-.219)	.490 (.391-.620)	.838 (.665-.964)	1523
Females	13-14	.081 (.073-.089)	.062 (.056-.070)	.115 (.099-.147)	.421 (.360-.481)	.634 (.574-.704)	1604
Females	15-16	.083 (.073-.094)	.066 (.058-.076)	.124 (.106-.147)	.374 (.321-.443)	.662 (.537-.753)	1555
Mexican Americans	13-14	.067 (.059-.077)	.057 (.051-.066)	.091 (.076-.120)	.214 (.163-.283)	.349 (.241-.603)	501
Mexican Americans	15-16	.083 (.077-.091)	.068 (.063-.073)	.117 (.098-.142)	.272 (.207-.414)	.497 (.319-.670)	557
Non-Hispanic blacks	13-14	.101 (.086-.118)	.075 (.059-.098)	.227 (.170-.289)	.506 (.450-.576)	.717 (.620-.880)	602
Non-Hispanic blacks	15-16	.099 (.084-.117)	.076 (.059-.103)	.212 (.175-.264)	.544 (.413-.675)	.767 (.654-.983)	637
Non-Hispanic whites	13-14	.091 (.083-.100)	.068 (.062-.074)	.146 (.122-.180)	.502 (.393-.600)	.826 (.685-.913)	1250
Non-Hispanic whites	15-16	.096 (.083-.111)	.077 (.063-.089)	.153 (.125-.197)	.508 (.374-.632)	.823 (.678-.889)	996
All Hispanics	13-14	.072 (.063-.081)	.059 (.054-.067)	.098 (.084-.118)	.240 (.167-.317)	.451 (.326-.585)	796
All Hispanics	15-16	.083 (.075-.091)	.067 (.060-.075)	.124 (.103-.148)	.292 (.225-.378)	.500 (.362-.675)	970
Asians	13-14	.063 (.056-.072)	.058 (.050-.065)	.082 (.072-.104)	.147 (.122-.267)	.324 (.191-.434)	355
Asians	15-16	.066 (.059-.074)	.058 (.053-.068)	.088 (.077-.108)	.155 (.112-.249)	.299 (.146-.522)	349

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.025 and 0.025 respectively.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Toluene_BiomonitoringSummary.html

Blood Trichloroethene (Trichloroethylene) (2011 - 2016)

CAS Number 79-01-6

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2694
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3103
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3089
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	496
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	581
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Age 20 + years	11-12	*	<LOD	<LOD	<LOD	<LOD	2198
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2522
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2543
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1343
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1492
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1527
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1351
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1611
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1562
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	284
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	495
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	558
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	724
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	600
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	641
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	927
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1256
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	1001
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	572
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	795
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	971
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	389
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	344
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.012, 0.012, and 0.012 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Blood aaa-Trifluorotoluene (2013 - 2016)

CAS Number 98-08-8

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3204
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3077
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	599
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	545
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2605
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2532
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1546
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1521
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1658
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1556
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	505
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	553
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	615
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	638
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1305
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	1000
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	810
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	964
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	364
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	348

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.040 and 0.040 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood Vinyl Bromide (2013 - 2016)

CAS Number 593-60-2

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	3152
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3063
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	586
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	539
Age 20 + years	13-14	*	<LOD	<LOD	<LOD	<LOD	2566
Age 20 + years	15-16	*	<LOD	<LOD	<LOD	<LOD	2524
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1523
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1514
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1629
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1549
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	501
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	551
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	601
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	638
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	1277
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	988
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	803
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	962
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	363
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	349

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.045 and 0.045 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Blood m-/p-Xylene (2011 - 2016)

CAS Number 108-38-3 or 106-42-3

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	.071 (.063-.079)	.063 (.056-.073)	.106 (.100-.122)	.225 (.187-.264)	.326 (.278-.365)	2579
Total population	13-14	.058 (.052-.064)	.048 (.042-.055)	.094 (.084-.111)	.205 (.188-.225)	.297 (.261-.340)	3174
Total population	15-16	.056 (.051-.062)	.045 (.039-.053)	.095 (.082-.110)	.220 (.188-.255)	.316 (.278-.347)	3085
Age 12-19 years	11-12	.067 (.055-.083)	.063 (.051-.082)	.098 (.082-.128)	.165 (.128-.194)	.223 (.169-.335)	486
Age 12-19 years	13-14	*	.038 (<LOD-.046)	.068 (.053-.085)	.116 (.096-.163)	.206 (.145-.308)	596
Age 12-19 years	15-16	.044 (.040-.047)	.038 (.035-.044)	.062 (.055-.073)	.109 (.090-.126)	.166 (.129-.185)	543
Age 20 + years	11-12	.071 (.064-.079)	.063 (.056-.073)	.108 (.102-.124)	.238 (.197-.278)	.334 (.279-.386)	2093
Age 20 + years	13-14	.060 (.054-.066)	.049 (.044-.057)	.101 (.088-.120)	.213 (.195-.238)	.309 (.270-.351)	2578
Age 20 + years	15-16	.058 (.053-.065)	.046 (.040-.055)	.101 (.085-.122)	.238 (.208-.265)	.331 (.299-.353)	2542
Males	11-12	.077 (.070-.086)	.070 (.062-.082)	.116 (.104-.144)	.249 (.191-.295)	.355 (.295-.424)	1292
Males	13-14	.063 (.057-.069)	.052 (.046-.060)	.105 (.093-.124)	.234 (.190-.268)	.339 (.275-.454)	1532
Males	15-16	.062 (.055-.070)	.051 (.043-.060)	.110 (.091-.130)	.246 (.208-.270)	.339 (.287-.403)	1525
Females	11-12	.065 (.057-.075)	.058 (.050-.069)	.099 (.083-.122)	.218 (.177-.248)	.299 (.260-.350)	1287
Females	13-14	.054 (.048-.060)	.044 (.037-.052)	.084 (.073-.105)	.188 (.164-.210)	.260 (.229-.291)	1642
Females	15-16	.051 (.047-.056)	.041 (.036-.047)	.081 (.066-.095)	.197 (.152-.235)	.294 (.246-.332)	1560
Mexican Americans	11-12	.066 (.058-.075)	.063 (.052-.075)	.095 (.081-.104)	.152 (.109-.191)	.250 (.136-.349)	266
Mexican Americans	13-14	*	.040 (<LOD-.056)	.070 (.051-.100)	.139 (.105-.168)	.204 (.156-.309)	504
Mexican Americans	15-16	.051 (.045-.058)	.043 (.038-.051)	.075 (.062-.091)	.154 (.120-.196)	.245 (.183-.316)	557
Non-Hispanic blacks	11-12	.061 (.053-.071)	.058 (.047-.071)	.099 (.089-.116)	.184 (.153-.217)	.263 (.204-.341)	662
Non-Hispanic blacks	13-14	.059 (.051-.067)	.048 (.038-.058)	.117 (.091-.133)	.220 (.187-.243)	.273 (.245-.367)	611
Non-Hispanic blacks	15-16	.060 (.051-.070)	.045 (.038-.054)	.111 (.087-.151)	.256 (.185-.316)	.347 (.275-.455)	641
Non-Hispanic whites	11-12	.076 (.067-.086)	.066 (.057-.080)	.116 (.102-.144)	.259 (.215-.297)	.350 (.297-.386)	909
Non-Hispanic whites	13-14	.062 (.056-.069)	.050 (.045-.059)	.105 (.088-.133)	.227 (.190-.269)	.334 (.279-.455)	1287
Non-Hispanic whites	15-16	.059 (.053-.067)	.047 (.041-.056)	.103 (.086-.126)	.238 (.208-.266)	.331 (.290-.362)	999
All Hispanics	11-12	.061 (.056-.068)	.057 (.050-.067)	.088 (.081-.099)	.149 (.113-.184)	.212 (.151-.325)	551
All Hispanics	13-14	*	.043 (<LOD-.054)	.071 (.057-.097)	.145 (.113-.171)	.212 (.179-.251)	806
All Hispanics	15-16	.051 (.046-.057)	.042 (.036-.050)	.075 (.062-.097)	.168 (.133-.211)	.266 (.205-.363)	969
Asians	11-12	.059 (.053-.065)	.056 (.049-.064)	.084 (.074-.095)	.122 (.113-.150)	.181 (.141-.204)	374
Asians	13-14	*	.037 (<LOD-.047)	.061 (.048-.082)	.125 (.082-.159)	.179 (.134-.248)	362
Asians	15-16	*	.035 (<LOD-.046)	.057 (.049-.066)	.097 (.080-.120)	.132 (.101-.200)	349

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.034, 0.034, and 0.034 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Blood o-Xylene (2011 - 2016)

CAS Number 95-47-6

Geometric mean and selected percentiles of whole blood concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.031 (.027-.036)	.054 (.045-.064)	.077 (.062-.091)	2718
Total population	13-14	*	<LOD	.027 (<LOD-.031)	.049 (.043-.053)	.066 (.059-.075)	3204
Total population	15-16	*	<LOD	.025 (<LOD-.030)	.049 (.042-.059)	.070 (.061-.079)	3065
Age 12-19 years	11-12	*	<LOD	.027 (<LOD-.034)	.043 (.034-.048)	.051 (.043-.067)	517
Age 12-19 years	13-14	*	<LOD	<LOD	.035 (.028-.042)	.046 (.035-.069)	599
Age 12-19 years	15-16	*	<LOD	<LOD	.030 (.027-.036)	.045 (.034-.056)	540
Age 20 + years	11-12	*	<LOD	.032 (.028-.038)	.056 (.046-.068)	.080 (.065-.093)	2201
Age 20 + years	13-14	*	<LOD	.028 (<LOD-.032)	.050 (.045-.054)	.068 (.059-.081)	2605
Age 20 + years	15-16	*	<LOD	.026 (<LOD-.031)	.052 (.044-.062)	.071 (.064-.081)	2525
Males	11-12	*	<LOD	.034 (.029-.040)	.058 (.048-.069)	.088 (.068-.097)	1359
Males	13-14	*	<LOD	.030 (.026-.033)	.051 (.045-.061)	.074 (.060-.088)	1546
Males	15-16	*	<LOD	.028 (.024-.034)	.053 (.043-.063)	.072 (.060-.092)	1518
Females	11-12	*	<LOD	.028 (.024-.034)	.051 (.040-.060)	.067 (.056-.087)	1359
Females	13-14	*	<LOD	.025 (<LOD-.030)	.044 (.038-.050)	.059 (.050-.070)	1658
Females	15-16	*	<LOD	<LOD	.045 (.037-.055)	.067 (.057-.074)	1547
Mexican Americans	11-12	*	<LOD	.028 (.025-.031)	.042 (.033-.059)	.065 (.040-.265)	290
Mexican Americans	13-14	*	<LOD	<LOD	.038 (.028-.049)	.055 (.042-.075)	505
Mexican Americans	15-16	*	<LOD	<LOD	.036 (.026-.052)	.062 (.051-.080)	540
Non-Hispanic blacks	11-12	*	<LOD	.029 (<LOD-.033)	.046 (.038-.054)	.061 (.050-.070)	721
Non-Hispanic blacks	13-14	*	<LOD	.028 (.025-.030)	.049 (.039-.054)	.066 (.051-.081)	615
Non-Hispanic blacks	15-16	*	<LOD	.028 (<LOD-.034)	.053 (.044-.064)	.068 (.055-.112)	641
Non-Hispanic whites	11-12	*	<LOD	.034 (.028-.042)	.058 (.048-.072)	.087 (.068-.097)	946
Non-Hispanic whites	13-14	*	<LOD	.029 (.025-.033)	.051 (.044-.060)	.071 (.059-.090)	1305
Non-Hispanic whites	15-16	*	<LOD	.027 (<LOD-.033)	.053 (.044-.064)	.073 (.063-.082)	998
All Hispanics	11-12	*	<LOD	.026 (.024-.028)	.040 (.033-.050)	.057 (.042-.089)	571
All Hispanics	13-14	*	<LOD	<LOD	.039 (.031-.047)	.052 (.046-.062)	810
All Hispanics	15-16	*	<LOD	<LOD	.042 (.031-.054)	.064 (.052-.092)	952
Asians	11-12	*	<LOD	<LOD	.033 (.029-.040)	.046 (.035-.054)	398
Asians	13-14	*	<LOD	<LOD	.031 (<LOD-.043)	.048 (.031-.070)	364
Asians	15-16	*	<LOD	<LOD	.028 (<LOD-.033)	.036 (.028-.050)	347

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.024, 0.024, and 0.024 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Volatile Organic Compound (VOC) Metabolites

Urinary N-Acetyl-S-(2-carboxyethyl)-L-cysteine (2011 - 2016)†

CAS Number 51868-61-2

Metabolite of Acrolein

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	87.1 (79.9-95.0)	90.4 (84.5-98.6)	178 (163-196)	326 (294-374)	457 (399-560)	2466
Total population	13-14	79.0 (72.8-85.7)	81.7 (74.4-90.3)	167 (151-183)	299 (276-330)	434 (401-479)	2609
Total population	15-16	91.2 (82.4-101)	95.4 (84.8-106)	174 (154-191)	300 (261-357)	464 (397-515)	3015
Age 3-5 years	15-16	60.8 (54.3-68.0)	60.5 (52.3-70.5)	112 (93.2-125)	186 (163-211)	246 (191-351)	459
Age 6-11 years	11-12	69.7 (61.3-79.3)	71.3 (56.2-88.9)	144 (123-165)	236 (198-304)	330 (245-489)	394
Age 6-11 years	13-14	57.3 (50.1-65.4)	59.0 (51.8-71.9)	123 (105-135)	206 (169-257)	275 (220-308)	392
Age 6-11 years	15-16	72.9 (64.9-81.9)	73.0 (61.1-92.4)	128 (109-150)	190 (167-208)	261 (197-308)	373
Age 12-19 years	11-12	73.7 (58.2-93.3)	85.0 (63.5-98.6)	145 (111-187)	256 (198-296)	382 (290-437)	384
Age 12-19 years	13-14	76.8 (66.3-88.9)	82.9 (65.4-105)	149 (126-180)	260 (208-349)	387 (282-497)	443
Age 12-19 years	15-16	76.4 (67.2-87.0)	80.6 (67.7-92.3)	145 (120-169)	212 (191-248)	284 (232-370)	395
Age 20+ years	11-12	91.6 (83.3-101)	94.0 (85.4-107)	187 (168-209)	347 (298-399)	488 (411-637)	1688
Age 20+ years	13-14	82.1 (74.9-89.9)	84.5 (75.2-94.0)	177 (162-192)	327 (289-361)	458 (410-542)	1774
Age 20+ years	15-16	97.1 (86.7-109)	103 (90.4-112)	187 (164-206)	347 (274-406)	497 (417-559)	1788
Males	11-12	105 (95.8-116)	107 (96.8-114)	197 (174-231)	351 (316-414)	489 (438-576)	1251
Males	13-14	88.0 (78.5-98.6)	94.5 (80.4-107)	174 (153-193)	303 (276-340)	422 (381-470)	1299
Males	15-16	105 (96.6-115)	108 (100-120)	192 (176-209)	334 (286-399)	515 (412-550)	1499
Females	11-12	72.5 (64.3-81.9)	74.1 (64.0-85.4)	162 (142-178)	295 (240-356)	413 (342-608)	1215
Females	13-14	71.1 (65.5-77.2)	70.6 (61.5-78.2)	157 (139-184)	290 (261-348)	446 (392-542)	1310
Females	15-16	79.5 (70.3-89.8)	79.3 (71.0-92.4)	150 (132-171)	267 (240-307)	435 (352-486)	1516
Mexican Americans	11-12	81.5 (70.1-94.8)	79.5 (74.1-91.3)	144 (118-171)	248 (182-316)	368 (248-571)	313
Mexican Americans	13-14	72.0 (63.9-81.2)	76.8 (69.4-83.9)	135 (118-151)	208 (172-360)	383 (238-526)	443
Mexican Americans	15-16	84.9 (78.1-92.2)	90.1 (83.8-101)	157 (138-170)	225 (206-268)	363 (259-429)	578
Non-Hispanic blacks	11-12	129 (117-141)	136 (123-148)	238 (218-264)	373 (322-433)	539 (454-618)	662
Non-Hispanic blacks	13-14	138 (128-149)	144 (131-157)	243 (217-275)	432 (385-473)	526 (473-743)	562
Non-Hispanic blacks	15-16	148 (136-162)	145 (132-158)	260 (222-291)	447 (382-509)	675 (533-810)	656
Non-Hispanic whites	11-12	84.0 (74.4-94.7)	87.3 (78.9-98.6)	176 (151-203)	338 (285-384)	457 (398-596)	810
Non-Hispanic whites	13-14	75.2 (67.1-84.4)	75.6 (66.4-88.8)	161 (145-184)	299 (270-336)	438 (393-542)	973
Non-Hispanic whites	15-16	87.4 (77.6-98.5)	90.7 (76.7-103)	167 (140-194)	296 (241-393)	473 (376-538)	912
All Hispanics	11-12	79.9 (68.6-93.1)	82.5 (69.9-98.6)	147 (118-173)	267 (209-314)	379 (299-474)	566
All Hispanics	13-14	73.1 (66.5-80.2)	78.5 (71.7-86.0)	140 (125-155)	236 (192-290)	347 (249-450)	687
All Hispanics	15-16	83.9 (77.8-90.5)	90.6 (85.4-100)	158 (149-166)	231 (207-262)	349 (283-394)	970
Asians	11-12	65.8 (59.9-72.2)	69.8 (60.7-77.8)	123 (111-147)	236 (181-289)	337 (263-440)	341
Asians	13-14	53.4 (45.6-62.5)	53.9 (47.4-66.4)	94.0 (80.7-114)	183 (133-226)	261 (188-378)	284
Asians	15-16	66.1 (59.9-72.9)	69.6 (60.2-82.7)	132 (113-149)	190 (171-210)	256 (202-295)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 6.96, 6.96, and 6.96 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-carboxyethyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 51868-61-2

Metabolite of Acrolein

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	99.5 (92.7-107)	92.9 (86.7-97.5)	161 (145-173)	285 (245-329)	422 (348-494)	2464
Total population	13-14	91.4 (84.1-99.4)	87.7 (80.2-95.6)	151 (136-166)	265 (239-294)	380 (337-425)	2608
Total population	15-16	103 (96.7-110)	97.6 (88.5-106)	160 (148-173)	258 (236-280)	358 (323-390)	3012
Age 3-5 years	15-16	147 (137-156)	145 (134-156)	208 (194-223)	283 (254-320)	327 (306-352)	458
Age 6-11 years	11-12	99.5 (91.8-108)	98.1 (88.1-106)	159 (143-173)	227 (205-272)	311 (229-330)	393
Age 6-11 years	13-14	86.1 (78.7-94.2)	87.0 (77.8-97.2)	134 (118-154)	208 (173-223)	236 (210-267)	392
Age 6-11 years	15-16	106 (98.4-115)	108 (99.4-116)	152 (133-166)	206 (173-236)	250 (220-307)	373
Age 12-19 years	11-12	71.8 (63.8-80.7)	68.5 (60.1-75.5)	104 (86.2-124)	162 (129-225)	225 (160-334)	384
Age 12-19 years	13-14	69.6 (64.3-75.3)	69.0 (59.6-75.5)	111 (91.5-125)	169 (148-202)	241 (187-290)	443
Age 12-19 years	15-16	72.2 (64.8-80.4)	70.4 (62.3-80.6)	102 (87.1-116)	157 (124-178)	199 (166-223)	395
Age 20+ years	11-12	104 (96.7-113)	96.6 (91.0-103)	170 (157-181)	318 (262-370)	474 (373-590)	1687
Age 20+ years	13-14	95.8 (87.4-105)	91.3 (82.7-99.4)	159 (145-174)	293 (260-320)	412 (358-462)	1773
Age 20+ years	15-16	106 (98.8-115)	98.6 (89.7-111)	169 (151-184)	274 (246-291)	390 (350-429)	1786
Males	11-12	99 (92.1-106)	88.4 (80.0-98.4)	158 (138-173)	284 (242-334)	402 (329-488)	1250
Males	13-14	88.3 (79.4-98.2)	87.6 (78.2-95.2)	141 (128-153)	240 (204-259)	346 (295-372)	1298
Males	15-16	100 (93.9-107)	94.5 (85.2-105)	150 (139-168)	253 (214-280)	344 (290-378)	1499
Females	11-12	99.9 (90.4-110)	94.5 (88.1-102)	164 (150-174)	293 (228-370)	455 (322-678)	1214
Females	13-14	94.6 (86.7-103)	87.8 (80.2-97.8)	162 (145-184)	290 (251-325)	428 (355-474)	1310
Females	15-16	105 (96.7-115)	99.5 (89.4-111)	169 (152-189)	262 (233-290)	385 (333-416)	1513
Mexican Americans	11-12	92 (79.6-106)	86.3 (76.6-98.0)	140 (118-166)	212 (169-298)	308 (204-478)	313
Mexican Americans	13-14	82.3 (74.3-91.2)	78.0 (71.1-87.6)	122 (112-134)	215 (167-267)	309 (215-442)	443
Mexican Americans	15-16	93.1 (87.7-98.8)	91.1 (84.2-98.8)	137 (127-145)	208 (179-233)	263 (226-307)	577
Non-Hispanic blacks	11-12	100 (93.8-108)	97.5 (92.2-103)	158 (140-172)	247 (212-274)	321 (263-399)	662
Non-Hispanic blacks	13-14	106 (95.5-118)	102 (95.8-113)	169 (155-191)	288 (256-330)	381 (333-432)	562
Non-Hispanic blacks	15-16	118 (110-127)	117 (104-128)	180 (165-198)	273 (235-329)	367 (312-483)	654
Non-Hispanic whites	11-12	103 (93.4-113)	94.5 (86.1-102)	170 (148-188)	321 (269-381)	488 (390-579)	808
Non-Hispanic whites	13-14	92.7 (83.9-102)	87.2 (77.6-96.4)	155 (143-173)	289 (241-333)	412 (351-467)	972
Non-Hispanic whites	15-16	104 (95.1-113)	96.5 (84.3-109)	167 (147-187)	264 (235-304)	385 (330-426)	912
All Hispanics	11-12	89.4 (80.3-99.5)	85.0 (77.2-95.0)	136 (122-153)	210 (188-247)	296 (217-366)	566
All Hispanics	13-14	81.4 (75.4-87.9)	79.3 (72.9-85.6)	123 (111-138)	210 (172-238)	294 (217-426)	687
All Hispanics	15-16	95.5 (90.7-101)	93.7 (87.9-98.8)	139 (130-150)	213 (191-240)	280 (241-338)	969
Asians	11-12	88 (82.2-94.3)	87.5 (78.9-92.9)	131 (118-147)	207 (179-249)	301 (240-411)	341
Asians	13-14	84 (73.0-96.7)	84.9 (73.8-97.6)	129 (107-155)	201 (156-289)	306 (204-382)	284
Asians	15-16	91.2 (84.6-98.3)	86.4 (80.9-94.1)	134 (126-144)	202 (165-246)	276 (208-349)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(3-hydroxypropyl)-L-cysteine (2011 - 2016)†

CAS Number 23127-40-4

Metabolite of Acrolein

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	225 (207-243)	210 (191-232)	433 (384-491)	949 (831-1120)	1550 (1330-1950)	2466
Total population	13-14	215 (198-234)	203 (186-226)	436 (389-479)	912 (809-1070)	1430 (1250-1760)	2606
Total population	15-16	248 (220-279)	237 (209-266)	484 (430-539)	1020 (852-1220)	1670 (1360-2120)	2821
Age 3-5 years	15-16	163 (143-186)	154 (129-199)	308 (268-362)	583 (501-621)	848 (616-1060)	432
Age 6-11 years	11-12	169 (152-188)	171 (148-205)	342 (286-391)	524 (452-607)	671 (597-816)	394
Age 6-11 years	13-14	159 (142-178)	160 (132-196)	318 (272-369)	519 (460-677)	804 (625-883)	389
Age 6-11 years	15-16	208 (185-235)	191 (167-234)	380 (309-444)	676 (521-918)	949 (740-1130)	348
Age 12-19 years	11-12	191 (155-237)	189 (145-256)	377 (296-467)	675 (494-868)	1100 (657-1470)	384
Age 12-19 years	13-14	191 (165-222)	202 (168-232)	356 (289-422)	642 (556-814)	881 (718-1400)	445
Age 12-19 years	15-16	215 (190-244)	229 (195-254)	422 (328-479)	688 (542-846)	918 (759-1110)	363
Age 20+ years	11-12	237 (219-257)	220 (201-244)	464 (419-528)	1070 (934-1220)	1810 (1520-2150)	1688
Age 20+ years	13-14	226 (205-249)	210 (186-240)	469 (415-527)	1050 (890-1190)	1520 (1310-2010)	1772
Age 20+ years	15-16	262 (229-300)	249 (215-291)	520 (446-600)	1170 (985-1460)	1890 (1560-2290)	1678
Males	11-12	269 (248-292)	250 (226-269)	469 (415-547)	971 (831-1300)	1610 (1400-2350)	1251
Males	13-14	238 (213-266)	235 (196-263)	441 (386-512)	894 (786-1190)	1470 (1290-1590)	1299
Males	15-16	303 (272-339)	304 (264-344)	543 (473-615)	1150 (934-1390)	1670 (1360-2110)	1421
Females	11-12	189 (167-213)	165 (149-190)	395 (340-463)	897 (731-1200)	1440 (1260-1950)	1215
Females	13-14	195 (174-218)	184 (158-203)	430 (366-501)	949 (779-1070)	1420 (1070-2080)	1307
Females	15-16	204 (177-235)	184 (156-216)	399 (346-469)	895 (747-1030)	1760 (1020-2290)	1400
Mexican Americans	11-12	220 (185-262)	223 (183-283)	414 (346-475)	714 (558-831)	1030 (714-1440)	313
Mexican Americans	13-14	203 (179-230)	197 (176-228)	378 (341-437)	654 (518-1070)	1110 (654-1420)	441
Mexican Americans	15-16	239 (215-265)	234 (211-269)	423 (382-498)	809 (648-1020)	1180 (996-1450)	514
Non-Hispanic blacks	11-12	282 (247-321)	268 (239-296)	547 (446-631)	1070 (853-1350)	1640 (1350-1980)	662
Non-Hispanic blacks	13-14	301 (268-338)	289 (244-350)	560 (479-658)	1230 (1000-1410)	2020 (1410-2510)	571
Non-Hispanic blacks	15-16	354 (312-401)	322 (288-363)	665 (534-850)	1310 (1060-1660)	2420 (1660-3300)	627
Non-Hispanic whites	11-12	213 (191-238)	195 (174-220)	421 (364-488)	971 (771-1220)	1710 (1320-2150)	810
Non-Hispanic whites	13-14	202 (179-228)	185 (159-207)	421 (354-503)	957 (803-1160)	1470 (1190-2010)	963
Non-Hispanic whites	15-16	235 (202-272)	219 (192-249)	466 (377-561)	1040 (758-1460)	1790 (1360-2290)	863
All Hispanics	11-12	213 (187-244)	213 (171-262)	395 (354-438)	726 (577-853)	1060 (734-1500)	566
All Hispanics	13-14	205 (183-230)	208 (182-229)	389 (342-457)	662 (540-868)	1080 (764-1250)	684
All Hispanics	15-16	228 (212-246)	237 (212-258)	411 (382-446)	726 (607-863)	1150 (962-1300)	881
Asians	11-12	250 (230-271)	240 (201-298)	550 (435-640)	912 (731-1130)	1260 (1010-1900)	341
Asians	13-14	227 (195-264)	209 (190-247)	419 (366-498)	827 (664-1100)	1300 (838-1970)	287
Asians	15-16	255 (229-283)	264 (219-290)	530 (450-657)	912 (780-1050)	1160 (981-1600)	311

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 13.0, 13.0, and 13.0 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(3-hydroxypropyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 23127-40-4

Metabolite of Acrolein

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	256 (239-275)	211 (197-226)	413 (378-446)	909 (776-1050)	1620 (1340-2040)	2464
Total population	13-14	245 (225-268)	213 (193-235)	416 (373-468)	906 (796-1030)	1460 (1170-1790)	2605
Total population	15-16	281 (259-305)	237 (219-254)	432 (372-494)	1030 (792-1230)	1550 (1300-1810)	2818
Age 3-5 years	15-16	399 (366-435)	403 (364-431)	578 (530-632)	912 (770-1050)	1190 (957-1370)	431
Age 6-11 years	11-12	241 (225-258)	233 (210-249)	360 (316-391)	530 (433-621)	763 (552-923)	393
Age 6-11 years	13-14	232 (214-251)	214 (193-239)	321 (284-381)	599 (499-656)	706 (616-1120)	389
Age 6-11 years	15-16	302 (275-333)	279 (258-313)	427 (371-497)	643 (555-751)	804 (684-1130)	348
Age 12-19 years	11-12	186 (162-215)	169 (142-208)	273 (228-339)	443 (351-632)	645 (443-914)	384
Age 12-19 years	13-14	171 (152-193)	163 (132-198)	267 (238-302)	494 (393-575)	625 (503-1140)	445
Age 12-19 years	15-16	205 (184-228)	201 (166-222)	280 (250-318)	458 (333-660)	663 (485-762)	363
Age 20+ years	11-12	271 (253-290)	218 (200-235)	458 (421-500)	1080 (891-1310)	2010 (1620-2270)	1687
Age 20+ years	13-14	260 (236-287)	224 (202-246)	461 (400-521)	1010 (879-1140)	1700 (1300-2190)	1771
Age 20+ years	15-16	287 (261-317)	236 (214-255)	448 (377-530)	1190 (964-1370)	1680 (1420-2080)	1676
Males	11-12	253 (235-273)	205 (195-226)	393 (353-447)	815 (669-1030)	1380 (1110-1930)	1250
Males	13-14	237 (215-261)	213 (190-238)	373 (323-446)	777 (636-906)	1220 (913-1540)	1298
Males	15-16	289 (264-317)	246 (228-268)	443 (362-508)	947 (731-1220)	1500 (1190-1700)	1421
Females	11-12	260 (233-290)	217 (191-244)	426 (378-474)	1030 (775-1310)	1820 (1430-2250)	1214
Females	13-14	254 (223-289)	212 (186-241)	469 (378-556)	1080 (872-1320)	1730 (1320-2590)	1307
Females	15-16	274 (245-305)	228 (210-247)	423 (358-520)	1110 (819-1300)	1570 (1300-2070)	1397
Mexican Americans	11-12	248 (211-293)	224 (196-265)	362 (317-438)	617 (492-727)	815 (617-1360)	313
Mexican Americans	13-14	229 (206-254)	210 (198-230)	335 (300-370)	691 (479-921)	1010 (620-1760)	441
Mexican Americans	15-16	265 (247-283)	238 (212-253)	400 (332-448)	669 (566-806)	1110 (797-1300)	513
Non-Hispanic blacks	11-12	220 (200-241)	185 (166-215)	331 (298-389)	698 (580-853)	1020 (826-1330)	662
Non-Hispanic blacks	13-14	230 (205-257)	204 (178-236)	407 (320-469)	772 (660-1020)	1170 (986-1320)	571
Non-Hispanic blacks	15-16	283 (252-318)	252 (226-286)	460 (382-549)	908 (736-1020)	1510 (1080-1660)	625
Non-Hispanic whites	11-12	261 (237-286)	207 (194-226)	421 (371-472)	1080 (812-1340)	1990 (1430-2290)	808
Non-Hispanic whites	13-14	246 (220-274)	205 (184-231)	431 (372-499)	945 (848-1220)	1700 (1140-2290)	962
Non-Hispanic whites	15-16	279 (248-314)	228 (207-253)	424 (349-523)	1180 (900-1400)	1660 (1280-2410)	863
All Hispanics	11-12	239 (215-265)	217 (191-239)	363 (336-411)	637 (568-727)	859 (707-1220)	566
All Hispanics	13-14	225 (204-247)	208 (193-230)	331 (296-371)	693 (486-921)	1030 (689-1760)	684
All Hispanics	15-16	261 (248-275)	236 (219-246)	392 (345-417)	638 (542-767)	972 (806-1260)	880
Asians	11-12	334 (304-367)	311 (267-353)	563 (464-628)	964 (747-1160)	1370 (1040-2450)	341
Asians	13-14	357 (309-412)	329 (267-406)	576 (492-756)	1080 (831-1360)	1510 (1100-1910)	287
Asians	15-16	353 (320-390)	313 (271-356)	568 (513-677)	1090 (800-1280)	1360 (1090-1630)	311

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-carbamoylethyl)-L-cysteine (2011 - 2016)†

CAS Number 81690-92-8

Metabolite of Acrylamide

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	46.6 (43.6-49.9)	45.9 (43.1-48.9)	88.4 (82.8-95.9)	170 (155-195)	276 (211-370)	2466
Total population	13-14	45.7 (41.3-50.7)	45.8 (42.2-49.6)	96.5 (86.6-104)	181 (153-204)	265 (229-297)	2511
Total population	15-16	50.3 (46.2-54.7)	50.4 (44.8-57.1)	95.8 (85.9-110)	176 (157-196)	244 (210-283)	3015
Age 3-5 years	15-16	31.9 (28.1-36.2)	31.5 (26.7-37.9)	55.3 (51.6-60.8)	96.4 (84.0-112)	139 (102-197)	459
Age 6-11 years	11-12	39.6 (36.0-43.5)	44.5 (40.0-51.5)	69.8 (60.5-82.2)	111 (96.8-126)	139 (122-187)	394
Age 6-11 years	13-14	36.0 (30.8-42.0)	35.2 (32.0-38.9)	71.3 (52.9-83.9)	133 (96.7-183)	191 (133-246)	385
Age 6-11 years	15-16	41.6 (37.8-45.6)	43.7 (37.3-46.6)	69.0 (61.8-78.3)	109 (93.4-123)	150 (113-170)	373
Age 12-19 years	11-12	53.5 (45.2-63.4)	49.8 (41.9-66.3)	119 (95.2-142)	168 (158-202)	279 (168-439)	384
Age 12-19 years	13-14	51.0 (43.6-59.7)	54.4 (47.0-60.6)	102 (85.3-122)	171 (128-235)	267 (171-394)	426
Age 12-19 years	15-16	53.1 (48.3-58.4)	55.9 (50.2-62.3)	89.6 (82.1-105)	155 (132-189)	212 (156-260)	395
Age 20+ years	11-12	46.5 (42.6-50.7)	45.2 (42.4-49.0)	85.8 (79.9-97.4)	181 (154-208)	285 (221-384)	1688
Age 20+ years	13-14	46.2 (41.4-51.5)	45.8 (41.8-50.6)	97.8 (87.5-107)	187 (162-210)	274 (234-317)	1700
Age 20+ years	15-16	51.8 (47.1-57.0)	51.6 (44.7-60.8)	102 (89.7-119)	187 (167-209)	255 (228-309)	1788
Males	11-12	55.6 (50.8-60.9)	53.4 (48.8-59.8)	101 (84.9-116)	177 (157-215)	276 (220-382)	1251
Males	13-14	50.1 (44.4-56.6)	49.7 (45.5-55.0)	100 (89.7-114)	183 (158-226)	267 (236-314)	1240
Males	15-16	59.0 (54.2-64.3)	60.9 (53.4-66.9)	113 (96.6-125)	210 (176-238)	286 (238-343)	1499
Females	11-12	39.3 (35.4-43.7)	38.7 (34.9-42.8)	75.3 (67.1-84.6)	158 (127-195)	272 (193-382)	1215
Females	13-14	41.9 (37.4-46.8)	41.7 (35.7-46.5)	90.5 (78.6-102)	179 (144-200)	259 (203-304)	1271
Females	15-16	43.2 (39.0-47.7)	42.5 (36.8-48.0)	85.4 (75.6-94.3)	152 (133-164)	196 (177-229)	1516
Mexican Americans	11-12	48.6 (41.6-56.9)	51.5 (42.7-59.8)	87.7 (75.1-108)	143 (108-195)	195 (143-274)	313
Mexican Americans	13-14	49.5 (42.2-58.1)	52.4 (44.2-61.3)	94.0 (75.3-116)	153 (122-183)	199 (176-237)	425
Mexican Americans	15-16	53.2 (49.0-57.9)	56.3 (49.7-60.7)	101 (90.4-112)	156 (145-186)	214 (162-253)	578
Non-Hispanic blacks	11-12	59.3 (54.0-65.0)	55.8 (49.9-62.2)	115 (93.8-141)	234 (178-276)	349 (293-419)	662
Non-Hispanic blacks	13-14	71.5 (63.3-80.8)	69.0 (57.8-83.0)	141 (109-171)	267 (218-338)	439 (336-517)	551
Non-Hispanic blacks	15-16	73.1 (67.6-79.0)	73.3 (65.6-80.1)	139 (125-152)	253 (192-311)	356 (253-603)	656
Non-Hispanic whites	11-12	46.4 (42.0-51.3)	45.1 (41.4-49.6)	87.6 (78.5-101)	168 (151-202)	285 (195-420)	810
Non-Hispanic whites	13-14	43.5 (37.3-50.7)	42.8 (37.1-48.7)	94.8 (80.0-105)	180 (134-226)	266 (207-317)	923
Non-Hispanic whites	15-16	48.6 (43.6-54.1)	47.4 (42.2-57.1)	93.2 (78.4-113)	168 (150-186)	220 (194-268)	912
All Hispanics	11-12	43.4 (37.3-50.5)	45.6 (38.7-52.2)	80.0 (69.1-91.1)	143 (112-186)	192 (163-264)	566
All Hispanics	13-14	46.4 (41.1-52.4)	48.5 (42.2-53.7)	90.3 (74.9-109)	161 (127-183)	204 (175-258)	656
All Hispanics	15-16	49.0 (46.4-51.8)	50.1 (46.2-54.4)	90.5 (81.2-103)	152 (138-170)	228 (165-293)	970
Asians	11-12	31.8 (27.6-36.6)	33.3 (29.0-39.7)	58.4 (50.1-71.9)	109 (78.3-145)	153 (131-200)	341
Asians	13-14	29.3 (25.6-33.5)	28.2 (24.5-34.3)	51.4 (46.0-61.8)	107 (84.9-127)	158 (114-199)	280
Asians	15-16	34.5 (30.1-39.5)	32.4 (28.1-37.6)	74.9 (59.4-86.8)	131 (105-161)	183 (147-203)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.20, 2.20, and 2.20 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Acrylamide_BiomonitoringSummary.html

Urinary N-Acetyl-S-(2-carbamoylethyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 81690-92-8

Metabolite of Acrylamide

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	53.3 (50.3-56.4)	49.5 (47.4-51.7)	82.0 (76.6-89.4)	146 (127-168)	199 (167-237)	2464
Total population	13-14	53.2 (48.1-58.9)	49.6 (44.9-54.1)	87.0 (78.1-97.1)	158 (133-192)	233 (197-277)	2510
Total population	15-16	56.8 (54.1-59.7)	52.7 (49.0-56.2)	86.4 (79.3-95.1)	144 (125-162)	198 (172-231)	3012
Age 3-5 years	15-16	76.9 (72.4-81.8)	73.5 (68.5-80.4)	104 (96.6-115)	159 (136-191)	219 (173-242)	458
Age 6-11 years	11-12	56.8 (53.5-60.4)	52.8 (50.9-56.2)	77.9 (70.3-84.6)	119 (105-143)	173 (121-202)	393
Age 6-11 years	13-14	54.3 (48.5-60.8)	52.9 (47.2-58.1)	81.0 (72.4-87.0)	116 (105-148)	153 (118-163)	385
Age 6-11 years	15-16	60.6 (57.7-63.7)	59.0 (54.5-62.1)	78.9 (73.3-86.9)	117 (103-125)	134 (124-157)	373
Age 12-19 years	11-12	52.1 (46.3-58.7)	48.2 (42.5-53.3)	81.1 (66.5-94.7)	133 (105-203)	203 (128-366)	384
Age 12-19 years	13-14	46 (41.2-51.4)	41.6 (36.2-47.3)	72.0 (61.9-82.8)	131 (99.5-189)	201 (152-256)	426
Age 12-19 years	15-16	50.1 (46.3-54.3)	47.0 (43.5-51.6)	66.0 (63.5-78.8)	126 (91.7-167)	183 (126-222)	395
Age 20+ years	11-12	53.1 (49.7-56.6)	49.0 (46.0-52.0)	83.1 (76.6-91.5)	150 (129-173)	199 (162-262)	1687
Age 20+ years	13-14	54.3 (48.6-60.6)	50.5 (45.8-55.4)	90.0 (79.6-102)	171 (139-209)	246 (212-293)	1699
Age 20+ years	15-16	56.8 (53.5-60.2)	51.2 (46.9-56.2)	90.1 (79.8-100)	152 (127-171)	210 (180-237)	1786
Males	11-12	52.3 (49.0-55.8)	48.4 (43.4-54.6)	82.5 (73.5-92.8)	145 (124-159)	187 (159-230)	1250
Males	13-14	50.6 (45.6-56.1)	48.0 (42.1-53.5)	81.8 (72.7-92.3)	146 (123-171)	224 (176-255)	1239
Males	15-16	56.3 (53.0-59.8)	49.5 (46.2-54.6)	90.3 (79.5-102)	148 (130-165)	198 (173-232)	1499
Females	11-12	54.3 (49.5-59.6)	50.3 (46.8-53.7)	82.0 (73.7-93.9)	155 (127-175)	210 (170-283)	1214
Females	13-14	55.9 (49.9-62.6)	51.2 (46.5-54.8)	89.0 (79.6-105)	179 (138-210)	256 (199-313)	1271
Females	15-16	57.3 (53.8-61.1)	55.6 (50.4-59.6)	84.5 (76.1-93.4)	141 (118-162)	198 (167-231)	1513
Mexican Americans	11-12	54.9 (45.6-66.1)	53.2 (45.3-61.0)	86.8 (69.9-104)	137 (104-183)	183 (135-215)	313
Mexican Americans	13-14	57.6 (50.7-65.3)	56.3 (47.9-67.4)	87.6 (74.6-105)	137 (111-165)	178 (142-212)	425
Mexican Americans	15-16	58.4 (54.2-62.9)	56.2 (52.3-60.7)	82.2 (73.6-91.9)	128 (114-153)	168 (153-202)	577
Non-Hispanic blacks	11-12	46.2 (42.7-50.0)	43.2 (41.0-46.4)	74.7 (66.4-80.8)	134 (110-156)	175 (148-210)	662
Non-Hispanic blacks	13-14	54.8 (48.2-62.3)	51.1 (44.6-57.7)	91.9 (77.2-109)	157 (133-225)	277 (220-320)	551
Non-Hispanic blacks	15-16	58.5 (54.7-62.5)	56.2 (52.6-60.0)	92.9 (77.9-105)	147 (123-190)	229 (173-273)	654
Non-Hispanic whites	11-12	56.8 (52.7-61.2)	51.7 (48.5-55.3)	88.1 (79.3-98.1)	159 (129-186)	215 (170-306)	808
Non-Hispanic whites	13-14	53.9 (47.3-61.4)	49.9 (43.6-55.1)	88.1 (77.1-101)	170 (130-222)	248 (195-310)	922
Non-Hispanic whites	15-16	57.6 (53.5-62.1)	52.6 (47.2-57.7)	89.8 (77.6-100)	145 (124-171)	204 (170-245)	912
All Hispanics	11-12	48.6 (41.8-56.3)	46.4 (42.0-50.7)	76.5 (65.7-87.6)	122 (101-143)	173 (127-215)	566
All Hispanics	13-14	52.4 (46.9-58.6)	50.6 (45.8-57.5)	84.3 (73.6-98.0)	135 (112-176)	195 (145-233)	656
All Hispanics	15-16	55.8 (52.3-59.5)	53.7 (47.9-58.5)	80.5 (73.8-86.7)	138 (116-153)	183 (156-230)	969
Asians	11-12	42.5 (38.4-47.0)	40.9 (35.5-45.1)	69.0 (58.1-79.3)	106 (94.3-126)	154 (124-166)	341
Asians	13-14	46.1 (40.9-52.0)	43.0 (37.1-50.3)	75.2 (59.1-96.6)	119 (105-139)	158 (119-183)	280
Asians	15-16	47.6 (43.9-51.6)	45.6 (39.2-51.8)	75.6 (65.7-90.4)	117 (102-128)	147 (126-180)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Acrylamide_BiomonitoringSummary.html

Urinary N-Acetyl-S-(2-carbamoyl-2-hydroxyethyl)-L-cysteine (2011 - 2016)†

CAS Number 81690-92-8

Metabolite of Acrylamide

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	14.2 (13.0-15.5)	25.5 (24.1-27.7)	37.0 (31.2-45.0)	2466
Total population	13-14	*	<LOD	14.4 (13.0-15.4)	26.7 (23.0-29.0)	35.4 (31.8-41.1)	2636
Total population	15-16	*	<LOD	13.6 (12.0-15.3)	23.1 (20.8-25.1)	32.7 (27.4-38.3)	3015
Age 3-5 years	15-16	*	<LOD	9.67 (<LOD-11.3)	14.7 (13.2-19.8)	21.6 (18.1-27.8)	459
Age 6-11 years	11-12	*	<LOD	13.8 (12.6-15.2)	22.0 (17.9-26.0)	29.4 (21.1-35.1)	394
Age 6-11 years	13-14	*	<LOD	12.6 (10.3-15.0)	21.9 (16.8-26.6)	27.6 (22.4-32.2)	398
Age 6-11 years	15-16	*	<LOD	11.7 (10.9-12.4)	16.8 (14.2-19.8)	22.5 (18.3-24.6)	373
Age 12-19 years	11-12	*	9.47 (<LOD-11.8)	16.1 (13.2-20.5)	28.3 (22.2-37.8)	39.3 (30.0-49.1)	384
Age 12-19 years	13-14	*	<LOD	14.6 (12.6-16.0)	23.5 (18.9-32.2)	33.0 (24.9-50.5)	447
Age 12-19 years	15-16	*	<LOD	12.7 (11.2-14.7)	19.3 (17.6-21.7)	24.0 (21.6-30.3)	395
Age 20+ years	11-12	*	<LOD	13.9 (12.6-15.4)	25.1 (22.9-28.3)	37.3 (30.1-49.2)	1688
Age 20+ years	13-14	*	<LOD	14.5 (12.9-15.8)	27.3 (23.9-30.8)	37.6 (31.8-42.9)	1791
Age 20+ years	15-16	*	<LOD	14.3 (12.3-16.1)	24.7 (22.1-27.4)	35.6 (29.1-41.7)	1788
Males	11-12	*	<LOD	15.2 (13.9-17.2)	25.2 (22.9-28.2)	36.6 (30.3-43.2)	1251
Males	13-14	*	<LOD	14.4 (12.8-15.4)	27.6 (24.5-30.1)	37.8 (32.3-43.5)	1309
Males	15-16	*	<LOD	15.2 (13.3-17.0)	24.8 (22.4-29.1)	35.8 (29.1-43.9)	1499
Females	11-12	*	<LOD	12.9 (12.1-14.7)	25.9 (21.1-29.2)	38.4 (29.3-51.3)	1215
Females	13-14	*	<LOD	14.5 (12.5-15.9)	25.5 (21.2-29.5)	34.3 (28.7-42.2)	1327
Females	15-16	*	<LOD	12.1 (10.8-13.8)	20.3 (18.3-24.3)	29.8 (24.8-32.2)	1516
Mexican Americans	11-12	*	9.53 (<LOD-10.3)	14.6 (12.6-17.4)	22.4 (17.4-30.0)	30.0 (22.4-41.3)	313
Mexican Americans	13-14	*	<LOD	15.2 (12.3-18.6)	24.7 (18.8-30.6)	30.6 (26.2-36.0)	451
Mexican Americans	15-16	*	<LOD	13.5 (12.2-15.2)	23.1 (19.8-26.1)	29.4 (24.5-36.2)	578
Non-Hispanic blacks	11-12	*	9.70 (<LOD-11.3)	16.9 (14.4-20.1)	30.6 (26.3-36.2)	43.2 (37.0-52.4)	662
Non-Hispanic blacks	13-14	*	9.88 (<LOD-10.5)	18.9 (15.1-22.8)	33.0 (27.9-44.5)	52.5 (38.8-57.7)	571
Non-Hispanic blacks	15-16	*	10.1 (<LOD-11.2)	17.0 (15.9-19.1)	31.8 (22.6-44.7)	46.5 (31.8-68.1)	656
Non-Hispanic whites	11-12	*	<LOD	14.4 (12.5-16.6)	25.9 (23.6-28.3)	38.3 (29.2-53.0)	810
Non-Hispanic whites	13-14	*	<LOD	14.1 (12.1-16.1)	27.0 (21.7-30.9)	35.3 (31.5-42.5)	973
Non-Hispanic whites	15-16	*	<LOD	13.6 (11.3-15.5)	22.4 (19.9-24.8)	31.0 (25.1-37.6)	912
All Hispanics	11-12	*	<LOD	13.5 (12.0-15.3)	21.9 (17.4-28.9)	30.0 (23.8-37.1)	566
All Hispanics	13-14	*	<LOD	15.0 (12.7-16.6)	24.7 (19.6-29.2)	31.6 (26.6-38.0)	699
All Hispanics	15-16	*	<LOD	12.6 (11.6-13.9)	21.9 (18.8-24.6)	29.4 (22.6-38.3)	970
Asians	11-12	*	<LOD	9.93 (<LOD-11.0)	13.9 (12.9-15.5)	17.3 (14.7-24.1)	341
Asians	13-14	*	<LOD	<LOD	13.0 (11.0-15.4)	17.3 (13.7-21.6)	289
Asians	15-16	*	<LOD	9.55 (<LOD-11.8)	16.2 (13.8-17.7)	19.1 (17.1-25.4)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 9.40, 9.40, and 9.40 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Acrylamide_BiomonitoringSummary.html

Urinary N-Acetyl-S-(2-carbamoyl-2-hydroxyethyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 81690-92-8

Metabolite of Acrylamide

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	18.0 (17.0-19.2)	28.9 (25.6-33.6)	39.1 (35.9-42.0)	2464
Total population	13-14	*	<LOD	18.5 (16.6-20.2)	28.7 (26.6-31.1)	39.1 (35.0-44.3)	2635
Total population	15-16	*	<LOD	17.1 (16.2-18.0)	26.4 (23.8-27.6)	32.5 (30.2-35.0)	3012
Age 3-5 years	15-16	*	<LOD	28.9 (<LOD-30.2)	41.6 (36.9-47.5)	60.5 (47.5-66.5)	458
Age 6-11 years	11-12	*	<LOD	20.2 (18.5-22.4)	33.3 (24.6-40.0)	40.0 (35.0-59.5)	393
Age 6-11 years	13-14	*	<LOD	20.8 (18.0-22.9)	30.2 (23.8-39.1)	39.1 (31.7-44.3)	398
Age 6-11 years	15-16	*	<LOD	18.0 (15.7-19.0)	25.6 (21.5-27.7)	35.0 (26.6-36.9)	373
Age 12-19 years	11-12	*	10.1 (<LOD-11.3)	16.2 (13.1-17.7)	29.4 (19.6-39.1)	40.5 (26.6-73.9)	384
Age 12-19 years	13-14	*	<LOD	13.8 (12.8-15.1)	21.0 (19.0-25.6)	31.7 (22.2-38.6)	447
Age 12-19 years	15-16	*	<LOD	13.0 (10.7-14.8)	19.0 (16.2-22.8)	25.6 (19.6-30.4)	395
Age 20+ years	11-12	*	<LOD	18.0 (17.0-19.6)	28.0 (24.6-34.1)	37.3 (34.6-42.0)	1687
Age 20+ years	13-14	*	<LOD	18.7 (16.6-20.2)	29.2 (26.7-31.7)	39.1 (35.1-47.5)	1790
Age 20+ years	15-16	*	<LOD	17.2 (15.8-18.5)	26.5 (23.7-27.7)	32.1 (29.6-34.8)	1786
Males	11-12	*	<LOD	15.4 (14.2-16.6)	23.2 (21.0-26.0)	33.3 (26.7-37.3)	1250
Males	13-14	*	<LOD	15.8 (14.8-16.6)	23.3 (21.5-26.7)	34.1 (27.8-41.4)	1308
Males	15-16	*	<LOD	15.3 (14.1-16.4)	22.9 (21.9-25.0)	31.3 (28.0-32.1)	1499
Females	11-12	*	<LOD	21.5 (19.1-22.9)	34.6 (28.9-37.7)	46.8 (38.7-51.2)	1214
Females	13-14	*	<LOD	20.5 (18.5-23.4)	31.7 (28.7-36.9)	41.6 (36.9-51.2)	1327
Females	15-16	*	<LOD	18.5 (17.5-20.2)	26.6 (24.6-30.2)	34.8 (31.7-37.1)	1513
Mexican Americans	11-12	*	11.7 (<LOD-12.6)	16.1 (13.3-20.0)	25.2 (19.3-30.5)	30.5 (23.1-35.8)	313
Mexican Americans	13-14	*	<LOD	17.5 (15.8-19.6)	24.6 (22.4-26.6)	30.7 (24.4-54.3)	451
Mexican Americans	15-16	*	<LOD	15.9 (14.8-17.1)	26.4 (21.5-29.3)	33.3 (30.2-37.3)	577
Non-Hispanic blacks	11-12	*	8.61 (<LOD-9.33)	14.1 (12.1-16.0)	21.5 (19.7-23.5)	25.5 (24.3-31.6)	662
Non-Hispanic blacks	13-14	*	9.06 (<LOD-10.1)	14.1 (12.5-15.6)	21.5 (18.0-24.3)	27.1 (22.2-38.1)	571
Non-Hispanic blacks	15-16	*	8.87 (<LOD-9.46)	13.9 (11.9-16.2)	20.2 (17.3-26.6)	28.7 (23.9-33.3)	654
Non-Hispanic whites	11-12	*	<LOD	19.5 (17.8-21.0)	31.7 (26.6-35.9)	41.0 (36.9-47.5)	808
Non-Hispanic whites	13-14	*	<LOD	19.6 (17.4-21.0)	31.7 (28.6-35.1)	43.7 (36.9-48.7)	972
Non-Hispanic whites	15-16	*	<LOD	18.0 (16.5-19.5)	26.6 (23.8-28.8)	32.1 (28.9-35.0)	912
All Hispanics	11-12	*	<LOD	15.9 (13.9-18.5)	25.5 (20.2-30.2)	30.5 (25.6-36.9)	566
All Hispanics	13-14	*	<LOD	17.1 (15.8-18.5)	25.6 (22.4-27.0)	31.5 (25.6-47.5)	699
All Hispanics	15-16	*	<LOD	16.2 (15.1-17.6)	26.6 (22.9-28.9)	35.0 (31.2-41.6)	969
Asians	11-12	*	<LOD	16.6 (<LOD-19.3)	27.7 (22.2-32.6)	36.9 (27.7-47.5)	341
Asians	13-14	*	<LOD	<LOD	27.7 (24.6-31.7)	35.0 (29.1-55.4)	289
Asians	15-16	*	<LOD	16.2 (<LOD-17.7)	27.7 (19.0-37.0)	39.1 (28.9-41.6)	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Acrylamide_BiomonitoringSummary.html

Urinary N-Acetyl-S-(1-cyano-2-hydroxyethyl)-L-cysteine (2015 - 2016)

CAS Number 116477-44-2

Metabolite of Acrylonitrile

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	17.6 (10.5-25.0)	37.9 (25.0-56.1)	3015
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	459
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	5.97 (<LOD-15.1)	395
Age 20+ years	15-16	*	<LOD	<LOD	22.8 (14.6-35.6)	46.8 (32.0-66.0)	1788
Males	15-16	*	<LOD	<LOD	21.4 (11.0-32.5)	42.8 (29.7-62.8)	1499
Females	15-16	*	<LOD	<LOD	14.9 (6.38-19.1)	33.1 (16.6-58.1)	1516
Mexican Americans	15-16	*	<LOD	<LOD	4.54 (<LOD-7.40)	18.9 (7.40-31.8)	578
Non-Hispanic blacks	15-16	*	<LOD	4.63 (<LOD-13.4)	35.6 (23.7-49.8)	63.3 (42.8-102)	656
Non-Hispanic whites	15-16	*	<LOD	<LOD	18.1 (9.84-26.3)	37.2 (22.4-58.5)	912
All Hispanics	15-16	*	<LOD	<LOD	4.82 (<LOD-7.40)	21.5 (13.4-35.7)	970
Asians	15-16	*	<LOD	<LOD	<LOD	7.15 (3.41-11.6)	329

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 2.60.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Acetyl-S-(1-cyano-2-hydroxyethyl)-L-cysteine (creatinine corrected) (2015 - 2016)

CAS Number 116477-44-2

Metabolite of Acrylonitrile

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	18.0 (12.8-24.8)	36.0 (29.2-44.0)	3012
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	458
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	10.1 (<LOD-20.4)	395
Age 20+ years	15-16	*	<LOD	<LOD	24.1 (16.1-33.8)	43.0 (34.8-52.5)	1786
Males	15-16	*	<LOD	<LOD	22.1 (12.9-26.7)	33.8 (26.4-46.0)	1499
Females	15-16	*	<LOD	<LOD	15.7 (11.4-26.3)	39.1 (33.8-50.3)	1513
Mexican Americans	15-16	*	<LOD	<LOD	9.73 (<LOD-11.5)	20.9 (11.5-25.5)	577
Non-Hispanic blacks	15-16	*	<LOD	6.38 (<LOD-13.1)	21.4 (14.7-29.8)	36.2 (23.8-51.2)	654
Non-Hispanic whites	15-16	*	<LOD	<LOD	22.3 (12.3-33.8)	39.9 (30.5-53.4)	912
All Hispanics	15-16	*	<LOD	<LOD	10.8 (<LOD-13.1)	24.5 (16.1-30.7)	969
Asians	15-16	*	<LOD	<LOD	<LOD	13.1 (10.8-15.3)	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Acetyl-S-(2-cyanoethyl)-L-cysteine (2011 - 2016)†

CAS Number 74514-75-3

Metabolite of Acrylonitrile

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.40 (2.97-3.90)	1.71 (1.61-1.86)	5.42 (4.03-8.55)	136 (100-172)	276 (238-323)	2466
Total population	13-14	3.18 (2.79-3.62)	1.65 (1.50-1.81)	5.29 (4.19-6.62)	111 (90.0-130)	234 (182-274)	2576
Total population	15-16	2.49 (2.00-3.11)	1.35 (1.19-1.53)	4.17 (3.01-7.47)	95.5 (61.5-142)	192 (136-292)	3015
Age 3-5 years	15-16	.939 (.842-1.05)	.886 (.770-1.03)	1.54 (1.33-1.88)	2.70 (2.08-3.96)	4.83 (3.49-5.88)	459
Age 6-11 years	11-12	1.47 (1.35-1.60)	1.38 (1.30-1.58)	2.44 (2.18-2.90)	4.27 (3.15-5.40)	6.71 (4.26-9.62)	394
Age 6-11 years	13-14	1.37 (1.20-1.55)	1.31 (1.04-1.65)	2.28 (1.88-2.83)	4.17 (3.58-5.10)	6.25 (4.63-8.17)	387
Age 6-11 years	15-16	1.05 (.888-1.25)	1.08 (.768-1.40)	1.77 (1.51-2.04)	2.90 (2.51-3.60)	4.58 (3.08-5.36)	373
Age 12-19 years	11-12	2.65 (2.07-3.39)	1.68 (1.36-2.13)	3.79 (2.90-5.85)	40.6 (9.71-88.9)	135 (43.9-276)	384
Age 12-19 years	13-14	2.42 (1.84-3.18)	1.67 (1.38-2.16)	3.74 (2.50-6.23)	21.8 (6.50-124)	149 (22.6-182)	438
Age 12-19 years	15-16	1.47 (1.18-1.85)	1.18 (.954-1.36)	2.55 (1.89-3.19)	10.0 (4.88-20.7)	25.6 (10.7-62.1)	395
Age 20+ years	11-12	3.87 (3.32-4.52)	1.78 (1.61-1.98)	10.3 (5.71-19.9)	164 (131-203)	310 (239-385)	1688
Age 20+ years	13-14	3.61 (3.13-4.17)	1.69 (1.52-1.89)	8.30 (5.68-13.9)	126 (105-162)	265 (201-323)	1751
Age 20+ years	15-16	3.04 (2.38-3.89)	1.48 (1.25-1.73)	8.11 (3.88-21.6)	133 (87.0-178)	236 (162-359)	1788
Males	11-12	4.27 (3.60-5.06)	2.14 (1.92-2.35)	9.79 (5.39-17.1)	166 (117-207)	294 (217-439)	1251
Males	13-14	3.52 (2.96-4.19)	1.83 (1.62-2.04)	6.69 (4.64-9.71)	101 (76.0-139)	218 (161-310)	1276
Males	15-16	3.22 (2.55-4.08)	1.62 (1.46-1.86)	6.58 (3.81-18.2)	136 (82.5-187)	258 (157-390)	1499
Females	11-12	2.73 (2.16-3.46)	1.42 (1.26-1.61)	3.72 (2.83-5.55)	118 (74.4-142)	260 (142-310)	1215
Females	13-14	2.88 (2.41-3.45)	1.50 (1.30-1.72)	4.34 (3.47-6.02)	113 (80.7-153)	234 (162-278)	1300
Females	15-16	1.95 (1.52-2.50)	1.11 (.918-1.27)	2.92 (2.28-4.33)	84.2 (39.5-110)	145 (100-217)	1516
Mexican Americans	11-12	2.51 (1.88-3.36)	1.61 (1.31-1.87)	3.50 (2.74-6.61)	51.6 (12.6-105)	105 (38.8-174)	313
Mexican Americans	13-14	1.95 (1.62-2.35)	1.45 (1.23-1.74)	2.67 (2.21-3.31)	29.8 (4.90-64.3)	92.2 (36.8-126)	447
Mexican Americans	15-16	1.71 (1.50-1.95)	1.18 (.999-1.31)	2.26 (2.06-2.79)	19.7 (11.0-42.8)	90.1 (42.8-176)	578
Non-Hispanic blacks	11-12	5.02 (3.99-6.32)	2.63 (2.16-3.11)	9.18 (5.27-24.4)	166 (123-228)	339 (234-429)	662
Non-Hispanic blacks	13-14	6.86 (5.80-8.11)	2.82 (2.45-3.35)	46.8 (23.7-72.5)	249 (156-318)	449 (310-548)	558
Non-Hispanic blacks	15-16	5.71 (4.25-7.67)	2.41 (1.97-2.96)	34.1 (12.6-89.5)	210 (127-292)	376 (237-466)	656
Non-Hispanic whites	11-12	3.46 (2.95-4.07)	1.63 (1.47-1.82)	6.33 (3.97-12.6)	146 (117-203)	280 (228-350)	810
Non-Hispanic whites	13-14	3.18 (2.60-3.88)	1.58 (1.38-1.85)	5.89 (3.90-9.93)	113 (80.7-153)	232 (165-280)	935
Non-Hispanic whites	15-16	2.48 (1.88-3.28)	1.30 (1.11-1.58)	4.28 (2.92-10.4)	98.7 (59.9-151)	182 (123-315)	912
All Hispanics	11-12	2.57 (2.01-3.28)	1.57 (1.41-1.79)	3.49 (2.78-5.42)	58.5 (17.3-105)	158 (74.3-253)	566
All Hispanics	13-14	2.24 (1.75-2.87)	1.53 (1.33-1.76)	2.97 (2.53-3.75)	40.2 (7.93-90.0)	121 (53.2-212)	693
All Hispanics	15-16	1.75 (1.55-1.98)	1.18 (1.07-1.28)	2.36 (2.15-2.85)	25.6 (12.9-44.6)	118 (64.5-178)	970
Asians	11-12	1.90 (1.65-2.21)	1.40 (1.24-1.65)	2.73 (2.18-3.10)	12.3 (4.53-48.4)	91.4 (24.4-133)	341
Asians	13-14	1.57 (1.21-2.03)	1.26 (1.03-1.53)	2.48 (1.85-2.85)	5.91 (2.99-50.1)	50.1 (4.89-177)	286
Asians	15-16	1.29 (1.09-1.51)	.965 (.828-1.16)	1.94 (1.61-2.32)	6.51 (3.35-23.8)	49.5 (8.45-97.4)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.500, 0.500, and 0.500 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-cyanoethyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 74514-75-3

Metabolite of Acrylonitrile

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	3.89 (3.44-4.40)	1.83 (1.73-1.93)	5.28 (4.08-7.59)	157 (119-194)	256 (224-300)	2464
Total population	13-14	3.72 (3.29-4.20)	1.87 (1.71-2.02)	5.83 (4.37-8.61)	121 (97.0-144)	227 (180-286)	2575
Total population	15-16	2.82 (2.33-3.40)	1.37 (1.26-1.48)	3.57 (2.61-6.83)	105 (65.5-143)	190 (153-225)	3012
Age 3-5 years	15-16	2.27 (2.11-2.44)	2.13 (1.89-2.31)	3.34 (3.06-3.58)	5.06 (4.19-6.20)	7.39 (6.12-9.35)	458
Age 6-11 years	11-12	2.11 (1.91-2.33)	2.00 (1.81-2.22)	2.95 (2.53-3.59)	5.00 (3.92-5.78)	6.31 (5.74-7.95)	393
Age 6-11 years	13-14	2.04 (1.80-2.31)	1.87 (1.62-2.29)	3.18 (2.77-3.97)	5.74 (4.30-7.22)	7.27 (5.91-9.83)	387
Age 6-11 years	15-16	1.54 (1.35-1.75)	1.42 (1.26-1.61)	2.07 (1.74-2.51)	3.37 (2.51-4.55)	5.37 (3.28-8.85)	373
Age 12-19 years	11-12	2.58 (2.10-3.18)	1.73 (1.51-1.88)	3.28 (2.35-5.84)	19.3 (7.61-58.9)	157 (17.6-228)	384
Age 12-19 years	13-14	2.21 (1.77-2.75)	1.46 (1.29-1.78)	3.47 (2.35-4.83)	14.1 (5.53-84.7)	89.7 (15.1-152)	438
Age 12-19 years	15-16	1.39 (1.10-1.76)	.991 (.887-1.11)	1.76 (1.39-2.43)	6.40 (2.72-25.4)	35.7 (5.79-85.0)	395
Age 20+ years	11-12	4.43 (3.85-5.09)	1.82 (1.66-2.00)	8.86 (5.46-20.6)	188 (151-224)	292 (238-339)	1687
Age 20+ years	13-14	4.27 (3.74-4.87)	1.95 (1.76-2.08)	9.07 (6.10-17.0)	144 (122-176)	272 (215-332)	1750
Age 20+ years	15-16	3.34 (2.70-4.13)	1.41 (1.30-1.51)	6.83 (3.25-27.7)	135 (94.8-171)	216 (173-255)	1786
Males	11-12	4.02 (3.34-4.83)	1.76 (1.61-1.93)	7.71 (4.18-20.2)	153 (116-220)	238 (220-278)	1250
Males	13-14	3.56 (3.05-4.15)	1.73 (1.56-1.97)	6.39 (4.64-8.89)	110 (67.2-146)	228 (168-281)	1275
Males	15-16	3.08 (2.47-3.83)	1.34 (1.23-1.47)	6.14 (2.90-19.9)	114 (70.2-161)	188 (149-222)	1499
Females	11-12	3.77 (3.01-4.73)	1.87 (1.71-2.09)	4.37 (3.22-6.59)	158 (86.4-228)	292 (229-315)	1214
Females	13-14	3.88 (3.21-4.68)	1.95 (1.72-2.21)	5.43 (3.91-9.19)	135 (91.6-172)	223 (176-353)	1300
Females	15-16	2.59 (2.08-3.22)	1.41 (1.22-1.54)	3.03 (2.36-4.32)	85.0 (57.6-129)	196 (140-240)	1513
Mexican Americans	11-12	2.84 (2.20-3.66)	1.65 (1.49-1.86)	3.52 (2.40-7.27)	41.8 (20.0-93.2)	128 (39.4-345)	313
Mexican Americans	13-14	2.24 (1.85-2.71)	1.44 (1.33-1.53)	2.72 (2.07-3.68)	26.4 (6.62-57.4)	71.0 (36.3-184)	447
Mexican Americans	15-16	1.88 (1.69-2.08)	1.20 (1.11-1.30)	2.22 (1.89-2.75)	21.5 (10.0-33.7)	81.4 (31.0-142)	577
Non-Hispanic blacks	11-12	3.91 (3.18-4.81)	1.92 (1.74-2.10)	7.14 (3.58-33.5)	120 (92.2-139)	199 (145-241)	662
Non-Hispanic blacks	13-14	5.26 (4.35-6.34)	2.28 (2.00-2.79)	31.0 (13.5-60.5)	177 (121-226)	280 (206-387)	558
Non-Hispanic blacks	15-16	4.57 (3.38-6.19)	1.78 (1.48-2.49)	32.2 (7.79-66.8)	134 (106-163)	205 (163-252)	654
Non-Hispanic whites	11-12	4.25 (3.67-4.92)	1.85 (1.74-1.97)	6.40 (4.02-13.7)	200 (157-230)	292 (238-342)	808
Non-Hispanic whites	13-14	3.98 (3.35-4.72)	1.95 (1.74-2.18)	7.21 (4.45-12.0)	126 (99.3-172)	260 (179-332)	934
Non-Hispanic whites	15-16	2.95 (2.30-3.78)	1.38 (1.23-1.49)	3.73 (2.36-12.9)	117 (61.2-184)	206 (159-251)	912
All Hispanics	11-12	2.88 (2.37-3.49)	1.62 (1.53-1.78)	3.38 (2.65-4.56)	54.1 (31.6-91.7)	146 (67.8-230)	566
All Hispanics	13-14	2.51 (1.96-3.23)	1.49 (1.40-1.69)	2.97 (2.28-4.51)	43.2 (8.51-89.7)	146 (51.3-235)	693
All Hispanics	15-16	2 (1.78-2.24)	1.24 (1.14-1.34)	2.40 (2.00-2.75)	30.2 (15.2-51.8)	96.4 (61.7-145)	969
Asians	11-12	2.55 (2.26-2.87)	1.76 (1.61-2.15)	3.50 (2.89-4.18)	13.0 (5.64-37.8)	68.0 (26.8-98.5)	341
Asians	13-14	2.46 (1.94-3.12)	1.97 (1.61-2.31)	3.22 (2.72-4.12)	9.28 (4.23-82.3)	82.3 (8.63-144)	286
Asians	15-16	1.77 (1.51-2.09)	1.34 (1.18-1.46)	2.10 (1.82-2.45)	6.93 (3.80-21.6)	38.2 (6.93-110)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-hydroxyethyl)-L-cysteine (2011 - 2016)†

CAS Number 15060-26-1

Metabolite of Acrylonitrile, Ethylene oxide, and Vinyl chloride

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	.920 (.815-1.05)	1.77 (1.61-1.94)	3.70 (3.19-4.65)	6.19 (5.31-7.07)	2466
Total population	13-14	*	<LOD	1.39 (1.26-1.56)	3.06 (2.64-3.56)	4.68 (3.99-6.06)	2586
Total population	15-16	*	<LOD	1.61 (1.44-1.77)	3.26 (2.73-3.83)	5.25 (4.20-6.46)	3015
Age 3-5 years	15-16	*	<LOD	1.38 (1.20-1.61)	2.49 (1.90-3.63)	3.94 (2.77-5.25)	459
Age 6-11 years	11-12	1.20 (1.06-1.36)	1.18 (1.00-1.27)	1.89 (1.62-2.33)	3.23 (2.73-3.96)	4.61 (3.46-5.12)	394
Age 6-11 years	13-14	*	<LOD	1.41 (1.24-1.91)	2.40 (2.07-2.90)	3.45 (2.72-4.23)	384
Age 6-11 years	15-16	*	1.01 (.853-1.17)	1.56 (1.29-1.84)	2.64 (2.03-3.31)	3.42 (2.75-4.17)	373
Age 12-19 years	11-12	1.28 (1.11-1.46)	1.19 (.920-1.32)	2.09 (1.67-2.60)	3.77 (2.89-5.38)	6.08 (4.91-7.45)	384
Age 12-19 years	13-14	*	<LOD	1.59 (1.25-1.89)	3.23 (2.84-3.77)	4.39 (3.48-5.40)	439
Age 12-19 years	15-16	*	.870 (<LOD-1.06)	1.71 (1.41-1.89)	3.02 (2.41-4.22)	4.45 (3.60-5.99)	395
Age 20+ years	11-12	*	.895 (<LOD-1.01)	1.70 (1.45-1.95)	3.76 (3.10-4.78)	6.53 (5.38-7.71)	1688
Age 20+ years	13-14	*	<LOD	1.38 (1.22-1.54)	3.07 (2.57-3.72)	4.87 (4.03-6.30)	1763
Age 20+ years	15-16	*	<LOD	1.60 (1.44-1.78)	3.43 (2.79-3.98)	5.82 (4.20-7.54)	1788
Males	11-12	*	.916 (<LOD-1.10)	1.71 (1.49-1.95)	3.35 (2.67-4.07)	5.31 (4.23-6.78)	1251
Males	13-14	*	<LOD	1.34 (1.12-1.57)	2.67 (2.24-3.19)	4.23 (3.47-4.95)	1285
Males	15-16	*	<LOD	1.59 (1.35-1.82)	3.22 (2.58-3.89)	5.06 (3.85-6.01)	1499
Females	11-12	*	.943 (<LOD-1.13)	1.83 (1.58-2.17)	4.53 (3.46-5.15)	6.83 (5.15-8.74)	1215
Females	13-14	*	<LOD	1.49 (1.30-1.77)	3.30 (2.82-4.08)	5.31 (4.16-7.15)	1301
Females	15-16	*	.803 (<LOD-.900)	1.63 (1.45-1.84)	3.26 (2.59-4.06)	5.53 (3.95-7.54)	1516
Mexican Americans	11-12	1.20 (1.05-1.38)	1.04 (.936-1.18)	1.86 (1.49-2.24)	3.93 (2.85-4.91)	5.24 (4.78-6.48)	313
Mexican Americans	13-14	*	<LOD	1.49 (1.38-1.63)	2.67 (2.03-3.06)	3.31 (2.82-4.18)	449
Mexican Americans	15-16	*	<LOD	1.84 (1.49-1.97)	3.06 (2.71-3.81)	5.00 (3.99-6.46)	578
Non-Hispanic blacks	11-12	1.43 (1.28-1.60)	1.29 (1.12-1.51)	2.41 (2.01-2.88)	4.78 (3.62-7.07)	8.62 (6.46-10.0)	662
Non-Hispanic blacks	13-14	*	.995 (.821-1.23)	2.13 (1.75-2.60)	4.68 (3.37-5.99)	7.05 (5.92-8.88)	553
Non-Hispanic blacks	15-16	1.46 (1.37-1.55)	1.24 (1.10-1.36)	2.79 (2.49-3.11)	5.25 (4.37-6.94)	8.38 (6.94-10.9)	656
Non-Hispanic whites	11-12	*	.883 (<LOD-1.01)	1.65 (1.43-1.87)	3.64 (2.89-4.65)	6.11 (5.03-7.45)	810
Non-Hispanic whites	13-14	*	<LOD	1.25 (1.12-1.45)	2.94 (2.18-3.60)	4.59 (3.51-6.34)	953
Non-Hispanic whites	15-16	*	<LOD	1.48 (1.26-1.71)	2.77 (2.22-3.48)	4.31 (3.64-5.82)	912
All Hispanics	11-12	*	.964 (.854-1.08)	1.75 (1.46-2.12)	3.49 (2.88-4.62)	5.24 (3.93-7.06)	566
All Hispanics	13-14	*	<LOD	1.50 (1.39-1.77)	2.81 (2.16-3.62)	3.95 (2.82-5.70)	695
All Hispanics	15-16	*	<LOD	1.71 (1.44-1.90)	3.06 (2.77-3.57)	4.46 (3.93-5.48)	970
Asians	11-12	*	<LOD	1.29 (1.14-1.41)	2.33 (1.62-2.73)	3.35 (2.53-4.80)	341
Asians	13-14	*	<LOD	1.01 (<LOD-1.31)	1.99 (1.54-2.80)	3.64 (2.40-4.23)	283
Asians	15-16	*	<LOD	1.11 (.947-1.34)	2.38 (1.55-5.29)	5.54 (3.34-6.70)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.791, 0.791, and 0.791 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-hydroxyethyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 15060-26-1

Metabolite of Acrylonitrile, Ethylene oxide, and Vinyl chloride

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	1.24 (1.17-1.33)	2.24 (2.07-2.41)	4.18 (3.76-4.57)	6.38 (5.08-7.70)	2464
Total population	13-14	*	<LOD	1.88 (1.74-2.07)	3.45 (3.11-3.99)	5.10 (4.56-6.21)	2585
Total population	15-16	*	<LOD	1.97 (1.82-2.11)	3.51 (3.11-3.99)	5.39 (4.44-5.92)	3012
Age 3-5 years	15-16	*	<LOD	3.49 (2.93-4.05)	5.59 (4.82-6.21)	6.48 (5.60-8.20)	458
Age 6-11 years	11-12	1.69 (1.50-1.91)	1.69 (1.46-1.90)	2.65 (2.26-3.16)	3.90 (3.26-4.66)	5.11 (3.81-7.06)	393
Age 6-11 years	13-14	*	<LOD	2.44 (2.00-2.66)	3.73 (2.95-4.45)	4.56 (3.52-5.68)	384
Age 6-11 years	15-16	*	1.55 (1.39-1.64)	2.24 (2.00-2.54)	3.40 (2.80-4.39)	4.41 (3.51-5.41)	373
Age 12-19 years	11-12	1.24 (1.13-1.37)	1.17 (.998-1.28)	2.01 (1.62-2.49)	3.62 (2.79-5.53)	6.21 (3.86-7.99)	384
Age 12-19 years	13-14	*	<LOD	1.58 (1.43-1.74)	2.61 (2.15-3.06)	3.88 (2.67-6.21)	439
Age 12-19 years	15-16	*	.997 (<LOD-1.22)	1.58 (1.40-1.75)	2.55 (1.86-3.63)	3.77 (2.55-5.53)	395
Age 20+ years	11-12	*	1.20 (<LOD-1.33)	2.16 (2.00-2.43)	4.30 (3.77-4.97)	6.87 (5.21-7.73)	1687
Age 20+ years	13-14	*	<LOD	1.87 (1.69-2.13)	3.58 (3.05-4.30)	5.59 (4.58-7.06)	1762
Age 20+ years	15-16	*	<LOD	1.93 (1.80-2.07)	3.53 (3.05-4.07)	5.51 (4.42-6.43)	1786
Males	11-12	*	.984 (<LOD-1.12)	1.75 (1.55-2.05)	3.29 (3.05-3.55)	4.90 (4.03-5.93)	1250
Males	13-14	*	<LOD	1.55 (1.42-1.67)	2.80 (2.33-3.49)	4.30 (3.75-5.08)	1284
Males	15-16	*	<LOD	1.68 (1.50-1.86)	2.87 (2.50-3.57)	4.51 (3.46-5.79)	1499
Females	11-12	*	1.47 (<LOD-1.61)	2.60 (2.33-2.96)	5.08 (3.94-6.96)	7.35 (5.29-11.6)	1214
Females	13-14	*	<LOD	2.24 (1.95-2.54)	4.13 (3.29-4.86)	6.79 (4.86-9.56)	1301
Females	15-16	*	1.34 (<LOD-1.43)	2.24 (2.07-2.43)	4.07 (3.56-4.30)	5.82 (5.17-6.74)	1513
Mexican Americans	11-12	1.36 (1.17-1.57)	1.27 (1.14-1.46)	2.26 (1.90-2.62)	3.98 (2.94-5.66)	6.05 (4.21-7.37)	313
Mexican Americans	13-14	*	<LOD	1.75 (1.56-1.93)	2.66 (2.16-3.14)	3.97 (3.00-4.78)	449
Mexican Americans	15-16	*	<LOD	1.93 (1.75-2.21)	3.49 (2.96-3.99)	5.00 (3.99-6.07)	577
Non-Hispanic blacks	11-12	1.12 (1.03-1.21)	.994 (.890-1.15)	1.99 (1.69-2.19)	3.77 (3.26-4.36)	5.33 (4.45-5.97)	662
Non-Hispanic blacks	13-14	*	.883 (.717-.981)	1.69 (1.32-2.26)	3.58 (2.62-4.33)	5.12 (3.99-6.78)	553
Non-Hispanic blacks	15-16	1.16 (1.10-1.23)	1.19 (1.07-1.30)	2.21 (2.04-2.43)	3.68 (3.19-4.30)	5.16 (4.71-5.78)	654
Non-Hispanic whites	11-12	*	1.30 (<LOD-1.40)	2.24 (2.07-2.52)	4.30 (3.49-5.08)	6.79 (4.53-8.85)	808
Non-Hispanic whites	13-14	*	<LOD	1.93 (1.69-2.23)	3.52 (3.06-4.19)	5.59 (4.24-7.69)	952
Non-Hispanic whites	15-16	*	<LOD	1.90 (1.75-2.10)	3.11 (2.83-3.96)	5.15 (4.00-6.39)	912
All Hispanics	11-12	*	1.21 (1.10-1.40)	2.13 (1.84-2.43)	3.66 (2.94-4.52)	5.83 (4.18-6.96)	566
All Hispanics	13-14	*	<LOD	1.70 (1.55-1.90)	2.96 (2.24-3.99)	4.66 (3.25-5.60)	695
All Hispanics	15-16	*	<LOD	1.97 (1.75-2.27)	3.76 (3.29-4.14)	5.44 (4.32-6.32)	969
Asians	11-12	*	<LOD	1.93 (1.69-2.50)	3.29 (2.54-4.30)	4.77 (3.30-7.99)	341
Asians	13-14	*	<LOD	2.20 (<LOD-2.54)	3.87 (2.54-5.08)	5.15 (4.36-9.74)	283
Asians	15-16	*	<LOD	2.00 (1.54-2.58)	4.04 (2.80-5.35)	6.15 (4.30-8.57)	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(phenyl)-L-cysteine (2011 - 2016)†

CAS Number 4775-80-8

Metabolite of Benzene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	1.07 (.985-1.14)	1.95 (1.72-2.30)	3.01 (2.65-3.32)	2466
Total population	13-14	*	<LOD	.897 (.720-1.07)	1.52 (1.27-1.93)	2.20 (1.77-3.12)	2561
Total population	15-16	*	<LOD	1.13 (1.01-1.26)	2.04 (1.88-2.31)	3.10 (2.77-3.37)	3015
Age 3-5 years	15-16	*	<LOD	1.13 (.928-1.30)	2.16 (1.61-2.77)	3.43 (2.60-4.99)	459
Age 6-11 years	11-12	*	<LOD	1.28 (1.10-1.52)	2.36 (1.93-2.63)	2.98 (2.40-3.67)	394
Age 6-11 years	13-14	*	<LOD	1.13 (.855-1.51)	1.83 (1.51-2.44)	2.92 (1.86-4.14)	385
Age 6-11 years	15-16	*	.608 (<LOD-.698)	1.21 (1.05-1.42)	2.41 (1.63-3.89)	3.95 (2.28-7.45)	373
Age 12-19 years	11-12	*	<LOD	1.12 (.963-1.41)	1.96 (1.57-2.52)	2.81 (2.03-3.27)	384
Age 12-19 years	13-14	*	<LOD	1.03 (.770-1.24)	1.63 (1.28-2.29)	2.60 (1.84-3.53)	435
Age 12-19 years	15-16	*	.697 (<LOD-.834)	1.48 (1.23-1.84)	2.74 (2.10-3.23)	3.28 (2.84-4.59)	395
Age 20+ years	11-12	*	<LOD	1.02 (.943-1.12)	1.91 (1.63-2.40)	3.05 (2.56-3.45)	1688
Age 20+ years	13-14	*	<LOD	.850 (.670-1.03)	1.50 (1.20-1.92)	2.08 (1.67-2.99)	1741
Age 20+ years	15-16	*	<LOD	1.06 (.950-1.21)	1.88 (1.69-2.17)	2.87 (2.45-3.31)	1788
Males	11-12	*	.645 (<LOD-.765)	1.20 (1.07-1.28)	2.12 (1.76-2.51)	3.11 (2.65-3.76)	1251
Males	13-14	*	<LOD	.969 (.766-1.17)	1.57 (1.33-2.10)	2.32 (1.79-3.48)	1273
Males	15-16	*	.650 (<LOD-.748)	1.23 (1.02-1.43)	2.16 (1.87-2.57)	3.25 (2.73-3.89)	1499
Females	11-12	*	<LOD	.964 (.834-1.07)	1.91 (1.56-2.38)	2.84 (2.12-3.32)	1215
Females	13-14	*	<LOD	.832 (.669-.997)	1.50 (1.17-1.91)	2.08 (1.67-2.84)	1288
Females	15-16	*	<LOD	1.02 (.885-1.18)	1.97 (1.68-2.35)	2.88 (2.40-3.45)	1516
Mexican Americans	11-12	*	.661 (<LOD-.958)	1.44 (.995-1.68)	2.54 (1.75-2.93)	2.96 (2.52-5.19)	313
Mexican Americans	13-14	*	<LOD	1.12 (.896-1.40)	2.07 (1.45-3.06)	3.29 (2.20-4.29)	431
Mexican Americans	15-16	*	.650 (<LOD-.711)	1.22 (1.11-1.36)	2.33 (1.95-2.89)	4.36 (3.25-5.99)	578
Non-Hispanic blacks	11-12	*	<LOD	1.05 (.963-1.16)	1.84 (1.59-2.11)	2.62 (2.19-3.06)	662
Non-Hispanic blacks	13-14	*	<LOD	.857 (.717-1.02)	1.45 (1.12-2.08)	2.13 (1.50-2.81)	563
Non-Hispanic blacks	15-16	*	.616 (<LOD-.732)	1.21 (1.03-1.39)	2.03 (1.65-2.41)	2.54 (2.14-3.27)	656
Non-Hispanic whites	11-12	*	<LOD	1.04 (.931-1.13)	1.92 (1.61-2.40)	3.08 (2.44-3.50)	810
Non-Hispanic whites	13-14	*	<LOD	.876 (.664-1.03)	1.49 (1.15-1.91)	2.03 (1.54-3.35)	952
Non-Hispanic whites	15-16	*	<LOD	1.09 (.950-1.35)	1.99 (1.80-2.39)	3.04 (2.57-3.43)	912
All Hispanics	11-12	*	<LOD	1.20 (1.00-1.45)	2.26 (1.75-2.62)	2.85 (2.49-3.33)	566
All Hispanics	13-14	*	<LOD	1.07 (.846-1.36)	1.85 (1.45-2.70)	2.99 (2.11-3.56)	665
All Hispanics	15-16	*	.604 (<LOD-.655)	1.18 (1.04-1.26)	2.10 (1.81-2.35)	3.80 (2.62-4.70)	970
Asians	11-12	*	<LOD	.932 (.806-1.09)	1.84 (1.45-2.16)	2.56 (2.13-3.48)	341
Asians	13-14	*	<LOD	.841 (<LOD-1.13)	1.45 (1.04-2.59)	2.30 (1.24-4.29)	280
Asians	15-16	*	<LOD	.782 (.631-1.05)	1.94 (1.41-2.32)	2.67 (2.00-3.50)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.600, 0.600, and 0.600 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Benzene_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Benzene_FactSheet.html

Urinary N-Acetyl-S-(phenyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 4775-80-8

Metabolite of Benzene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	1.29 (1.18-1.41)	2.10 (1.86-2.37)	3.03 (2.62-3.53)	2464
Total population	13-14	*	<LOD	1.21 (1.06-1.40)	2.10 (1.85-2.41)	3.03 (2.54-3.52)	2560
Total population	15-16	*	<LOD	1.35 (1.26-1.46)	2.13 (2.02-2.36)	2.98 (2.65-3.26)	3012
Age 3-5 years	15-16	*	<LOD	2.65 (2.23-3.16)	4.73 (3.86-6.83)	7.62 (5.63-10.2)	458
Age 6-11 years	11-12	*	<LOD	1.95 (1.64-2.24)	2.68 (2.44-3.45)	3.58 (2.66-4.71)	393
Age 6-11 years	13-14	*	<LOD	1.96 (1.51-2.49)	2.92 (2.52-3.86)	4.21 (2.78-5.93)	385
Age 6-11 years	15-16	*	1.03 (<LOD-1.17)	1.77 (1.46-2.12)	3.03 (2.36-4.24)	4.71 (3.09-6.80)	373
Age 12-19 years	11-12	*	<LOD	1.14 (.942-1.41)	1.70 (1.29-2.23)	2.35 (1.70-4.39)	384
Age 12-19 years	13-14	*	<LOD	1.05 (.831-1.24)	1.83 (1.27-2.06)	2.06 (1.83-2.68)	435
Age 12-19 years	15-16	*	.815 (<LOD-.920)	1.25 (1.11-1.41)	2.27 (1.72-2.94)	2.97 (2.13-4.36)	395
Age 20+ years	11-12	*	<LOD	1.26 (1.15-1.39)	2.02 (1.77-2.42)	3.03 (2.50-3.53)	1687
Age 20+ years	13-14	*	<LOD	1.18 (1.02-1.34)	2.03 (1.75-2.36)	2.89 (2.41-3.50)	1740
Age 20+ years	15-16	*	<LOD	1.29 (1.18-1.37)	2.02 (1.81-2.13)	2.65 (2.46-2.93)	1786
Males	11-12	*	.704 (<LOD-.771)	1.12 (1.00-1.25)	1.89 (1.64-2.21)	2.55 (2.23-2.98)	1250
Males	13-14	*	<LOD	1.06 (.902-1.25)	1.90 (1.57-2.08)	2.53 (2.12-3.14)	1272
Males	15-16	*	.719 (<LOD-.785)	1.19 (1.06-1.33)	2.02 (1.77-2.36)	2.86 (2.46-3.17)	1499
Females	11-12	*	<LOD	1.46 (1.30-1.62)	2.35 (2.02-2.73)	3.46 (2.73-4.71)	1214
Females	13-14	*	<LOD	1.34 (1.21-1.51)	2.36 (2.02-2.64)	3.41 (2.62-3.93)	1288
Females	15-16	*	<LOD	1.51 (1.37-1.63)	2.27 (2.12-2.49)	3.26 (2.83-3.53)	1513
Mexican Americans	11-12	*	.883 (<LOD-.986)	1.45 (1.15-1.82)	2.15 (1.66-3.04)	3.04 (1.93-5.59)	313
Mexican Americans	13-14	*	<LOD	1.41 (1.12-1.74)	2.38 (1.85-2.82)	2.92 (2.29-4.06)	431
Mexican Americans	15-16	*	.831 (<LOD-.887)	1.37 (1.28-1.57)	2.52 (2.15-2.84)	3.44 (2.93-4.31)	577
Non-Hispanic blacks	11-12	*	<LOD	.847 (.742-.924)	1.35 (1.18-1.57)	1.88 (1.57-2.36)	662
Non-Hispanic blacks	13-14	*	<LOD	.744 (.628-.924)	1.18 (1.01-1.42)	1.47 (1.22-1.93)	563
Non-Hispanic blacks	15-16	*	.573 (<LOD-.673)	.992 (.833-1.12)	1.48 (1.27-1.78)	2.04 (1.61-2.38)	654
Non-Hispanic whites	11-12	*	<LOD	1.36 (1.22-1.46)	2.23 (1.92-2.55)	3.26 (2.55-4.15)	808
Non-Hispanic whites	13-14	*	<LOD	1.25 (1.09-1.41)	2.20 (1.93-2.49)	3.14 (2.49-3.88)	951
Non-Hispanic whites	15-16	*	<LOD	1.43 (1.33-1.57)	2.12 (2.00-2.46)	2.97 (2.51-3.39)	912
All Hispanics	11-12	*	<LOD	1.34 (1.11-1.64)	1.93 (1.68-2.62)	2.68 (2.04-3.39)	566
All Hispanics	13-14	*	<LOD	1.32 (1.08-1.64)	2.19 (1.81-2.49)	2.82 (2.29-3.58)	665
All Hispanics	15-16	*	.815 (<LOD-.851)	1.36 (1.28-1.49)	2.49 (2.23-2.77)	3.39 (3.03-4.21)	969
Asians	11-12	*	<LOD	1.46 (1.27-1.66)	2.23 (1.91-3.03)	3.03 (2.37-4.95)	341
Asians	13-14	*	<LOD	1.77 (<LOD-2.18)	2.77 (2.23-3.53)	3.60 (2.69-5.70)	280
Asians	15-16	*	<LOD	1.33 (1.15-1.70)	2.49 (2.02-2.98)	3.26 (2.65-3.56)	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Benzene_BiomonitoringSummary.html
Factsheet: https://www.cdc.gov/biomonitoring/Benzene_FactSheet.html

Urinary N-Acetyl-S-(n-propyl)-L-cysteine (2011 - 2016)†

CAS Number 4775-80-8

Metabolite of 1-Bromopropane

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.08 (3.67-4.52)	3.70 (3.18-4.14)	10.3 (8.86-11.8)	26.5 (23.0-29.9)	43.7 (37.0-60.9)	2396
Total population	13-14	3.27 (2.92-3.68)	2.68 (2.27-3.19)	7.56 (6.56-8.76)	20.6 (17.4-24.9)	37.1 (29.4-45.3)	2631
Total population	15-16	3.67 (3.29-4.09)	3.15 (2.75-3.59)	8.14 (6.94-9.77)	20.9 (17.1-26.3)	33.8 (29.8-41.2)	2952
Age 3-5 years	15-16	*	1.28 (<LOD-1.65)	3.37 (2.48-4.71)	9.15 (6.79-10.8)	14.4 (10.4-19.0)	449
Age 6-11 years	11-12	2.44 (2.15-2.78)	1.74 (1.44-2.30)	5.09 (4.38-6.26)	12.1 (8.91-20.7)	24.8 (15.7-32.0)	387
Age 6-11 years	13-14	*	1.33 (<LOD-1.69)	4.16 (2.90-5.84)	10.2 (7.11-12.9)	17.2 (11.5-22.4)	398
Age 6-11 years	15-16	2.41 (2.01-2.88)	2.02 (1.53-2.61)	4.90 (4.01-5.94)	9.83 (7.39-16.1)	19.0 (9.81-26.2)	369
Age 12-19 years	11-12	3.13 (2.41-4.08)	2.46 (1.50-4.28)	7.10 (4.72-10.3)	18.1 (11.1-31.5)	31.6 (18.1-49.3)	366
Age 12-19 years	13-14	2.94 (2.51-3.45)	2.58 (1.96-3.20)	6.75 (5.48-8.73)	15.0 (9.85-21.2)	23.3 (16.9-34.5)	445
Age 12-19 years	15-16	3.23 (2.84-3.68)	2.71 (2.41-3.11)	7.39 (5.62-8.81)	18.3 (11.4-25.5)	27.7 (19.1-36.9)	388
Age 20+ years	11-12	4.48 (4.00-5.02)	4.10 (3.64-4.63)	11.4 (9.69-13.8)	28.9 (24.6-33.1)	49.7 (36.1-72.4)	1643
Age 20+ years	13-14	3.49 (3.09-3.95)	2.93 (2.42-3.45)	8.09 (6.90-9.58)	22.9 (19.4-28.7)	40.8 (32.3-50.3)	1788
Age 20+ years	15-16	4.01 (3.56-4.51)	3.47 (3.09-4.01)	9.00 (7.32-10.7)	24.9 (19.0-29.8)	38.0 (31.9-46.1)	1746
Males	11-12	4.27 (3.73-4.89)	3.75 (3.13-4.51)	10.4 (8.86-12.2)	28.4 (23.0-33.9)	48.9 (33.1-72.9)	1218
Males	13-14	3.52 (3.05-4.06)	3.01 (2.57-3.53)	8.72 (7.25-10.0)	25.3 (17.2-31.1)	40.3 (30.1-50.9)	1306
Males	15-16	3.95 (3.46-4.52)	3.44 (2.95-4.24)	9.07 (7.10-11.1)	21.9 (18.5-27.3)	32.5 (27.9-40.2)	1465
Females	11-12	3.90 (3.44-4.41)	3.58 (2.85-4.23)	10.2 (8.23-12.7)	24.8 (20.2-30.2)	43.0 (32.4-52.3)	1178
Females	13-14	3.05 (2.66-3.50)	2.43 (1.95-3.06)	6.75 (5.79-7.88)	18.0 (15.2-21.2)	31.9 (23.5-41.0)	1325
Females	15-16	3.41 (3.04-3.83)	2.81 (2.35-3.25)	7.34 (6.67-8.81)	20.2 (16.0-26.3)	36.9 (30.1-43.4)	1487
Mexican Americans	11-12	5.51 (4.37-6.95)	5.59 (4.13-8.24)	14.3 (11.1-20.8)	29.0 (22.3-40.5)	40.5 (28.2-60.8)	293
Mexican Americans	13-14	3.65 (3.09-4.31)	2.97 (2.38-3.72)	9.90 (7.25-12.7)	24.1 (18.1-35.8)	38.0 (30.7-50.3)	450
Mexican Americans	15-16	4.47 (3.92-5.09)	4.05 (3.18-5.59)	9.64 (8.00-11.5)	27.3 (17.4-32.0)	39.5 (29.6-77.9)	570
Non-Hispanic blacks	11-12	5.15 (4.24-6.27)	4.52 (3.51-5.67)	13.1 (10.3-16.4)	38.3 (27.3-52.2)	66.0 (43.0-93.2)	655
Non-Hispanic blacks	13-14	3.99 (3.29-4.84)	3.49 (2.84-4.44)	8.87 (7.14-11.5)	28.5 (18.0-37.3)	40.2 (31.7-59.6)	569
Non-Hispanic blacks	15-16	4.75 (4.00-5.64)	4.73 (3.93-5.61)	11.4 (8.87-14.9)	25.9 (20.9-29.5)	35.3 (26.8-46.5)	637
Non-Hispanic whites	11-12	3.52 (3.10-3.99)	3.09 (2.38-3.75)	8.33 (6.46-10.5)	21.7 (17.5-27.4)	39.6 (25.8-61.8)	795
Non-Hispanic whites	13-14	2.99 (2.59-3.45)	2.41 (1.99-2.96)	6.75 (5.67-8.03)	17.2 (13.2-22.9)	29.9 (24.8-40.1)	973
Non-Hispanic whites	15-16	3.27 (2.90-3.68)	2.75 (2.32-3.18)	6.99 (5.82-8.38)	18.3 (12.0-26.1)	32.1 (21.3-41.2)	897
All Hispanics	11-12	5.18 (4.34-6.20)	5.16 (4.22-6.36)	12.9 (11.1-17.2)	28.9 (24.0-34.9)	43.5 (33.7-60.8)	544
All Hispanics	13-14	3.46 (2.95-4.07)	2.82 (2.20-3.59)	8.73 (6.89-11.6)	24.1 (19.1-30.7)	36.9 (30.7-47.5)	698
All Hispanics	15-16	4.22 (3.86-4.61)	3.62 (3.18-4.09)	9.65 (7.87-11.1)	24.8 (20.4-29.6)	40.3 (32.0-50.5)	952
Asians	11-12	6.94 (5.71-8.45)	6.33 (4.70-9.11)	20.9 (16.9-27.0)	42.2 (32.8-58.0)	69.7 (48.9-98.7)	316
Asians	13-14	4.92 (3.88-6.22)	3.99 (3.10-5.50)	12.4 (9.35-16.7)	42.1 (24.0-64.0)	71.3 (48.6-116)	287
Asians	15-16	5.33 (4.13-6.87)	5.54 (4.17-6.81)	12.6 (8.98-22.0)	32.2 (21.9-43.3)	44.8 (30.4-95.9)	320

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 1.20, 1.20, and 1.20 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(n-propyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 4775-80-8

Metabolite of 1-Bromopropane

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	4.64 (4.23-5.09)	4.19 (3.69-4.72)	11.3 (9.46-12.8)	28.8 (24.2-32.7)	46.1 (36.4-58.4)	2394
Total population	13-14	3.8 (3.42-4.21)	3.44 (3.04-4.04)	8.67 (7.23-10.0)	21.6 (17.6-24.7)	35.2 (29.2-44.1)	2630
Total population	15-16	4.14 (3.74-4.59)	3.81 (3.53-4.15)	8.74 (7.56-10.1)	20.3 (17.3-23.1)	35.4 (27.5-46.1)	2949
Age 3-5 years	15-16	*	4.25 (<LOD-5.00)	7.63 (6.07-9.54)	16.8 (13.3-18.9)	25.7 (18.9-29.5)	448
Age 6-11 years	11-12	3.39 (3.01-3.82)	3.15 (2.58-3.87)	6.54 (5.46-7.71)	14.0 (10.7-17.1)	21.5 (14.5-30.0)	386
Age 6-11 years	13-14	*	2.74 (<LOD-3.27)	5.67 (4.72-7.25)	12.1 (7.90-18.1)	21.8 (11.7-27.3)	398
Age 6-11 years	15-16	3.52 (3.01-4.11)	3.11 (2.61-3.66)	6.81 (5.00-8.71)	14.4 (11.2-18.9)	22.6 (14.4-42.0)	369
Age 12-19 years	11-12	3.08 (2.31-4.10)	2.59 (1.74-4.24)	7.14 (4.29-10.6)	15.6 (9.44-23.4)	23.8 (15.6-43.1)	366
Age 12-19 years	13-14	2.68 (2.29-3.13)	2.67 (2.43-2.96)	5.91 (5.05-7.03)	11.4 (9.30-14.6)	18.6 (13.7-28.8)	445
Age 12-19 years	15-16	3.03 (2.63-3.48)	2.53 (2.18-3.34)	5.64 (4.69-7.27)	14.5 (10.6-17.3)	22.0 (16.1-30.9)	388
Age 20+ years	11-12	5.1 (4.61-5.64)	4.72 (4.17-5.32)	12.7 (11.1-13.9)	31.2 (25.1-40.0)	50.3 (37.9-64.4)	1642
Age 20+ years	13-14	4.09 (3.65-4.58)	3.84 (3.29-4.43)	9.32 (7.90-11.2)	23.8 (19.5-29.5)	40.1 (31.6-52.9)	1787
Age 20+ years	15-16	4.39 (3.90-4.94)	3.96 (3.60-4.45)	9.39 (7.96-11.8)	22.0 (18.6-25.9)	38.0 (32.5-50.4)	1744
Males	11-12	4.01 (3.59-4.47)	3.59 (3.24-4.03)	9.20 (7.62-11.1)	24.6 (19.2-31.0)	40.0 (33.8-47.6)	1217
Males	13-14	3.53 (3.10-4.02)	3.27 (2.67-4.00)	8.52 (6.94-9.55)	18.8 (16.6-24.6)	31.9 (24.6-42.1)	1305
Males	15-16	3.77 (3.32-4.29)	3.61 (3.11-4.16)	7.65 (6.52-9.23)	17.1 (13.9-20.6)	26.6 (20.6-33.7)	1465
Females	11-12	5.34 (4.58-6.24)	4.88 (4.12-6.06)	12.9 (10.6-16.2)	30.3 (25.1-37.1)	50.3 (36.7-65.1)	1177
Females	13-14	4.07 (3.57-4.65)	3.70 (3.10-4.25)	8.68 (7.05-11.2)	22.5 (18.1-30.4)	39.9 (28.8-56.4)	1325
Females	15-16	4.53 (4.01-5.12)	3.94 (3.55-4.39)	9.74 (8.50-12.0)	23.0 (20.2-29.1)	46.9 (33.7-68.8)	1484
Mexican Americans	11-12	6.14 (5.18-7.29)	5.61 (3.86-8.70)	15.0 (12.5-21.8)	32.4 (22.7-45.2)	46.3 (27.4-67.1)	293
Mexican Americans	13-14	4.18 (3.68-4.75)	3.48 (3.04-4.36)	10.3 (7.07-13.5)	22.3 (18.6-28.6)	38.7 (23.5-59.6)	450
Mexican Americans	15-16	4.85 (4.39-5.36)	4.39 (3.92-5.05)	10.7 (7.52-13.8)	22.9 (17.3-32.8)	41.1 (29.6-56.9)	569
Non-Hispanic blacks	11-12	4.02 (3.29-4.91)	3.76 (2.94-4.71)	9.20 (6.72-12.9)	28.1 (17.7-45.7)	56.6 (33.4-72.3)	655
Non-Hispanic blacks	13-14	3.05 (2.49-3.74)	2.74 (2.24-3.47)	6.91 (5.23-8.96)	16.1 (11.4-22.1)	28.8 (17.6-42.5)	569
Non-Hispanic blacks	15-16	3.79 (3.16-4.54)	3.61 (2.82-4.58)	9.20 (7.37-12.0)	21.0 (15.1-30.4)	35.6 (24.1-48.7)	635
Non-Hispanic whites	11-12	4.3 (3.80-4.87)	3.83 (3.27-4.54)	9.88 (8.31-12.1)	25.6 (19.1-31.0)	42.2 (29.3-54.5)	793
Non-Hispanic whites	13-14	3.7 (3.25-4.21)	3.44 (2.93-4.20)	8.29 (6.40-9.44)	19.0 (15.3-27.3)	32.6 (22.5-42.1)	972
Non-Hispanic whites	15-16	3.88 (3.46-4.36)	3.62 (3.31-4.03)	7.46 (6.21-9.22)	17.7 (14.2-21.8)	30.1 (22.2-42.4)	897
All Hispanics	11-12	5.76 (5.02-6.61)	5.44 (4.25-6.61)	13.8 (11.9-16.3)	30.9 (24.8-37.6)	45.8 (34.7-63.0)	544
All Hispanics	13-14	3.87 (3.44-4.37)	3.30 (2.97-3.66)	9.34 (7.05-12.2)	22.3 (19.5-24.7)	36.4 (24.8-45.6)	698
All Hispanics	15-16	4.79 (4.45-5.15)	4.39 (3.84-5.05)	9.70 (8.67-11.3)	22.5 (18.2-27.5)	40.8 (32.4-51.2)	951
Asians	11-12	9.12 (7.40-11.2)	8.93 (7.06-11.8)	23.6 (16.6-36.7)	54.2 (43.1-65.0)	72.0 (60.4-107)	316
Asians	13-14	7.76 (5.81-10.4)	7.08 (5.12-9.96)	18.2 (11.7-26.8)	53.3 (38.7-72.3)	96.7 (53.3-162)	287
Asians	15-16	7.32 (5.66-9.47)	6.70 (5.80-8.15)	18.1 (11.5-24.4)	35.9 (26.2-48.1)	52.9 (33.2-100)	320

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(3,4-dihydroxybutyl)-L-cysteine (2011 - 2016)†

CAS Number 144889-50-9

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	262 (244-281)	281 (264-307)	470 (436-499)	673 (629-736)	877 (777-971)	2466
Total population	13-14	246 (229-265)	270 (250-283)	458 (430-487)	710 (659-750)	865 (799-908)	2639
Total population	15-16	314 (294-335)	342 (319-367)	547 (510-572)	770 (710-822)	972 (881-1050)	2691
Age 3-5 years	15-16	257 (229-288)	258 (221-298)	449 (387-505)	670 (539-873)	892 (668-1260)	414
Age 6-11 years	11-12	265 (236-297)	283 (248-346)	466 (416-512)	756 (552-914)	934 (604-1480)	394
Age 6-11 years	13-14	244 (213-280)	256 (211-307)	434 (367-524)	757 (582-863)	918 (782-990)	398
Age 6-11 years	15-16	294 (270-319)	304 (276-346)	468 (407-532)	686 (595-742)	813 (677-977)	328
Age 12-19 years	11-12	266 (228-309)	283 (233-353)	524 (429-548)	674 (627-711)	754 (674-912)	384
Age 12-19 years	13-14	282 (241-331)	305 (264-351)	525 (424-587)	747 (661-844)	946 (747-1230)	449
Age 12-19 years	15-16	333 (300-370)	372 (328-417)	561 (507-611)	791 (664-1020)	1040 (773-1250)	349
Age 20+ years	11-12	261 (241-283)	281 (256-310)	466 (427-498)	670 (618-768)	877 (777-976)	1688
Age 20+ years	13-14	242 (223-261)	267 (244-280)	453 (427-472)	701 (645-738)	837 (782-901)	1792
Age 20+ years	15-16	316 (293-340)	348 (321-372)	558 (508-581)	779 (710-843)	983 (881-1050)	1600
Males	11-12	310 (284-339)	340 (299-382)	505 (475-547)	721 (645-837)	958 (797-1220)	1251
Males	13-14	270 (243-301)	288 (261-328)	483 (439-533)	725 (658-781)	877 (768-943)	1310
Males	15-16	349 (329-370)	379 (359-414)	573 (538-604)	800 (752-881)	968 (856-1040)	1335
Females	11-12	223 (204-243)	233 (215-258)	422 (384-442)	625 (574-658)	803 (661-909)	1215
Females	13-14	225 (210-242)	244 (220-266)	421 (395-456)	696 (641-747)	844 (794-898)	1329
Females	15-16	284 (260-309)	300 (262-334)	506 (460-558)	691 (659-754)	983 (822-1080)	1356
Mexican Americans	11-12	258 (221-301)	285 (228-346)	458 (401-489)	591 (520-718)	755 (613-911)	313
Mexican Americans	13-14	254 (230-282)	276 (234-315)	426 (392-484)	669 (570-761)	808 (718-953)	451
Mexican Americans	15-16	325 (301-351)	354 (324-380)	545 (499-573)	757 (680-905)	1040 (813-1240)	502
Non-Hispanic blacks	11-12	328 (302-356)	369 (320-399)	536 (496-583)	777 (689-848)	947 (872-1060)	662
Non-Hispanic blacks	13-14	337 (310-366)	365 (337-384)	544 (501-617)	761 (703-878)	938 (814-1120)	572
Non-Hispanic blacks	15-16	384 (360-409)	411 (367-456)	618 (581-656)	839 (777-861)	1020 (844-1240)	611
Non-Hispanic whites	11-12	259 (238-281)	275 (240-303)	470 (424-520)	688 (628-771)	906 (746-1030)	810
Non-Hispanic whites	13-14	238 (212-268)	255 (222-282)	459 (411-518)	725 (651-790)	876 (790-936)	975
Non-Hispanic whites	15-16	313 (289-338)	336 (299-377)	556 (500-581)	782 (687-856)	1000 (857-1080)	790
All Hispanics	11-12	253 (220-290)	277 (238-329)	453 (398-493)	582 (521-671)	740 (618-841)	566
All Hispanics	13-14	250 (230-273)	272 (236-302)	421 (393-462)	655 (560-738)	799 (718-871)	699
All Hispanics	15-16	304 (287-322)	336 (321-363)	508 (488-537)	720 (680-752)	877 (773-1000)	854
Asians	11-12	193 (171-218)	220 (193-247)	340 (299-407)	498 (440-566)	623 (537-751)	341
Asians	13-14	167 (145-192)	182 (137-227)	311 (287-338)	435 (376-497)	542 (454-708)	289
Asians	15-16	220 (197-245)	236 (216-270)	386 (354-425)	553 (519-628)	658 (552-789)	304

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 5.25, 5.25, and 5.25 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(3,4-dihydroxybutyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 144889-50-9

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	299 (285-314)	293 (282-308)	388 (373-404)	504 (476-539)	603 (567-645)	2464
Total population	13-14	285 (264-308)	288 (267-313)	390 (371-415)	512 (481-559)	624 (571-694)	2638
Total population	15-16	353 (342-364)	343 (331-358)	444 (428-457)	571 (544-601)	686 (644-715)	2689
Age 3-5 years	15-16	604 (574-636)	578 (543-629)	774 (705-831)	983 (934-1040)	1100 (1010-1250)	414
Age 6-11 years	11-12	380 (354-408)	379 (346-401)	478 (448-528)	644 (581-674)	755 (651-773)	393
Age 6-11 years	13-14	366 (332-405)	372 (335-418)	476 (447-545)	622 (567-698)	715 (622-931)	398
Age 6-11 years	15-16	430 (419-442)	416 (398-441)	535 (495-558)	655 (582-690)	748 (678-805)	328
Age 12-19 years	11-12	259 (241-278)	260 (246-270)	314 (284-353)	406 (359-430)	433 (407-480)	384
Age 12-19 years	13-14	256 (242-271)	251 (234-265)	343 (318-355)	451 (401-510)	522 (451-664)	449
Age 12-19 years	15-16	306 (290-324)	308 (283-321)	370 (342-397)	481 (440-527)	587 (500-639)	349
Age 20+ years	11-12	298 (283-313)	292 (280-309)	384 (370-404)	502 (472-539)	583 (560-645)	1687
Age 20+ years	13-14	283 (260-307)	286 (264-314)	387 (364-412)	507 (475-556)	617 (555-696)	1791
Age 20+ years	15-16	345 (333-357)	338 (325-352)	431 (410-450)	541 (513-570)	644 (614-686)	1598
Males	11-12	291 (276-307)	286 (272-295)	382 (363-405)	493 (462-528)	579 (527-675)	1250
Males	13-14	271 (248-296)	273 (246-305)	367 (343-391)	486 (456-534)	600 (534-667)	1309
Males	15-16	334 (321-348)	320 (306-341)	416 (397-441)	533 (500-574)	650 (600-700)	1335
Females	11-12	307 (290-326)	304 (285-320)	392 (370-421)	524 (491-549)	608 (567-645)	1214
Females	13-14	300 (277-325)	304 (286-328)	413 (388-435)	537 (497-587)	661 (585-771)	1329
Females	15-16	371 (357-387)	364 (345-382)	464 (444-489)	604 (554-644)	699 (656-791)	1354
Mexican Americans	11-12	291 (245-345)	291 (251-340)	378 (338-423)	490 (416-575)	575 (492-647)	313
Mexican Americans	13-14	291 (271-314)	290 (263-327)	374 (350-411)	502 (454-535)	601 (493-924)	451
Mexican Americans	15-16	355 (341-369)	343 (328-354)	453 (418-478)	589 (554-639)	719 (640-791)	501
Non-Hispanic blacks	11-12	256 (240-272)	246 (234-261)	327 (303-350)	438 (390-478)	520 (470-571)	662
Non-Hispanic blacks	13-14	257 (243-272)	259 (244-280)	346 (333-365)	469 (435-511)	558 (507-605)	572
Non-Hispanic blacks	15-16	307 (295-320)	294 (275-312)	385 (367-415)	525 (489-570)	639 (584-688)	610
Non-Hispanic whites	11-12	316 (300-333)	311 (295-324)	408 (392-431)	534 (493-573)	645 (572-681)	808
Non-Hispanic whites	13-14	295 (268-324)	297 (277-325)	411 (382-441)	537 (489-595)	655 (585-732)	974
Non-Hispanic whites	15-16	369 (353-387)	360 (341-378)	455 (437-476)	594 (544-634)	699 (650-795)	790
All Hispanics	11-12	283 (254-316)	280 (253-310)	367 (342-395)	472 (430-504)	540 (477-603)	566
All Hispanics	13-14	280 (260-301)	279 (258-309)	370 (354-387)	483 (450-523)	585 (492-782)	699
All Hispanics	15-16	348 (338-357)	334 (325-345)	431 (410-456)	580 (545-617)	712 (640-756)	853
Asians	11-12	258 (243-275)	252 (234-272)	330 (309-355)	413 (380-462)	524 (425-583)	341
Asians	13-14	264 (235-296)	267 (237-299)	339 (311-371)	468 (364-584)	577 (437-1080)	289
Asians	15-16	302 (285-321)	296 (278-312)	368 (345-395)	481 (428-535)	590 (500-630)	304

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(1-hydroxymethyl-2-propenyl)-L-cysteine (2011 - 2016)†

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations of (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2466
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2587
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2987
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	453
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	394
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	389
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	365
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	394
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1688
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1760
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1775
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1251
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1283
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1488
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1215
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1304
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1499
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	446
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	558
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	559
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	656
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	810
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	952
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	911
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	692
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	943
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.700, 0.700, and 0.700 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(1-hydroxymethyl-2-propenyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations of (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2464
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2586
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2984
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	452
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	393
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	389
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	365
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	438
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	394
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1687
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1759
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1773
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1250
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1282
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1488
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1214
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1304
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1496
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	446
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	557
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	559
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	654
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	808
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	951
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	911
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	692
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	942
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	286
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-hydroxy-3-butenyl)-L-cysteine (2011 - 2016)†

CAS Number 159092-64-5

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	.985 (<LOD-1.33)	2.53 (2.03-3.34)	2466
Total population	13-14	*	<LOD	<LOD	.906 (<LOD-1.25)	2.29 (1.85-2.72)	2627
Total population	15-16	*	<LOD	<LOD	1.03 (<LOD-1.45)	2.44 (1.63-3.53)	3015
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	459
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	394
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	395
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	1.51 (.882-2.12)	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	1.13 (<LOD-2.41)	449
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	395
Age 20+ years	11-12	*	<LOD	<LOD	1.21 (.931-1.88)	3.23 (2.20-4.26)	1688
Age 20+ years	13-14	*	<LOD	<LOD	1.19 (.793-1.50)	2.54 (2.03-3.32)	1783
Age 20+ years	15-16	*	<LOD	<LOD	1.43 (.952-2.11)	3.12 (2.23-4.19)	1788
Males	11-12	*	<LOD	<LOD	.931 (<LOD-1.25)	2.21 (1.33-3.23)	1251
Males	13-14	*	<LOD	<LOD	.712 (<LOD-.960)	1.94 (1.50-2.23)	1304
Males	15-16	*	<LOD	<LOD	1.15 (.705-1.78)	2.78 (1.80-4.12)	1499
Females	11-12	*	<LOD	<LOD	1.07 (<LOD-1.76)	2.90 (2.20-3.79)	1215
Females	13-14	*	<LOD	<LOD	1.17 (<LOD-1.76)	2.69 (1.68-4.43)	1323
Females	15-16	*	<LOD	<LOD	.845 (<LOD-1.43)	2.23 (1.28-3.56)	1516
Mexican Americans	11-12	*	<LOD	<LOD	.785 (<LOD-1.24)	1.25 (.785-3.39)	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.730 (<LOD-1.91)	448
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	1.57 (.735-2.89)	578
Non-Hispanic blacks	11-12	*	<LOD	<LOD	.855 (<LOD-1.23)	2.71 (1.32-4.34)	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	1.31 (.802-2.06)	3.32 (2.06-5.10)	570
Non-Hispanic blacks	15-16	*	<LOD	<LOD	1.70 (.925-2.61)	3.52 (2.49-5.52)	656
Non-Hispanic whites	11-12	*	<LOD	<LOD	1.16 (.714-1.76)	2.90 (2.11-4.26)	810
Non-Hispanic whites	13-14	*	<LOD	<LOD	1.11 (<LOD-1.60)	2.57 (1.68-3.47)	970
Non-Hispanic whites	15-16	*	<LOD	<LOD	1.12 (<LOD-1.69)	2.48 (1.49-3.98)	912
All Hispanics	11-12	*	<LOD	<LOD	.711 (<LOD-1.23)	1.45 (.914-2.97)	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	1.28 (<LOD-1.98)	696
All Hispanics	15-16	*	<LOD	<LOD	<LOD	2.07 (.994-2.82)	970
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	289
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.700, 0.700, and 0.700 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-hydroxy-3-butenyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 159092-64-5

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	2.15 (<LOD-2.65)	3.70 (2.75-5.20)	2464
Total population	13-14	*	<LOD	<LOD	2.15 (<LOD-2.36)	3.31 (2.75-3.81)	2626
Total population	15-16	*	<LOD	<LOD	2.15 (<LOD-2.48)	3.19 (2.89-3.56)	3012
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	458
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	393
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	395
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	2.61 (1.65-3.09)	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	1.77 (<LOD-2.75)	449
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	395
Age 20+ years	11-12	*	<LOD	<LOD	2.32 (1.98-2.86)	4.27 (2.91-5.68)	1687
Age 20+ years	13-14	*	<LOD	<LOD	2.25 (2.03-2.61)	3.54 (2.91-4.30)	1782
Age 20+ years	15-16	*	<LOD	<LOD	2.36 (1.98-2.69)	3.51 (2.96-3.81)	1786
Males	11-12	*	<LOD	<LOD	1.71 (<LOD-2.06)	2.91 (2.12-3.51)	1250
Males	13-14	*	<LOD	<LOD	1.69 (<LOD-1.98)	2.55 (1.83-3.54)	1303
Males	15-16	*	<LOD	<LOD	1.83 (1.52-2.36)	2.75 (2.20-3.58)	1499
Females	11-12	*	<LOD	<LOD	2.65 (<LOD-3.30)	4.67 (3.06-6.21)	1214
Females	13-14	*	<LOD	<LOD	2.61 (<LOD-2.91)	3.75 (2.91-4.50)	1323
Females	15-16	*	<LOD	<LOD	2.48 (<LOD-2.77)	3.59 (3.19-3.81)	1513
Mexican Americans	11-12	*	<LOD	<LOD	1.71 (<LOD-2.32)	2.32 (1.71-4.76)	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	1.98 (<LOD-2.36)	448
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	2.48 (2.25-2.81)	577
Non-Hispanic blacks	11-12	*	<LOD	<LOD	1.44 (<LOD-1.57)	2.06 (1.65-2.70)	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	1.45 (1.20-1.83)	2.39 (1.83-3.06)	570
Non-Hispanic blacks	15-16	*	<LOD	<LOD	1.65 (1.46-1.90)	2.48 (1.90-3.17)	654
Non-Hispanic whites	11-12	*	<LOD	<LOD	2.48 (1.98-2.91)	4.48 (2.91-5.67)	808
Non-Hispanic whites	13-14	*	<LOD	<LOD	2.48 (<LOD-2.91)	3.63 (2.91-4.50)	969
Non-Hispanic whites	15-16	*	<LOD	<LOD	2.30 (<LOD-2.75)	3.51 (2.80-3.94)	912
All Hispanics	11-12	*	<LOD	<LOD	1.98 (<LOD-2.32)	2.61 (2.15-3.30)	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	2.15 (<LOD-3.54)	696
All Hispanics	15-16	*	<LOD	<LOD	<LOD	2.75 (2.44-3.54)	969
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	289
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-hydroxy-3-methyl-3-buten-1-yl)-L-cysteine + N-Acetyl-S-[1-(hydroxymethyl)-2-methyl-2-propen-1-yl]-L-cysteine (2015 - 2016)

Metabolite of Isoprene

Geometric mean and selected percentiles of urine concentrations of (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	3.32 (3.12-3.53)	3.37 (3.15-3.65)	6.16 (5.68-6.60)	9.75 (8.74-11.8)	14.8 (13.0-16.8)	3015
Age 3-5 years	15-16	*	<LOD	2.07 (1.91-2.33)	3.15 (2.82-3.70)	4.24 (3.49-4.89)	459
Age 6-11 years	15-16	*	1.72 (1.53-1.86)	3.02 (2.58-3.48)	5.08 (4.20-6.58)	6.96 (5.14-10.8)	373
Age 12-19 years	15-16	2.77 (2.50-3.07)	2.77 (2.38-3.21)	4.69 (3.81-5.60)	6.90 (6.14-8.54)	9.08 (7.81-10.2)	395
Age 20+ years	15-16	3.71 (3.45-3.99)	3.84 (3.53-4.13)	6.80 (6.20-7.31)	11.0 (9.41-13.3)	16.6 (13.7-18.5)	1788
Males	15-16	3.88 (3.62-4.16)	4.04 (3.72-4.42)	6.96 (6.50-7.45)	10.9 (9.48-13.0)	15.4 (13.3-18.1)	1499
Females	15-16	2.85 (2.68-3.04)	2.81 (2.55-2.97)	5.18 (4.84-5.58)	8.83 (7.81-9.43)	13.8 (10.5-17.6)	1516
Mexican Americans	15-16	3.20 (3.06-3.35)	3.41 (3.18-3.69)	5.78 (5.23-6.25)	8.70 (7.69-9.60)	12.6 (9.31-14.8)	578
Non-Hispanic blacks	15-16	4.20 (3.86-4.58)	4.20 (3.70-4.64)	7.29 (6.66-7.97)	12.1 (10.7-14.7)	18.5 (14.9-23.6)	656
Non-Hispanic whites	15-16	3.34 (3.09-3.61)	3.33 (2.98-3.68)	6.25 (5.63-6.95)	10.2 (8.56-13.4)	14.9 (12.7-18.0)	912
All Hispanics	15-16	3.10 (2.97-3.25)	3.32 (3.03-3.60)	5.70 (5.25-5.98)	8.06 (7.56-9.10)	12.0 (9.87-13.2)	970
Asians	15-16	2.27 (2.10-2.45)	2.07 (1.72-2.67)	4.12 (3.65-4.42)	6.18 (5.26-7.28)	9.48 (6.23-12.3)	329

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 1.43.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Acetyl-S-(2-hydroxy-3-methyl-3-buten-1-yl)-L-cysteine + N-Acetyl-S-[1-(hydroxymethyl)-2-methyl-2-propen-1-yl]-L-cysteine (creatinine corrected) (2015 - 2016)

Metabolite of Isoprene

Geometric mean and selected percentiles of urine concentrations of (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	3.75 (3.59-3.91)	3.41 (3.29-3.54)	5.02 (4.63-5.39)	8.32 (7.51-8.96)	11.7 (10.1-13.8)	3012
Age 3-5 years	15-16	*	<LOD	4.81 (4.39-5.61)	7.21 (6.31-8.27)	10.1 (7.77-11.2)	458
Age 6-11 years	15-16	*	2.59 (2.44-2.82)	3.69 (3.28-4.04)	5.61 (4.59-7.21)	8.00 (5.24-11.2)	373
Age 12-19 years	15-16	2.62 (2.46-2.78)	2.59 (2.45-2.74)	3.19 (3.05-3.52)	4.48 (3.81-5.32)	5.64 (4.66-6.46)	395
Age 20+ years	15-16	4.06 (3.86-4.28)	3.64 (3.50-3.82)	5.42 (4.99-5.93)	8.96 (8.01-10.2)	13.1 (10.4-15.6)	1786
Males	15-16	3.7 (3.48-3.93)	3.40 (3.24-3.61)	4.96 (4.56-5.53)	8.01 (6.86-9.94)	11.4 (9.80-13.5)	1499
Females	15-16	3.79 (3.62-3.97)	3.41 (3.26-3.57)	5.05 (4.62-5.52)	8.45 (7.51-9.28)	11.9 (9.58-15.7)	1513
Mexican Americans	15-16	3.51 (3.39-3.64)	3.48 (3.21-3.66)	4.59 (4.24-5.05)	6.31 (5.71-6.73)	8.13 (6.46-10.1)	577
Non-Hispanic blacks	15-16	3.36 (3.12-3.62)	3.06 (2.83-3.50)	4.86 (4.25-5.23)	7.36 (6.69-8.40)	10.4 (8.57-12.2)	654
Non-Hispanic whites	15-16	3.96 (3.74-4.20)	3.54 (3.36-3.74)	5.33 (4.67-5.93)	9.03 (7.77-10.7)	13.1 (10.1-16.4)	912
All Hispanics	15-16	3.53 (3.43-3.64)	3.41 (3.23-3.58)	4.54 (4.33-4.90)	6.42 (6.00-6.75)	8.42 (7.74-10.1)	969
Asians	15-16	3.13 (2.91-3.38)	2.81 (2.66-2.97)	4.33 (3.79-4.92)	7.05 (5.41-8.50)	8.92 (7.05-12.7)	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Acetyl-S-(4-hydroxy-2-butenyl)-L-cysteine (2011 - 2016)†

CAS Number 159092-65-6

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	5.64 (5.12-6.21)	5.30 (4.89-5.80)	10.6 (9.41-12.2)	28.2 (24.5-32.1)	57.6 (44.2-68.1)	2466
Total population	13-14	5.81 (5.29-6.38)	5.18 (4.79-5.69)	10.9 (9.77-12.2)	28.1 (24.4-32.5)	53.5 (46.5-56.6)	2520
Total population	15-16	4.25 (3.76-4.81)	4.08 (3.64-4.61)	7.89 (6.97-9.23)	20.1 (16.3-26.3)	40.4 (29.6-51.2)	3015
Age 3-5 years	15-16	2.97 (2.69-3.27)	3.07 (2.63-3.71)	5.43 (4.85-6.87)	10.4 (7.96-12.4)	12.6 (10.5-14.2)	459
Age 6-11 years	11-12	4.58 (4.16-5.04)	4.77 (4.07-5.49)	8.91 (7.39-10.4)	14.8 (11.1-19.3)	19.3 (14.6-22.8)	394
Age 6-11 years	13-14	4.61 (3.86-5.49)	4.86 (3.63-6.52)	8.86 (7.84-10.3)	15.6 (12.9-18.9)	19.4 (15.6-29.1)	380
Age 6-11 years	15-16	3.51 (3.21-3.84)	3.72 (3.17-3.97)	7.17 (5.90-8.40)	11.3 (9.40-12.7)	13.6 (11.9-17.0)	373
Age 12-19 years	11-12	4.49 (3.59-5.61)	5.18 (3.54-6.67)	9.16 (7.79-10.2)	15.9 (11.3-25.7)	25.7 (14.1-51.1)	384
Age 12-19 years	13-14	5.32 (4.58-6.19)	5.28 (4.59-5.95)	10.2 (7.74-12.1)	16.3 (13.3-23.0)	24.9 (16.3-55.7)	437
Age 12-19 years	15-16	3.43 (3.00-3.92)	3.81 (3.30-4.20)	6.74 (5.73-7.83)	9.74 (8.92-11.8)	15.3 (10.6-19.7)	395
Age 20+ years	11-12	5.97 (5.40-6.61)	5.43 (4.92-6.00)	11.5 (9.82-13.5)	34.3 (28.2-42.3)	61.7 (55.7-72.7)	1688
Age 20+ years	13-14	6.03 (5.42-6.70)	5.19 (4.72-5.83)	11.5 (10.0-13.9)	33.4 (28.3-40.7)	55.2 (50.6-61.7)	1703
Age 20+ years	15-16	4.53 (3.93-5.22)	4.24 (3.68-4.82)	8.50 (7.10-10.8)	26.2 (19.1-31.7)	48.8 (33.1-59.8)	1788
Males	11-12	6.69 (6.18-7.26)	6.21 (5.80-6.87)	11.3 (10.1-13.5)	28.5 (23.6-37.1)	58.0 (38.5-74.9)	1251
Males	13-14	6.25 (5.75-6.79)	5.73 (5.17-6.27)	11.3 (10.2-12.2)	26.8 (23.4-32.0)	53.5 (45.5-57.6)	1260
Males	15-16	4.96 (4.32-5.69)	4.83 (4.16-5.47)	8.81 (7.56-10.6)	23.1 (16.3-31.4)	43.4 (28.8-54.2)	1499
Females	11-12	4.78 (4.06-5.63)	4.24 (3.68-4.92)	9.56 (8.20-11.8)	28.2 (20.5-40.0)	57.1 (40.7-69.9)	1215
Females	13-14	5.40 (4.69-6.22)	4.71 (4.12-5.36)	10.7 (8.25-13.5)	31.3 (23.7-37.5)	53.3 (42.6-61.3)	1260
Females	15-16	3.67 (3.25-4.15)	3.26 (2.97-3.86)	6.87 (5.87-8.05)	18.5 (15.4-22.3)	33.1 (28.2-45.7)	1516
Mexican Americans	11-12	5.12 (4.07-6.44)	5.36 (4.37-6.46)	10.2 (8.60-13.4)	20.5 (16.8-24.1)	24.7 (18.5-60.8)	313
Mexican Americans	13-14	5.11 (4.54-5.75)	4.76 (4.24-5.18)	9.11 (7.79-11.0)	16.9 (12.6-24.1)	25.0 (18.3-40.2)	425
Mexican Americans	15-16	3.74 (3.42-4.09)	3.80 (3.45-4.07)	6.82 (6.04-7.32)	11.9 (9.31-17.9)	22.1 (17.9-29.8)	578
Non-Hispanic blacks	11-12	7.22 (6.50-8.03)	6.93 (6.31-7.54)	13.5 (12.2-15.0)	31.7 (23.7-37.7)	58.5 (40.4-73.1)	662
Non-Hispanic blacks	13-14	8.59 (7.59-9.71)	7.50 (6.77-8.63)	17.3 (12.9-21.6)	46.2 (33.3-55.2)	69.2 (54.3-77.2)	556
Non-Hispanic blacks	15-16	6.70 (5.76-7.81)	5.94 (5.08-6.87)	13.4 (11.0-16.8)	32.2 (23.3-39.7)	52.9 (36.5-85.8)	656
Non-Hispanic whites	11-12	5.57 (4.88-6.36)	5.03 (4.41-5.85)	10.6 (8.66-12.8)	31.4 (25.6-42.3)	58.5 (44.5-69.0)	810
Non-Hispanic whites	13-14	5.74 (5.02-6.56)	4.99 (4.51-5.80)	10.9 (9.00-13.4)	31.5 (23.3-40.7)	55.7 (47.6-63.5)	929
Non-Hispanic whites	15-16	4.24 (3.66-4.90)	3.89 (3.37-4.57)	7.63 (6.52-9.39)	22.3 (14.3-31.2)	45.5 (29.2-58.8)	912
All Hispanics	11-12	5.07 (4.29-6.01)	5.10 (4.46-5.80)	9.82 (8.81-11.5)	20.6 (16.8-24.4)	30.2 (23.2-46.3)	566
All Hispanics	13-14	5.14 (4.57-5.78)	4.79 (4.38-5.17)	9.64 (8.00-11.3)	19.0 (13.6-24.9)	27.5 (24.1-37.1)	661
All Hispanics	15-16	3.61 (3.36-3.88)	3.81 (3.60-4.07)	6.46 (5.91-7.13)	11.8 (9.95-17.1)	21.9 (17.9-28.0)	970
Asians	11-12	4.34 (3.83-4.92)	4.62 (3.96-5.13)	8.20 (7.13-9.51)	13.7 (11.6-19.8)	29.9 (16.1-50.6)	341
Asians	13-14	4.06 (3.42-4.81)	4.02 (3.33-4.53)	7.18 (5.80-8.60)	13.9 (10.1-19.9)	25.0 (13.5-59.9)	272
Asians	15-16	2.55 (1.76-3.67)	2.64 (2.04-3.55)	5.68 (4.08-7.73)	10.4 (7.92-13.8)	16.1 (10.2-30.5)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.600, 0.600, and 0.600 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(4-hydroxy-2-butenyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 159092-65-6

Metabolite of 1,3-Butadiene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.44 (5.91-7.02)	5.36 (4.88-5.82)	9.69 (8.71-11.0)	29.9 (25.3-36.2)	52.8 (37.4-73.3)	2464
Total population	13-14	6.54 (5.85-7.31)	5.46 (4.89-6.16)	10.4 (9.33-11.8)	29.6 (24.0-34.1)	49.6 (43.0-60.0)	2519
Total population	15-16	4.8 (4.31-5.36)	3.91 (3.56-4.27)	7.31 (6.50-8.11)	19.5 (16.0-25.9)	41.4 (31.6-48.7)	3012
Age 3-5 years	15-16	7.17 (6.51-7.89)	7.02 (6.25-7.89)	10.6 (8.88-12.8)	16.1 (13.5-19.9)	21.6 (15.6-29.2)	458
Age 6-11 years	11-12	6.55 (6.05-7.09)	6.46 (5.94-7.00)	9.10 (8.17-10.3)	13.8 (11.2-17.7)	17.7 (13.4-24.5)	393
Age 6-11 years	13-14	6.71 (5.72-7.88)	7.09 (5.97-8.11)	10.3 (9.05-11.0)	14.9 (12.2-18.9)	23.0 (14.9-27.9)	380
Age 6-11 years	15-16	5.13 (4.60-5.71)	5.30 (4.80-5.59)	7.67 (7.00-8.95)	11.9 (10.4-13.0)	15.7 (12.9-17.6)	373
Age 12-19 years	11-12	4.37 (3.77-5.07)	4.36 (3.57-4.92)	6.27 (5.68-7.64)	11.4 (8.24-17.1)	19.3 (10.9-31.0)	384
Age 12-19 years	13-14	4.73 (4.17-5.37)	4.31 (3.64-5.08)	6.70 (5.62-7.48)	11.4 (9.66-16.1)	30.8 (12.7-54.1)	437
Age 12-19 years	15-16	3.24 (2.87-3.66)	3.07 (2.71-3.43)	4.43 (3.76-5.44)	7.69 (6.07-9.61)	10.9 (7.91-16.6)	395
Age 20+ years	11-12	6.82 (6.25-7.44)	5.39 (4.85-6.07)	10.7 (9.51-12.2)	37.1 (29.9-43.3)	64.8 (44.1-84.1)	1687
Age 20+ years	13-14	6.85 (6.09-7.70)	5.53 (4.96-6.29)	11.2 (9.71-13.9)	33.3 (27.7-42.0)	54.5 (46.0-66.4)	1702
Age 20+ years	15-16	4.96 (4.39-5.62)	3.90 (3.47-4.34)	7.47 (6.42-8.76)	26.3 (18.6-32.9)	47.8 (37.7-52.2)	1786
Males	11-12	6.29 (5.83-6.79)	5.38 (4.85-5.83)	9.83 (8.50-11.6)	27.0 (20.4-34.4)	41.9 (37.4-52.1)	1250
Males	13-14	6.11 (5.55-6.73)	5.39 (4.79-5.90)	9.94 (8.91-10.7)	25.2 (18.5-29.8)	43.0 (31.6-50.6)	1259
Males	15-16	4.73 (4.15-5.40)	3.86 (3.39-4.27)	7.22 (6.35-8.34)	20.2 (15.7-28.3)	36.7 (29.0-47.8)	1499
Females	11-12	6.59 (5.69-7.64)	5.35 (4.68-6.17)	9.49 (7.93-12.9)	31.5 (19.7-49.2)	68.8 (44.1-89.0)	1214
Females	13-14	6.98 (5.97-8.16)	5.68 (4.81-6.61)	10.6 (9.08-14.5)	34.2 (24.5-47.5)	60.7 (45.3-81.8)	1260
Females	15-16	4.87 (4.37-5.43)	4.00 (3.64-4.39)	7.44 (6.35-8.30)	18.7 (14.2-24.5)	44.1 (32.8-51.6)	1513
Mexican Americans	11-12	5.78 (4.56-7.33)	5.39 (4.72-6.18)	9.51 (7.91-10.9)	17.4 (12.3-28.3)	29.9 (17.1-58.1)	313
Mexican Americans	13-14	5.63 (4.95-6.41)	5.20 (4.37-6.07)	8.55 (7.60-9.94)	15.4 (12.0-18.1)	31.2 (15.8-50.9)	425
Mexican Americans	15-16	4.1 (3.75-4.47)	3.81 (3.48-4.10)	6.07 (5.23-6.91)	10.6 (9.30-12.3)	17.1 (11.6-28.2)	577
Non-Hispanic blacks	11-12	5.63 (5.23-6.07)	4.86 (4.35-5.38)	9.45 (8.29-10.7)	21.9 (17.2-24.3)	34.2 (24.8-40.1)	662
Non-Hispanic blacks	13-14	6.4 (5.57-7.37)	4.93 (4.31-5.65)	12.5 (10.4-16.0)	28.5 (24.7-33.2)	41.0 (32.3-50.6)	556
Non-Hispanic blacks	15-16	5.35 (4.58-6.27)	4.53 (3.71-5.31)	9.58 (7.69-12.2)	20.7 (16.2-27.3)	35.0 (27.2-41.7)	654
Non-Hispanic whites	11-12	6.81 (6.10-7.61)	5.42 (4.78-6.15)	10.1 (8.68-12.0)	37.2 (27.0-45.2)	68.5 (43.3-89.0)	808
Non-Hispanic whites	13-14	6.91 (6.03-7.91)	5.61 (4.95-6.49)	10.5 (8.99-13.4)	33.5 (25.4-45.3)	55.4 (45.4-69.3)	928
Non-Hispanic whites	15-16	5.03 (4.40-5.74)	3.98 (3.45-4.54)	7.35 (6.42-8.46)	25.9 (16.6-33.9)	49.4 (35.8-54.8)	912
All Hispanics	11-12	5.68 (4.93-6.54)	5.22 (4.72-5.79)	8.78 (7.84-9.81)	18.3 (12.9-25.8)	30.9 (20.2-44.7)	566
All Hispanics	13-14	5.53 (4.80-6.36)	5.01 (4.36-5.82)	8.75 (7.39-10.4)	15.6 (12.7-18.9)	31.3 (17.7-49.7)	661
All Hispanics	15-16	4.1 (3.78-4.46)	3.69 (3.44-3.90)	6.16 (5.64-6.66)	10.9 (9.30-13.1)	18.3 (12.3-28.7)	969
Asians	11-12	5.81 (5.41-6.25)	5.25 (4.89-5.64)	8.53 (7.50-9.29)	17.7 (12.1-23.0)	28.2 (22.1-44.2)	341
Asians	13-14	6.18 (5.28-7.24)	5.79 (4.98-7.09)	10.4 (8.28-11.8)	17.4 (13.8-25.6)	27.0 (16.1-47.8)	272
Asians	15-16	3.51 (2.45-5.04)	3.55 (2.94-4.51)	5.70 (4.82-8.33)	11.4 (8.61-14.5)	18.3 (11.9-27.5)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(4-hydroxy-2-methyl-2 buten-1-yl)-L-cysteine (2015 - 2016)

Metabolite of Isoprene

Geometric mean and selected percentiles of urine concentrations of (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	4.00 (3.58-4.46)	3.21 (2.89-3.75)	7.33 (6.55-8.40)	25.8 (19.8-32.7)	53.7 (39.4-68.7)	3015
Age 3-5 years	15-16	2.74 (2.43-3.10)	2.71 (2.12-3.14)	5.65 (4.17-6.85)	9.96 (7.90-12.7)	13.7 (11.4-15.1)	459
Age 6-11 years	15-16	2.95 (2.77-3.15)	2.73 (2.47-3.06)	6.21 (5.47-6.88)	10.4 (8.23-13.0)	14.4 (10.8-19.5)	373
Age 12-19 years	15-16	2.89 (2.57-3.26)	2.81 (2.35-3.47)	5.04 (4.46-5.71)	10.2 (7.19-13.8)	14.6 (11.7-19.6)	395
Age 20+ years	15-16	4.38 (3.82-5.02)	3.43 (3.00-4.00)	8.36 (7.01-9.96)	34.3 (24.6-43.8)	63.4 (45.0-89.5)	1788
Males	15-16	4.40 (3.86-5.02)	3.57 (3.03-4.15)	7.55 (6.18-9.93)	27.2 (18.5-39.2)	58.8 (39.2-73.3)	1499
Females	15-16	3.65 (3.28-4.06)	3.03 (2.65-3.43)	7.14 (6.44-7.76)	22.6 (16.9-29.4)	47.5 (35.2-59.8)	1516
Mexican Americans	15-16	3.33 (3.07-3.61)	3.11 (2.81-3.38)	6.02 (5.35-6.88)	11.1 (9.62-14.9)	27.5 (14.9-37.5)	578
Non-Hispanic blacks	15-16	5.82 (4.97-6.81)	4.59 (3.93-5.47)	13.4 (9.39-17.1)	39.2 (26.9-60.9)	71.5 (43.8-146)	656
Non-Hispanic whites	15-16	4.09 (3.49-4.80)	3.15 (2.74-3.94)	7.58 (6.18-9.35)	27.2 (16.9-40.1)	57.8 (36.9-88.7)	912
All Hispanics	15-16	3.19 (2.99-3.41)	3.02 (2.78-3.23)	5.82 (5.35-6.30)	11.1 (9.46-16.1)	27.5 (17.3-45.1)	970
Asians	15-16	2.45 (2.03-2.95)	2.12 (1.69-2.73)	4.73 (3.55-6.22)	10.8 (6.62-13.5)	16.3 (12.1-22.3)	329

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 1.20.

Urinary N-Acetyl-S-(4-hydroxy-2-methyl-2 buten-1-yl)-L-cysteine (creatinine corrected) (2015 - 2016)

Metabolite of Isoprene

Geometric mean and selected percentiles of urine concentrations of (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	4.52 (4.14-4.93)	3.52 (3.31-3.79)	6.71 (5.85-7.87)	24.1 (17.9-32.1)	58.3 (41.9-72.2)	3012
Age 3-5 years	15-16	6.62 (5.83-7.53)	6.07 (5.41-6.70)	9.65 (8.25-12.1)	17.2 (14.2-21.3)	23.1 (17.4-26.5)	458
Age 6-11 years	15-16	4.31 (3.91-4.74)	4.10 (3.75-4.40)	6.54 (5.74-7.26)	10.6 (8.59-13.9)	14.5 (11.0-18.5)	373
Age 12-19 years	15-16	2.73 (2.49-2.99)	2.45 (2.30-2.53)	3.92 (3.34-4.30)	6.67 (5.33-7.93)	8.74 (6.95-17.7)	395
Age 20+ years	15-16	4.8 (4.29-5.36)	3.54 (3.27-3.87)	7.20 (6.07-9.04)	32.3 (20.9-47.1)	69.7 (44.7-85.6)	1786
Males	15-16	4.2 (3.73-4.73)	3.10 (2.84-3.51)	6.22 (5.25-8.40)	25.3 (16.8-36.0)	53.0 (37.4-69.7)	1499
Females	15-16	4.84 (4.42-5.30)	3.80 (3.52-4.25)	6.83 (6.26-8.02)	21.8 (15.5-32.3)	62.9 (40.4-77.3)	1513
Mexican Americans	15-16	3.65 (3.43-3.88)	3.16 (2.89-3.43)	5.67 (5.01-6.30)	11.5 (8.68-18.3)	22.8 (15.5-29.8)	577
Non-Hispanic blacks	15-16	4.64 (3.92-5.50)	3.56 (2.94-4.27)	9.19 (6.92-12.3)	27.6 (19.4-36.3)	53.1 (36.9-59.2)	654
Non-Hispanic whites	15-16	4.86 (4.23-5.57)	3.69 (3.31-4.25)	6.94 (5.82-8.82)	32.3 (14.7-53.6)	69.7 (42.5-88.6)	912
All Hispanics	15-16	3.63 (3.38-3.89)	3.14 (2.85-3.43)	5.52 (5.00-6.13)	11.7 (9.44-17.9)	23.5 (18.3-29.8)	969
Asians	15-16	3.38 (2.82-4.05)	3.07 (2.45-3.54)	5.31 (4.19-7.24)	9.70 (8.24-14.0)	20.2 (11.1-25.5)	329

Urinary 2-Thioxothiazolidine-4-carboxylic acid (2011 - 2014)

CAS Number 20933-67-9

Metabolite of Carbon disulfide

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	17.7 (14.3-22.2)	51.7 (39.1-64.5)	109 (73.9-145)	2466
Total population	13-14	*	<LOD	18.4 (17.2-19.3)	51.7 (45.2-60.3)	119 (93.9-132)	2640
Age 6-11 years	11-12	*	<LOD	<LOD	37.0 (24.2-50.7)	58.5 (41.2-89.7)	394
Age 6-11 years	13-14	*	<LOD	13.3 (<LOD-17.4)	30.8 (21.8-46.9)	64.5 (30.8-139)	398
Age 12-19 years	11-12	*	<LOD	13.2 (<LOD-21.1)	39.0 (21.4-63.5)	91.5 (39.0-138)	384
Age 12-19 years	13-14	*	<LOD	13.8 (<LOD-18.1)	40.9 (22.8-59.3)	82.0 (45.5-122)	449
Age 20+ years	11-12	*	<LOD	19.5 (14.9-25.1)	56.7 (42.4-69.6)	118 (91.1-147)	1688
Age 20+ years	13-14	*	<LOD	19.3 (17.9-22.0)	57.3 (47.0-73.0)	125 (97.3-152)	1793
Males	11-12	*	<LOD	23.2 (17.0-28.8)	62.5 (46.7-96.0)	123 (99.6-157)	1251
Males	13-14	*	<LOD	20.3 (17.9-22.5)	56.3 (40.3-88.4)	127 (88.4-176)	1311
Females	11-12	*	<LOD	13.9 (<LOD-18.1)	36.7 (28.1-52.9)	73.9 (49.8-134)	1215
Females	13-14	*	<LOD	16.5 (14.8-18.2)	47.6 (39.9-60.3)	105 (82.9-128)	1329
Mexican Americans	11-12	*	<LOD	15.7 (<LOD-22.6)	42.6 (32.6-59.3)	65.4 (52.3-104)	313
Mexican Americans	13-14	*	<LOD	12.3 (<LOD-19.6)	36.8 (23.1-52.6)	81.7 (48.9-105)	451
Non-Hispanic blacks	11-12	*	<LOD	25.6 (21.1-29.6)	63.1 (51.3-75.0)	125 (75.0-177)	662
Non-Hispanic blacks	13-14	*	<LOD	22.5 (18.0-28.8)	76.9 (47.0-97.6)	130 (99.6-172)	572
Non-Hispanic whites	11-12	*	<LOD	16.0 (11.6-23.4)	46.7 (34.1-70.0)	111 (65.7-159)	810
Non-Hispanic whites	13-14	*	<LOD	18.7 (16.7-20.9)	49.9 (40.9-63.6)	121 (73.9-153)	976
All Hispanics	11-12	*	<LOD	13.6 (<LOD-19.1)	38.9 (29.8-55.1)	65.4 (55.1-92.5)	566
All Hispanics	13-14	*	<LOD	12.9 (<LOD-18.4)	39.1 (28.0-52.6)	93.4 (59.8-106)	699
Asians	11-12	*	<LOD	31.1 (20.6-45.6)	121 (68.0-180)	225 (130-558)	341
Asians	13-14	*	<LOD	23.7 (15.5-35.6)	79.2 (48.1-130)	227 (73.7-578)	289

Limit of detection (LOD, see Data Analysis section) for Survey year 11-12 and 13-14 are 11.2 and 11.2 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2-Thioxothiazolidine-4-carboxylic acid (creatinine corrected) (2011 - 2014)

CAS Number 20933-67-9

Metabolite of Carbon disulfide

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	26.8 (23.9-29.3)	58.0 (49.6-71.8)	107 (93.8-136)	2464
Total population	13-14	*	<LOD	27.7 (25.4-30.2)	64.4 (56.4-71.3)	113 (93.8-134)	2639
Age 6-11 years	11-12	*	<LOD	<LOD	50.2 (41.6-60.8)	87.8 (56.4-123)	393
Age 6-11 years	13-14	*	<LOD	28.2 (<LOD-41.5)	52.7 (45.7-74.0)	82.7 (59.4-203)	398
Age 12-19 years	11-12	*	<LOD	20.8 (<LOD-27.6)	37.9 (29.3-66.7)	87.8 (31.6-113)	384
Age 12-19 years	13-14	*	<LOD	17.6 (<LOD-22.6)	33.3 (28.2-40.6)	53.3 (38.6-87.8)	449
Age 20+ years	11-12	*	<LOD	27.5 (24.9-29.8)	62.3 (51.4-79.1)	134 (86.0-176)	1687
Age 20+ years	13-14	*	<LOD	29.3 (27.2-31.6)	68.5 (60.8-76.2)	129 (99.3-158)	1792
Males	11-12	*	<LOD	23.2 (21.0-27.2)	53.5 (44.6-68.0)	110 (75.8-147)	1250
Males	13-14	*	<LOD	24.7 (21.9-27.2)	60.6 (46.5-74.1)	93.8 (74.9-137)	1310
Females	11-12	*	<LOD	29.3 (<LOD-31.6)	61.7 (44.0-87.8)	106 (87.8-142)	1214
Females	13-14	*	<LOD	30.1 (27.2-34.9)	68.0 (52.7-78.3)	134 (100-171)	1329
Mexican Americans	11-12	*	<LOD	23.1 (<LOD-28.6)	41.6 (29.4-58.4)	61.1 (37.0-198)	313
Mexican Americans	13-14	*	<LOD	22.6 (<LOD-24.7)	38.7 (30.4-56.3)	69.5 (44.1-115)	451
Non-Hispanic blacks	11-12	*	<LOD	21.4 (18.0-24.7)	55.5 (44.2-66.0)	103 (71.8-135)	662
Non-Hispanic blacks	13-14	*	<LOD	20.1 (17.6-23.7)	59.5 (37.7-80.0)	110 (80.3-151)	572
Non-Hispanic whites	11-12	*	<LOD	27.2 (23.9-30.4)	60.8 (46.5-81.0)	110 (81.0-153)	808
Non-Hispanic whites	13-14	*	<LOD	28.8 (27.2-31.8)	68.0 (56.4-75.7)	122 (87.8-158)	975
All Hispanics	11-12	*	<LOD	23.2 (<LOD-29.4)	44.2 (34.0-56.3)	62.4 (49.2-156)	566
All Hispanics	13-14	*	<LOD	22.6 (<LOD-24.7)	43.6 (35.3-56.4)	77.2 (52.7-122)	699
Asians	11-12	*	<LOD	44.7 (35.9-62.7)	128 (79.0-198)	227 (142-421)	341
Asians	13-14	*	<LOD	41.6 (35.9-55.9)	117 (69.6-191)	257 (118-702)	289

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary N-Acetyl-S-(3-hydroxypropyl-1-methyl)-L-cysteine (2011 - 2016)†

CAS Number 33164-70-4

Metabolite of Crotonaldehyde

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	443 (417-471)	419 (383-446)	806 (735-856)	2000 (1720-2340)	3700 (3100-4230)	2466
Total population	13-14	388 (355-423)	369 (345-403)	725 (663-804)	1730 (1430-2070)	3040 (2600-3420)	2593
Total population	15-16	422 (379-470)	402 (359-445)	730 (656-821)	1780 (1360-2180)	3020 (2490-3850)	3015
Age 3-5 years	15-16	300 (257-351)	289 (248-348)	521 (458-601)	962 (729-1450)	1570 (900-3470)	459
Age 6-11 years	11-12	318 (291-347)	347 (312-400)	569 (501-629)	861 (762-937)	1190 (871-1500)	394
Age 6-11 years	13-14	290 (254-332)	309 (252-367)	501 (459-620)	838 (672-1040)	1140 (899-1650)	396
Age 6-11 years	15-16	317 (291-346)	312 (289-355)	546 (487-606)	781 (704-856)	895 (846-1060)	373
Age 12-19 years	11-12	350 (292-421)	360 (301-439)	631 (532-750)	1130 (858-2190)	2200 (1100-4040)	384
Age 12-19 years	13-14	329 (282-384)	339 (279-381)	579 (471-710)	1020 (762-1240)	1390 (1040-2070)	446
Age 12-19 years	15-16	323 (288-363)	321 (287-383)	550 (476-652)	843 (708-1020)	1090 (908-1710)	395
Age 20+ years	11-12	477 (448-507)	439 (392-470)	874 (809-970)	2350 (2000-2730)	4160 (3580-4450)	1688
Age 20+ years	13-14	410 (371-453)	393 (355-422)	785 (708-893)	2030 (1650-2420)	3360 (2980-4010)	1751
Age 20+ years	15-16	458 (405-516)	439 (386-492)	820 (724-975)	2070 (1590-2620)	3520 (2740-4960)	1788
Males	11-12	507 (470-546)	467 (425-502)	848 (746-982)	2010 (1520-2660)	3840 (3010-4320)	1251
Males	13-14	412 (368-462)	401 (353-450)	729 (666-866)	1630 (1340-1830)	3230 (2560-3600)	1284
Males	15-16	485 (442-532)	466 (413-519)	772 (709-868)	1980 (1360-2600)	3290 (2520-4820)	1499
Females	11-12	390 (349-435)	352 (304-413)	733 (630-834)	2000 (1360-2490)	3520 (2980-4190)	1215
Females	13-14	365 (333-401)	346 (311-376)	719 (605-824)	1820 (1370-2250)	2910 (2290-4090)	1309
Females	15-16	370 (327-420)	333 (295-399)	692 (577-772)	1490 (1240-1900)	2820 (2060-3660)	1516
Mexican Americans	11-12	389 (320-474)	393 (300-496)	767 (655-856)	1330 (990-1800)	2350 (1460-3010)	313
Mexican Americans	13-14	332 (298-371)	344 (289-413)	565 (508-639)	951 (838-1170)	1480 (1020-2280)	448
Mexican Americans	15-16	378 (339-421)	381 (351-428)	652 (571-733)	1130 (895-1430)	1780 (1380-2620)	578
Non-Hispanic blacks	11-12	511 (454-576)	480 (446-525)	794 (691-899)	2190 (1530-2690)	3350 (2650-4850)	662
Non-Hispanic blacks	13-14	527 (475-584)	464 (433-506)	908 (731-1130)	2900 (1880-3350)	3980 (3100-5070)	567
Non-Hispanic blacks	15-16	567 (513-626)	507 (449-562)	944 (805-1110)	2160 (1890-2780)	3970 (2990-5630)	656
Non-Hispanic whites	11-12	449 (411-492)	422 (366-456)	834 (706-930)	2120 (1680-2660)	3880 (3290-4370)	810
Non-Hispanic whites	13-14	388 (339-445)	366 (321-410)	745 (666-872)	1820 (1420-2380)	3230 (2560-4090)	944
Non-Hispanic whites	15-16	425 (366-492)	403 (338-480)	730 (625-908)	1900 (1200-2740)	3340 (2420-4960)	912
All Hispanics	11-12	398 (348-455)	384 (333-451)	751 (651-838)	1460 (1080-2060)	2600 (1910-3270)	566
All Hispanics	13-14	341 (310-374)	348 (291-413)	600 (536-658)	995 (893-1210)	1730 (1260-2280)	693
All Hispanics	15-16	367 (339-398)	375 (351-410)	642 (558-716)	1190 (1000-1380)	1960 (1520-2420)	970
Asians	11-12	336 (294-383)	339 (313-384)	588 (521-694)	1140 (944-1580)	1830 (1160-3090)	341
Asians	13-14	292 (243-353)	291 (237-350)	512 (444-590)	1110 (798-1680)	2200 (1160-4720)	287
Asians	15-16	306 (270-346)	306 (264-361)	538 (464-656)	1130 (790-1300)	1550 (1270-2390)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 2.00, 3.00, and 3.00 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(3-hydroxypropyl-1-methyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 33164-70-4

Metabolite of Crotonaldehyde

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	506 (473-540)	398 (370-419)	683 (613-760)	2050 (1720-2490)	3970 (3220-5200)	2464
Total population	13-14	450 (412-493)	365 (338-397)	707 (626-798)	1750 (1510-2030)	2870 (2410-3310)	2592
Total population	15-16	477 (442-515)	379 (350-401)	632 (563-728)	1730 (1370-2230)	3060 (2670-3690)	3012
Age 3-5 years	15-16	724 (628-835)	615 (546-694)	848 (746-1070)	1900 (1170-2830)	3110 (1620-7280)	458
Age 6-11 years	11-12	450 (421-480)	425 (395-449)	534 (501-611)	843 (635-1110)	1100 (785-1970)	393
Age 6-11 years	13-14	436 (390-486)	412 (361-448)	573 (518-647)	902 (798-1080)	1180 (975-1680)	396
Age 6-11 years	15-16	463 (430-499)	428 (389-467)	547 (512-601)	808 (718-941)	1080 (812-1710)	373
Age 12-19 years	11-12	341 (300-388)	308 (257-336)	431 (376-502)	909 (534-1430)	1430 (763-2400)	384
Age 12-19 years	13-14	299 (274-325)	269 (241-291)	364 (326-416)	603 (476-914)	1360 (671-2410)	446
Age 12-19 years	15-16	305 (280-331)	274 (252-298)	351 (322-409)	537 (448-713)	826 (568-1080)	395
Age 20+ years	11-12	543 (508-581)	408 (385-432)	760 (693-920)	2610 (2020-3280)	4700 (3510-5830)	1687
Age 20+ years	13-14	481 (436-530)	387 (357-430)	817 (721-932)	1990 (1720-2330)	3190 (2630-3670)	1750
Age 20+ years	15-16	501 (458-548)	383 (352-413)	697 (588-852)	2200 (1590-2670)	3470 (2830-4140)	1786
Males	11-12	476 (442-511)	377 (351-405)	654 (600-770)	1780 (1480-2170)	3170 (2350-4230)	1250
Males	13-14	414 (378-455)	348 (327-371)	600 (532-681)	1470 (1210-1780)	2410 (2140-2870)	1283
Males	15-16	462 (427-501)	371 (340-391)	628 (534-733)	1740 (1250-2380)	2980 (2380-3690)	1499
Females	11-12	536 (483-596)	410 (379-444)	698 (605-855)	2700 (1570-3800)	4700 (3350-5710)	1214
Females	13-14	488 (437-545)	390 (344-460)	805 (688-952)	2030 (1620-2460)	3310 (2580-5280)	1309
Females	15-16	492 (443-545)	390 (356-427)	661 (561-790)	1660 (1260-2360)	3070 (2360-4340)	1513
Mexican Americans	11-12	439 (361-535)	362 (320-424)	581 (479-698)	1430 (1090-1850)	2240 (1660-4310)	313
Mexican Americans	13-14	378 (340-421)	341 (316-359)	492 (442-532)	970 (720-1380)	1860 (984-2890)	448
Mexican Americans	15-16	415 (387-445)	356 (331-382)	519 (480-592)	993 (811-1230)	1860 (1230-2280)	577
Non-Hispanic blacks	11-12	399 (364-437)	322 (293-360)	536 (471-641)	1450 (1050-1780)	2070 (1800-2680)	662
Non-Hispanic blacks	13-14	403 (361-449)	309 (286-340)	682 (523-803)	1690 (1400-2270)	2490 (2040-3270)	567
Non-Hispanic blacks	15-16	452 (407-503)	360 (326-412)	683 (541-804)	1550 (1350-1980)	2650 (2040-2900)	654
Non-Hispanic whites	11-12	548 (506-594)	411 (388-444)	730 (628-932)	2700 (1720-3550)	4700 (3280-6190)	808
Non-Hispanic whites	13-14	481 (431-537)	390 (353-436)	817 (686-937)	1910 (1610-2390)	3140 (2480-3890)	943
Non-Hispanic whites	15-16	504 (447-568)	390 (358-438)	673 (556-849)	2250 (1360-2770)	3650 (2670-4630)	912
All Hispanics	11-12	445 (395-502)	361 (325-405)	607 (519-712)	1650 (1220-2020)	2700 (1850-3440)	566
All Hispanics	13-14	381 (345-421)	336 (315-354)	505 (460-556)	1030 (795-1420)	2050 (1350-2880)	693
All Hispanics	15-16	418 (393-444)	347 (329-376)	537 (498-610)	1080 (922-1220)	2090 (1520-2400)	969
Asians	11-12	449 (415-486)	393 (353-433)	575 (508-640)	1110 (806-1680)	2000 (1350-2410)	341
Asians	13-14	465 (402-537)	417 (361-462)	695 (573-805)	1490 (947-2030)	2190 (1490-2680)	287
Asians	15-16	422 (372-477)	356 (304-400)	598 (458-723)	1220 (859-1430)	1680 (1270-2620)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary 2-Aminothiazoline-4-carboxylic acid (2011 - 2016)†

CAS Number 2150-55-2

Metabolite of Cyanide

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	110 (101-120)	120 (106-133)	234 (212-249)	410 (364-441)	558 (500-622)	2466
Total population	13-14	102 (93.3-111)	105 (94.8-116)	228 (209-253)	406 (377-442)	540 (491-595)	2523
Total population	15-16	120 (108-134)	130 (113-146)	267 (231-299)	464 (418-515)	624 (550-713)	3015
Age 3-5 years	15-16	281 (253-313)	287 (258-335)	518 (442-576)	741 (643-936)	1020 (845-1100)	459
Age 6-11 years	11-12	247 (227-270)	270 (239-308)	482 (394-583)	718 (641-835)	911 (749-1090)	394
Age 6-11 years	13-14	203 (170-242)	243 (194-297)	413 (347-517)	614 (552-721)	764 (638-927)	382
Age 6-11 years	15-16	275 (253-298)	319 (266-363)	480 (446-517)	677 (622-751)	824 (701-1010)	373
Age 12-19 years	11-12	118 (97.2-143)	133 (100-159)	266 (232-334)	435 (347-562)	583 (435-923)	384
Age 12-19 years	13-14	123 (105-145)	131 (109-155)	262 (220-328)	449 (380-505)	529 (483-559)	424
Age 12-19 years	15-16	128 (110-148)	132 (106-163)	300 (225-337)	442 (369-590)	652 (443-905)	395
Age 20+ years	11-12	99.8 (90.3-110)	106 (98.9-121)	201 (181-228)	348 (304-407)	483 (393-545)	1688
Age 20+ years	13-14	91.9 (83.7-101)	93.6 (83.8-106)	202 (177-222)	371 (339-400)	491 (442-554)	1717
Age 20+ years	15-16	106 (94.2-119)	114 (98.6-131)	225 (195-263)	394 (339-464)	555 (479-634)	1788
Males	11-12	92.0 (84.1-101)	98.4 (82.4-109)	191 (169-211)	361 (314-386)	493 (414-586)	1251
Males	13-14	81.9 (74.5-90.0)	86.9 (79.5-96.9)	186 (171-209)	352 (317-377)	449 (401-491)	1247
Males	15-16	101 (89.3-113)	106 (88.2-120)	227 (203-260)	417 (358-464)	576 (506-670)	1499
Females	11-12	131 (116-148)	147 (131-162)	275 (246-303)	447 (401-515)	589 (514-757)	1215
Females	13-14	125 (113-138)	123 (107-146)	262 (232-299)	471 (412-530)	612 (540-757)	1276
Females	15-16	143 (126-162)	153 (133-178)	295 (253-348)	502 (437-553)	652 (553-812)	1516
Mexican Americans	11-12	135 (109-168)	144 (106-184)	271 (191-374)	501 (364-671)	728 (537-872)	313
Mexican Americans	13-14	143 (130-158)	151 (136-167)	293 (258-323)	471 (418-556)	695 (540-804)	430
Mexican Americans	15-16	167 (151-184)	191 (163-224)	350 (298-379)	503 (469-577)	657 (589-714)	578
Non-Hispanic blacks	11-12	142 (124-163)	163 (122-201)	315 (264-383)	534 (485-604)	728 (651-816)	662
Non-Hispanic blacks	13-14	136 (114-163)	142 (113-180)	314 (256-381)	554 (491-629)	775 (629-842)	559
Non-Hispanic blacks	15-16	169 (150-189)	176 (154-202)	339 (300-400)	624 (527-754)	849 (749-1080)	656
Non-Hispanic whites	11-12	99.5 (91.2-109)	107 (99.0-125)	202 (182-229)	356 (331-391)	482 (419-553)	810
Non-Hispanic whites	13-14	88.6 (80.7-97.1)	90.7 (81.9-99.3)	198 (172-220)	363 (316-397)	491 (403-554)	920
Non-Hispanic whites	15-16	107 (94.7-120)	116 (99.6-133)	234 (196-278)	425 (349-468)	565 (506-667)	912
All Hispanics	11-12	135 (117-156)	139 (114-170)	268 (212-310)	483 (374-589)	671 (537-835)	566
All Hispanics	13-14	137 (125-149)	149 (132-162)	286 (255-299)	464 (423-540)	684 (531-772)	662
All Hispanics	15-16	156 (147-166)	169 (153-191)	315 (294-347)	514 (481-586)	677 (606-747)	970
Asians	11-12	114 (100-131)	114 (102-130)	225 (181-290)	424 (335-520)	543 (440-671)	341
Asians	13-14	97.8 (84.5-113)	95.0 (74.9-117)	236 (161-265)	376 (323-405)	437 (382-607)	280
Asians	15-16	101 (90.2-114)	92.8 (84.5-109)	182 (157-230)	382 (336-413)	446 (402-502)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 15.0, 15.0, and 15.0 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary 2-Aminothiazoline-4-carboxylic acid (creatinine corrected) (2011 - 2016)†

CAS Number 2150-55-2

Metabolite of Cyanide

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	126 (118-134)	135 (123-147)	249 (228-272)	413 (380-438)	539 (489-588)	2464
Total population	13-14	118 (108-129)	135 (122-148)	239 (217-264)	405 (363-468)	555 (503-610)	2522
Total population	15-16	136 (126-147)	144 (130-161)	272 (244-301)	480 (449-518)	650 (598-696)	3012
Age 3-5 years	15-16	679 (622-740)	663 (622-734)	962 (895-1030)	1310 (1140-1430)	1530 (1430-1860)	458
Age 6-11 years	11-12	352 (323-384)	375 (329-418)	540 (472-628)	742 (634-859)	926 (747-1000)	393
Age 6-11 years	13-14	305 (266-351)	338 (284-382)	504 (413-593)	682 (587-849)	849 (671-1080)	382
Age 6-11 years	15-16	401 (384-419)	405 (388-447)	586 (527-621)	796 (720-917)	966 (905-1230)	373
Age 12-19 years	11-12	115 (101-131)	125 (113-151)	214 (183-240)	338 (255-438)	438 (307-591)	384
Age 12-19 years	13-14	112 (93.1-134)	127 (92.1-159)	205 (180-240)	340 (267-404)	453 (340-581)	424
Age 12-19 years	15-16	121 (106-137)	127 (112-156)	229 (203-250)	359 (312-410)	460 (375-534)	395
Age 20+ years	11-12	114 (105-123)	120 (111-134)	221 (201-241)	363 (336-379)	444 (411-514)	1687
Age 20+ years	13-14	108 (98.2-118)	122 (107-136)	219 (197-244)	363 (307-422)	511 (439-562)	1716
Age 20+ years	15-16	116 (107-126)	124 (114-134)	224 (203-247)	370 (328-430)	500 (453-565)	1786
Males	11-12	86.4 (79.1-94.3)	80.2 (73.1-91.6)	169 (142-199)	328 (298-375)	471 (426-539)	1250
Males	13-14	82.4 (75.5-89.8)	86.1 (75.6-98.1)	174 (154-189)	318 (275-356)	439 (381-529)	1246
Males	15-16	95.9 (86.2-107)	91.6 (77.9-102)	194 (170-220)	415 (371-462)	598 (510-688)	1499
Females	11-12	181 (166-196)	189 (171-204)	312 (286-337)	440 (413-489)	577 (520-624)	1214
Females	13-14	167 (149-187)	184 (166-202)	292 (255-340)	493 (404-549)	619 (537-753)	1276
Females	15-16	189 (174-206)	201 (184-218)	328 (294-357)	518 (472-588)	695 (588-784)	1513
Mexican Americans	11-12	153 (121-192)	178 (149-215)	300 (228-353)	438 (363-539)	585 (450-800)	313
Mexican Americans	13-14	165 (153-177)	179 (160-194)	312 (283-354)	521 (439-567)	633 (555-726)	430
Mexican Americans	15-16	183 (172-194)	184 (168-202)	348 (314-378)	560 (503-621)	732 (646-884)	577
Non-Hispanic blacks	11-12	111 (98.4-125)	125 (106-147)	245 (212-276)	396 (325-458)	504 (445-544)	662
Non-Hispanic blacks	13-14	104 (87.3-123)	104 (90.3-124)	249 (202-276)	404 (341-454)	555 (439-607)	559
Non-Hispanic blacks	15-16	134 (122-149)	136 (121-155)	288 (254-318)	507 (423-577)	666 (554-770)	654
Non-Hispanic whites	11-12	121 (113-131)	123 (112-136)	230 (217-256)	413 (373-440)	539 (458-605)	808
Non-Hispanic whites	13-14	110 (101-120)	125 (113-142)	219 (197-248)	377 (313-453)	514 (453-593)	919
Non-Hispanic whites	15-16	127 (115-139)	134 (116-154)	251 (227-289)	466 (414-500)	619 (558-713)	912
All Hispanics	11-12	152 (130-177)	178 (153-201)	286 (253-331)	423 (359-483)	568 (454-749)	566
All Hispanics	13-14	154 (142-166)	170 (150-184)	301 (265-328)	496 (432-539)	617 (555-718)	662
All Hispanics	15-16	177 (166-189)	182 (167-198)	348 (315-374)	560 (505-617)	731 (662-878)	969
Asians	11-12	153 (137-172)	158 (141-190)	265 (232-309)	439 (342-525)	547 (459-691)	341
Asians	13-14	155 (131-182)	166 (129-208)	292 (244-331)	467 (383-529)	625 (476-719)	280
Asians	15-16	140 (127-154)	144 (127-159)	238 (201-268)	422 (323-488)	605 (463-741)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(N-methylcarbamoyl)-L-cysteine (2011 - 2016)†

CAS Number 103974-29-4

Metabolite of N,N-Dimethylformamide

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	138 (129-149)	136 (124-145)	289 (252-326)	557 (481-660)	847 (703-1010)	2466
Total population	13-14	124 (112-136)	122 (109-135)	276 (238-309)	517 (472-578)	802 (691-897)	2629
Total population	15-16	115 (106-124)	107 (101-117)	241 (210-273)	457 (398-531)	726 (580-914)	2965
Age 3-5 years	15-16	37.9 (34.0-42.2)	37.0 (32.1-42.6)	59.5 (54.5-69.9)	99.5 (74.9-142)	153 (103-215)	454
Age 6-11 years	11-12	59.1 (53.3-65.4)	64.2 (57.0-70.9)	111 (98.0-120)	159 (125-192)	192 (140-217)	394
Age 6-11 years	13-14	53.4 (47.7-59.7)	57.8 (46.0-65.7)	97.0 (83.7-107)	150 (134-180)	196 (167-240)	396
Age 6-11 years	15-16	48.5 (44.7-52.6)	51.3 (46.4-57.4)	73.9 (68.0-79.4)	107 (89.5-124)	139 (116-177)	364
Age 12-19 years	11-12	87.7 (73.8-104)	84.7 (70.2-104)	163 (141-183)	279 (224-413)	446 (364-568)	384
Age 12-19 years	13-14	87.7 (71.0-108)	82.2 (65.0-109)	156 (125-223)	297 (218-490)	463 (294-907)	448
Age 12-19 years	15-16	65.4 (59.1-72.5)	68.9 (58.6-76.7)	107 (92.7-118)	173 (141-204)	226 (167-448)	388
Age 20+ years	11-12	163 (151-176)	163 (148-180)	333 (302-364)	655 (564-702)	975 (773-1130)	1688
Age 20+ years	13-14	142 (128-158)	141 (126-155)	315 (287-338)	583 (524-642)	869 (778-1010)	1785
Age 20+ years	15-16	141 (129-155)	145 (133-152)	286 (253-329)	530 (444-633)	857 (677-978)	1759
Males	11-12	153 (139-168)	151 (132-176)	289 (250-338)	540 (446-665)	882 (661-1130)	1251
Males	13-14	127 (114-141)	122 (109-140)	281 (233-320)	500 (453-548)	786 (645-869)	1306
Males	15-16	127 (118-136)	117 (108-131)	262 (224-300)	508 (418-626)	798 (592-997)	1471
Females	11-12	126 (113-140)	120 (108-138)	287 (228-333)	575 (456-702)	838 (686-1050)	1215
Females	13-14	121 (108-135)	122 (105-136)	268 (218-315)	529 (450-631)	810 (663-938)	1323
Females	15-16	104 (94.2-115)	99.3 (85.5-112)	221 (187-259)	418 (340-517)	627 (507-916)	1494
Mexican Americans	11-12	97.9 (83.0-116)	95.2 (78.9-116)	193 (161-211)	292 (238-378)	468 (316-732)	313
Mexican Americans	13-14	100 (87.8-114)	101 (89.9-109)	198 (165-235)	351 (303-422)	500 (396-706)	450
Mexican Americans	15-16	95.0 (87.6-103)	90.0 (80.7-103)	174 (152-189)	319 (259-418)	482 (334-617)	574
Non-Hispanic blacks	11-12	122 (110-135)	116 (106-132)	230 (195-252)	471 (361-572)	696 (584-791)	662
Non-Hispanic blacks	13-14	138 (123-155)	125 (112-141)	290 (222-372)	602 (485-702)	928 (663-1130)	571
Non-Hispanic blacks	15-16	119 (109-131)	107 (98.2-121)	228 (198-277)	518 (390-622)	882 (601-997)	643
Non-Hispanic whites	11-12	157 (143-173)	158 (140-180)	333 (302-363)	629 (526-702)	969 (715-1130)	810
Non-Hispanic whites	13-14	134 (116-155)	134 (114-154)	303 (254-346)	577 (500-651)	869 (708-1030)	972
Non-Hispanic whites	15-16	125 (111-141)	117 (107-138)	268 (224-314)	508 (398-633)	822 (581-987)	885
All Hispanics	11-12	107 (87.6-129)	108 (87.8-130)	208 (159-259)	372 (286-452)	534 (420-725)	566
All Hispanics	13-14	105 (92.4-120)	105 (92.5-123)	208 (170-244)	372 (304-497)	541 (409-708)	696
All Hispanics	15-16	97.8 (88.2-109)	93.1 (82.9-105)	185 (158-225)	338 (284-427)	489 (400-652)	962
Asians	11-12	79.9 (69.3-92.1)	77.3 (66.1-92.0)	161 (131-201)	299 (235-400)	522 (368-622)	341
Asians	13-14	60.5 (51.7-70.7)	57.6 (47.9-72.2)	118 (99.3-148)	193 (165-244)	326 (200-492)	286
Asians	15-16	63.9 (56.6-72.3)	65.7 (57.7-71.7)	121 (104-145)	229 (180-247)	315 (236-382)	328

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 6.26, 6.26, and 6.26 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(N-methylcarbamoyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 103974-29-4

Metabolite of N,N-Dimethylformamide

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	158 (147-170)	146 (136-155)	279 (257-315)	541 (454-649)	849 (693-959)	2464
Total population	13-14	143 (129-159)	137 (124-151)	264 (238-297)	482 (431-538)	679 (602-900)	2628
Total population	15-16	130 (123-136)	121 (113-128)	219 (200-247)	403 (365-464)	588 (524-652)	2962
Age 3-5 years	15-16	91.5 (87.0-96.3)	85.4 (80.7-90.2)	120 (112-126)	157 (143-173)	185 (167-213)	453
Age 6-11 years	11-12	84.7 (80.4-89.2)	82.3 (78.8-86.2)	110 (100-124)	152 (131-166)	171 (143-221)	393
Age 6-11 years	13-14	79.9 (72.4-88.2)	80.7 (75.8-86.7)	107 (95.2-120)	150 (123-170)	173 (149-206)	396
Age 6-11 years	15-16	70.7 (66.0-75.9)	70.5 (68.4-73.8)	85.8 (79.2-95.2)	112 (95.4-136)	140 (111-186)	364
Age 12-19 years	11-12	85.4 (75.4-96.9)	77.7 (64.3-101)	121 (108-142)	191 (169-243)	262 (196-364)	384
Age 12-19 years	13-14	79.5 (69.2-91.4)	72.5 (62.1-83.3)	115 (94.6-150)	217 (158-377)	415 (230-596)	448
Age 12-19 years	15-16	62.4 (58.1-67.0)	59.5 (56.2-62.5)	88.4 (77.7-98.7)	122 (106-146)	151 (124-202)	388
Age 20+ years	11-12	186 (173-199)	176 (164-190)	336 (308-364)	649 (525-747)	892 (781-1000)	1687
Age 20+ years	13-14	166 (148-186)	163 (147-183)	305 (271-337)	518 (466-603)	823 (638-1080)	1784
Age 20+ years	15-16	155 (145-165)	155 (140-166)	263 (236-289)	473 (418-513)	652 (587-759)	1757
Males	11-12	144 (131-158)	136 (121-152)	245 (206-294)	458 (379-593)	711 (547-836)	1250
Males	13-14	127 (116-140)	126 (114-138)	231 (205-260)	411 (357-462)	561 (485-668)	1305
Males	15-16	121 (113-129)	112 (102-122)	202 (180-226)	395 (319-449)	550 (473-645)	1471
Females	11-12	173 (158-190)	156 (145-173)	321 (271-362)	686 (494-849)	921 (850-997)	1214
Females	13-14	160 (140-183)	152 (132-169)	308 (255-376)	541 (455-668)	938 (636-1290)	1323
Females	15-16	139 (129-149)	131 (120-151)	236 (203-277)	424 (365-519)	631 (537-827)	1491
Mexican Americans	11-12	111 (93.6-131)	98.4 (90.2-108)	170 (136-206)	286 (212-382)	442 (281-1080)	313
Mexican Americans	13-14	115 (102-129)	116 (100-130)	183 (153-216)	317 (245-412)	462 (321-629)	450
Mexican Americans	15-16	104 (96.4-112)	98.0 (87.1-109)	155 (146-171)	259 (208-300)	352 (257-551)	573
Non-Hispanic blacks	11-12	94.8 (87.1-103)	86.3 (77.1-95.6)	155 (133-176)	290 (257-330)	438 (353-526)	662
Non-Hispanic blacks	13-14	105 (94.9-117)	88.6 (79.2-97.5)	215 (181-252)	423 (368-487)	518 (462-600)	571
Non-Hispanic blacks	15-16	95.2 (87.4-104)	85.2 (76.2-92.9)	170 (144-194)	327 (286-377)	419 (355-500)	641
Non-Hispanic whites	11-12	192 (179-207)	178 (160-197)	356 (313-378)	692 (536-833)	921 (849-1000)	808
Non-Hispanic whites	13-14	165 (145-187)	159 (137-183)	306 (270-347)	541 (458-647)	860 (639-1090)	971
Non-Hispanic whites	15-16	148 (136-162)	143 (128-158)	256 (223-288)	478 (395-537)	648 (574-777)	885
All Hispanics	11-12	119 (105-136)	108 (98.8-121)	183 (159-226)	336 (265-436)	500 (414-557)	566
All Hispanics	13-14	118 (102-136)	118 (101-134)	195 (165-228)	323 (266-412)	506 (380-680)	696
All Hispanics	15-16	111 (103-120)	106 (94.0-112)	172 (156-191)	284 (230-347)	388 (298-548)	961
Asians	11-12	107 (97.5-117)	107 (92.0-122)	174 (150-198)	280 (240-338)	397 (292-533)	341
Asians	13-14	95.2 (81.5-111)	91.3 (76.8-110)	165 (136-206)	278 (217-387)	416 (301-488)	286
Asians	15-16	88.3 (79.6-97.9)	79.7 (71.2-95.0)	132 (120-155)	229 (181-278)	292 (248-411)	328

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary Phenylglyoxylic acid (2011 - 2016)†

CAS Number 611-73-4

Metabolite of Ethylbenzene and Styrene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	177 (165-191)	199 (184-212)	334 (314-359)	491 (451-559)	706 (630-789)	2466
Total population	13-14	169 (155-184)	178 (162-190)	318 (291-353)	505 (459-561)	657 (614-725)	2575
Total population	15-16	193 (180-208)	205 (188-224)	353 (329-380)	521 (488-544)	669 (590-732)	3013
Age 3-5 years	15-16	125 (111-141)	132 (118-150)	223 (197-259)	316 (282-357)	382 (345-425)	459
Age 6-11 years	11-12	161 (148-176)	184 (161-202)	282 (255-312)	393 (347-456)	508 (393-594)	394
Age 6-11 years	13-14	151 (133-171)	155 (142-178)	280 (228-330)	411 (349-514)	515 (420-649)	389
Age 6-11 years	15-16	170 (155-186)	177 (161-207)	270 (244-300)	387 (356-466)	506 (387-568)	373
Age 12-19 years	11-12	173 (152-197)	193 (165-222)	341 (307-392)	468 (423-579)	662 (505-872)	384
Age 12-19 years	13-14	179 (157-205)	197 (155-246)	319 (276-384)	445 (385-561)	561 (445-744)	443
Age 12-19 years	15-16	182 (167-199)	196 (166-218)	299 (274-322)	414 (371-462)	549 (439-640)	395
Age 20+ years	11-12	180 (165-197)	203 (184-219)	341 (314-369)	514 (448-596)	732 (653-842)	1688
Age 20+ years	13-14	169 (154-186)	179 (164-193)	327 (290-357)	533 (477-605)	688 (617-798)	1743
Age 20+ years	15-16	201 (186-218)	218 (191-239)	373 (351-410)	542 (506-584)	720 (640-742)	1786
Males	11-12	201 (179-226)	225 (198-248)	369 (329-411)	540 (468-588)	789 (592-900)	1251
Males	13-14	183 (160-208)	191 (169-229)	335 (291-384)	514 (453-590)	637 (608-692)	1282
Males	15-16	217 (202-234)	236 (216-265)	386 (355-416)	549 (504-585)	695 (591-734)	1497
Females	11-12	157 (143-172)	171 (157-193)	298 (273-332)	447 (412-518)	660 (502-771)	1215
Females	13-14	156 (145-169)	158 (145-177)	305 (279-336)	491 (454-555)	682 (612-758)	1293
Females	15-16	173 (160-187)	178 (160-196)	322 (293-343)	485 (431-521)	627 (544-726)	1516
Mexican Americans	11-12	149 (123-181)	166 (141-185)	279 (209-347)	423 (347-505)	505 (431-706)	313
Mexican Americans	13-14	151 (138-166)	159 (139-176)	276 (250-311)	418 (389-468)	504 (468-611)	449
Mexican Americans	15-16	173 (149-200)	197 (169-222)	308 (288-324)	428 (388-464)	545 (431-655)	578
Non-Hispanic blacks	11-12	217 (198-237)	229 (204-255)	369 (342-390)	570 (489-647)	771 (683-937)	662
Non-Hispanic blacks	13-14	223 (204-244)	237 (215-260)	369 (349-401)	612 (531-647)	738 (634-1110)	568
Non-Hispanic blacks	15-16	249 (229-271)	254 (225-287)	415 (365-463)	616 (528-767)	849 (682-1160)	656
Non-Hispanic whites	11-12	180 (165-196)	205 (184-220)	340 (316-365)	493 (439-585)	726 (578-861)	810
Non-Hispanic whites	13-14	168 (147-193)	177 (154-203)	334 (283-376)	514 (452-605)	674 (606-764)	935
Non-Hispanic whites	15-16	194 (178-211)	205 (177-234)	356 (329-395)	521 (476-569)	692 (572-734)	911
All Hispanics	11-12	154 (130-183)	169 (146-192)	283 (233-359)	442 (393-558)	604 (464-711)	566
All Hispanics	13-14	158 (143-175)	169 (146-184)	283 (255-313)	435 (400-490)	550 (490-616)	695
All Hispanics	15-16	172 (154-192)	196 (174-218)	312 (295-333)	433 (415-491)	559 (476-640)	969
Asians	11-12	139 (120-160)	161 (131-187)	266 (221-302)	398 (330-489)	518 (410-617)	341
Asians	13-14	111 (94.6-131)	113 (92.6-152)	208 (184-231)	296 (278-358)	400 (310-458)	281
Asians	15-16	148 (135-163)	159 (138-174)	262 (231-289)	388 (346-416)	498 (400-549)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 12.0, 12.0, and 12.0 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Ethylbenzene_BiomonitoringSummary.html
Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Styrene_BiomonitoringSummary.html

Urinary Phenylglyoxylic acid (creatinine corrected) (2011 - 2016)†

CAS Number 611-73-4

Metabolite of Ethylbenzene and Styrene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	202 (189-217)	206 (195-219)	285 (269-301)	401 (377-426)	518 (468-568)	2464
Total population	13-14	194 (176-214)	195 (180-213)	279 (256-304)	420 (372-484)	562 (501-657)	2574
Total population	15-16	219 (207-231)	219 (209-231)	303 (290-317)	397 (378-421)	491 (456-520)	3010
Age 3-5 years	15-16	301 (271-334)	321 (292-357)	422 (378-469)	520 (489-556)	610 (549-650)	458
Age 6-11 years	11-12	231 (219-244)	239 (221-256)	310 (297-323)	411 (377-436)	467 (416-502)	393
Age 6-11 years	13-14	227 (199-258)	240 (204-261)	311 (266-363)	394 (356-446)	476 (380-844)	389
Age 6-11 years	15-16	247 (228-268)	255 (233-281)	328 (300-349)	408 (373-459)	491 (418-543)	373
Age 12-19 years	11-12	168 (150-189)	181 (167-193)	239 (212-256)	285 (261-336)	368 (285-550)	384
Age 12-19 years	13-14	163 (151-176)	170 (161-179)	220 (192-238)	311 (248-357)	397 (327-405)	443
Age 12-19 years	15-16	172 (159-185)	171 (161-182)	216 (200-243)	283 (253-313)	328 (290-347)	395
Age 20+ years	11-12	205 (191-220)	207 (195-220)	288 (272-310)	413 (384-442)	536 (482-602)	1687
Age 20+ years	13-14	196 (177-218)	197 (179-215)	284 (257-311)	456 (382-517)	583 (517-707)	1742
Age 20+ years	15-16	221 (209-233)	222 (212-234)	306 (292-320)	398 (381-425)	507 (453-534)	1784
Males	11-12	189 (174-205)	194 (178-207)	270 (244-299)	400 (367-418)	517 (481-538)	1250
Males	13-14	184 (164-206)	188 (170-204)	256 (240-279)	380 (330-454)	531 (427-657)	1281
Males	15-16	207 (199-217)	211 (199-224)	289 (273-308)	387 (355-409)	453 (424-496)	1497
Females	11-12	217 (199-235)	223 (202-239)	291 (274-318)	404 (366-460)	536 (448-598)	1214
Females	13-14	205 (185-229)	201 (184-224)	300 (268-333)	467 (387-523)	595 (517-800)	1293
Females	15-16	230 (215-246)	230 (213-250)	312 (297-328)	418 (386-438)	511 (478-547)	1513
Mexican Americans	11-12	168 (135-210)	177 (160-198)	240 (220-265)	311 (267-413)	413 (311-520)	313
Mexican Americans	13-14	172 (163-183)	174 (166-183)	238 (230-252)	322 (281-401)	444 (349-617)	449
Mexican Americans	15-16	189 (171-210)	192 (178-204)	266 (241-290)	355 (307-398)	411 (371-494)	577
Non-Hispanic blacks	11-12	169 (160-179)	171 (158-180)	233 (221-243)	308 (291-334)	395 (355-431)	662
Non-Hispanic blacks	13-14	171 (151-192)	170 (155-185)	253 (222-301)	407 (347-435)	485 (435-543)	568
Non-Hispanic blacks	15-16	199 (183-217)	190 (176-210)	284 (250-297)	398 (342-436)	482 (434-535)	654
Non-Hispanic whites	11-12	220 (207-234)	224 (210-233)	304 (281-336)	426 (395-481)	562 (481-660)	808
Non-Hispanic whites	13-14	207 (182-234)	205 (186-227)	295 (262-331)	464 (385-540)	596 (517-765)	934
Non-Hispanic whites	15-16	230 (216-245)	232 (219-250)	319 (303-331)	418 (388-436)	507 (456-534)	911
All Hispanics	11-12	173 (150-199)	179 (164-197)	243 (226-265)	317 (295-344)	390 (354-476)	566
All Hispanics	13-14	176 (162-191)	178 (165-188)	247 (228-275)	359 (306-401)	458 (396-595)	695
All Hispanics	15-16	196 (181-212)	197 (185-209)	274 (251-292)	359 (322-390)	437 (380-552)	968
Asians	11-12	186 (169-204)	187 (173-208)	257 (241-277)	336 (315-381)	419 (351-515)	341
Asians	13-14	174 (155-196)	183 (161-206)	256 (225-286)	345 (284-415)	400 (319-551)	281
Asians	15-16	205 (189-222)	208 (193-221)	274 (258-293)	358 (325-403)	440 (361-528)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Ethylbenzene_BiomonitoringSummary.html

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Styrene_BiomonitoringSummary.html

Urinary N-Acetyl-S-(2-hydroxypropyl)-L-cysteine (2011 - 2016)†

CAS Number 923-43-3

Metabolite of Propylene oxide

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	32.1 (29.3-35.1)	30.6 (27.6-32.7)	60.2 (55.8-64.6)	124 (111-142)	249 (181-313)	2466
Total population	13-14	26.5 (23.9-29.2)	25.2 (22.5-27.7)	52.9 (45.6-59.1)	106 (91.4-118)	173 (144-198)	2597
Total population	15-16	30.3 (28.0-32.8)	28.2 (26.3-30.6)	55.7 (52.0-59.0)	113 (92.8-139)	219 (159-313)	3014
Age 3-5 years	15-16	18.7 (16.5-21.2)	18.3 (14.5-23.1)	33.2 (29.6-36.2)	62.8 (47.2-76.8)	84.9 (68.3-160)	459
Age 6-11 years	11-12	24.8 (21.7-28.3)	24.2 (21.2-29.6)	40.9 (36.8-52.0)	77.7 (63.5-95.2)	129 (88.1-160)	394
Age 6-11 years	13-14	20.9 (17.8-24.5)	22.3 (17.0-26.1)	41.0 (33.9-47.9)	71.1 (58.5-105)	128 (73.5-208)	391
Age 6-11 years	15-16	23.1 (20.5-26.1)	23.2 (19.9-27.1)	39.0 (34.8-44.8)	59.2 (49.7-69.7)	86.2 (65.4-166)	373
Age 12-19 years	11-12	26.2 (21.6-31.7)	26.0 (21.3-31.8)	47.5 (39.6-58.5)	81.5 (58.5-105)	112 (82.1-203)	384
Age 12-19 years	13-14	27.7 (22.6-34.0)	26.5 (22.2-31.0)	46.3 (40.6-60.2)	86.9 (70.8-125)	175 (104-596)	444
Age 12-19 years	15-16	24.6 (21.4-28.3)	22.5 (20.4-24.5)	41.6 (36.9-51.1)	73.3 (61.1-93.1)	124 (72.3-268)	394
Age 20+ years	11-12	34.1 (30.8-37.7)	32.1 (29.6-33.8)	65.7 (59.6-71.1)	142 (120-167)	286 (199-382)	1688
Age 20+ years	13-14	26.9 (23.9-30.4)	25.3 (21.9-29.2)	55.5 (47.2-64.0)	109 (91.9-127)	177 (143-206)	1762
Age 20+ years	15-16	32.7 (29.8-35.8)	30.6 (28.1-32.8)	59.7 (55.7-64.8)	126 (105-170)	253 (170-352)	1788
Males	11-12	34.6 (31.0-38.6)	32.7 (29.7-35.9)	61.3 (52.1-70.6)	107 (95.7-140)	202 (142-270)	1251
Males	13-14	27.8 (24.8-31.1)	26.4 (23.5-29.7)	52.9 (44.8-60.7)	103 (90.4-113)	172 (137-194)	1287
Males	15-16	34.5 (32.4-36.8)	34.4 (31.3-37.2)	58.9 (55.4-62.0)	116 (96.4-147)	208 (135-331)	1498
Females	11-12	29.9 (25.9-34.5)	26.8 (23.3-31.8)	59.1 (49.9-67.8)	137 (121-162)	293 (167-442)	1215
Females	13-14	25.3 (22.5-28.4)	24.0 (20.5-28.5)	53.2 (43.8-60.7)	108 (85.4-130)	177 (136-230)	1310
Females	15-16	26.8 (23.9-29.9)	23.7 (21.4-26.3)	51.6 (41.9-57.8)	107 (81.0-154)	227 (155-352)	1516
Mexican Americans	11-12	32.9 (27.8-39.0)	31.8 (26.0-37.0)	53.6 (45.6-62.4)	101 (81.0-178)	205 (111-498)	313
Mexican Americans	13-14	26.0 (23.4-28.8)	26.9 (23.0-29.5)	51.4 (44.6-56.4)	84.0 (75.5-115)	135 (89.7-228)	451
Mexican Americans	15-16	28.6 (26.5-30.8)	28.2 (24.2-32.3)	50.6 (45.3-54.3)	105 (81.9-127)	176 (134-198)	577
Non-Hispanic blacks	11-12	37.2 (32.9-42.0)	35.6 (32.9-39.7)	64.0 (58.0-71.1)	120 (103-142)	182 (148-211)	662
Non-Hispanic blacks	13-14	35.5 (32.7-38.6)	35.0 (32.3-37.9)	63.5 (57.4-69.3)	112 (99.5-129)	173 (126-219)	565
Non-Hispanic blacks	15-16	38.2 (34.2-42.6)	35.6 (31.8-39.3)	65.6 (56.7-78.0)	126 (97.1-163)	195 (120-345)	656
Non-Hispanic whites	11-12	32.0 (28.5-35.9)	29.7 (25.5-32.8)	61.8 (54.7-68.4)	130 (107-162)	286 (178-392)	810
Non-Hispanic whites	13-14	25.5 (22.3-29.2)	23.7 (20.5-26.9)	49.5 (42.5-60.7)	109 (87.3-130)	177 (137-208)	952
Non-Hispanic whites	15-16	30.4 (27.4-33.8)	27.4 (24.4-30.6)	56.2 (50.2-61.5)	116 (84.5-188)	253 (134-363)	912
All Hispanics	11-12	30.7 (26.4-35.8)	28.9 (24.7-33.6)	52.2 (42.6-66.2)	101 (82.6-147)	191 (138-235)	566
All Hispanics	13-14	26.6 (23.7-30.0)	26.9 (23.1-30.3)	53.3 (44.6-60.2)	87.0 (77.7-112)	137 (105-198)	694
All Hispanics	15-16	27.8 (26.0-29.8)	28.6 (26.1-30.8)	47.7 (44.0-52.5)	93.6 (79.2-113)	165 (127-196)	969
Asians	11-12	25.8 (22.0-30.3)	24.4 (21.8-29.1)	48.4 (40.6-59.6)	99.0 (78.8-117)	202 (110-320)	341
Asians	13-14	21.0 (16.6-26.7)	19.1 (16.0-21.7)	37.6 (27.6-51.2)	106 (53.0-204)	204 (99.6-892)	285
Asians	15-16	24.7 (21.7-28.2)	23.7 (21.1-27.6)	44.3 (37.3-54.9)	103 (67.1-154)	184 (103-489)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 5.30, 5.30, and 5.30 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(2-hydroxypropyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 923-43-3

Metabolite of Propylene oxide

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	36.6 (33.3-40.2)	30.9 (28.8-32.4)	55.1 (51.7-61.8)	121 (105-143)	220 (189-315)	2464
Total population	13-14	30.5 (27.2-34.2)	26.6 (24.1-29.7)	48.0 (43.0-56.9)	106 (92.1-126)	180 (151-218)	2596
Total population	15-16	34.2 (32.2-36.4)	28.6 (27.4-30.6)	50.2 (47.0-53.6)	103 (87.0-128)	185 (141-268)	3011
Age 3-5 years	15-16	45.2 (40.5-50.4)	40.8 (37.4-45.4)	59.1 (51.1-70.7)	92.0 (79.5-117)	136 (94.4-245)	458
Age 6-11 years	11-12	35.3 (31.8-39.2)	32.3 (29.3-34.4)	50.7 (44.9-56.0)	87.6 (63.7-118)	128 (87.6-187)	393
Age 6-11 years	13-14	31.1 (27.3-35.5)	28.7 (24.1-31.7)	46.4 (35.8-57.5)	82.0 (64.4-112)	169 (81.7-278)	391
Age 6-11 years	15-16	33.7 (31.1-36.6)	30.5 (27.3-33.0)	44.5 (41.0-49.7)	64.8 (57.2-78.9)	96.8 (72.4-185)	373
Age 12-19 years	11-12	25.5 (22.9-28.3)	23.1 (20.8-24.7)	36.5 (31.7-43.1)	53.7 (44.0-76.0)	85.5 (62.7-118)	384
Age 12-19 years	13-14	25.1 (20.8-30.3)	21.2 (18.3-26.1)	35.6 (32.0-41.5)	85.2 (46.2-147)	154 (53.3-411)	444
Age 12-19 years	15-16	23.3 (21.0-25.9)	21.4 (18.5-23.9)	32.2 (28.1-36.7)	53.8 (45.0-59.0)	75.0 (55.6-161)	394
Age 20+ years	11-12	38.8 (35.0-43.1)	31.9 (29.8-34.5)	61.5 (53.6-70.4)	141 (121-167)	269 (198-426)	1687
Age 20+ years	13-14	31.3 (27.6-35.5)	27.3 (24.7-31.1)	52.2 (43.8-61.3)	113 (93.8-137)	190 (152-238)	1761
Age 20+ years	15-16	35.8 (33.1-38.6)	29.7 (27.8-31.5)	53.2 (48.8-59.2)	117 (95.6-147)	205 (146-345)	1786
Males	11-12	32.4 (29.7-35.5)	28.8 (27.0-31.3)	47.4 (43.6-53.5)	88.2 (72.6-113)	143 (118-201)	1250
Males	13-14	27.7 (24.6-31.1)	25.2 (22.6-29.0)	43.6 (39.1-46.9)	86.8 (72.7-105)	140 (111-161)	1286
Males	15-16	32.9 (31.0-35.0)	27.9 (26.9-29.4)	48.7 (44.5-53.3)	93.5 (76.4-117)	146 (111-191)	1498
Females	11-12	41.2 (34.8-48.7)	32.8 (28.8-37.3)	68.5 (54.2-79.7)	164 (122-208)	324 (190-878)	1214
Females	13-14	33.5 (29.1-38.6)	27.9 (24.8-32.0)	56.9 (44.5-68.6)	128 (97.8-167)	218 (162-307)	1310
Females	15-16	35.5 (32.3-39.1)	30.0 (26.8-32.7)	52.1 (46.4-57.8)	122 (90.2-159)	226 (147-409)	1513
Mexican Americans	11-12	37.2 (32.6-42.3)	30.1 (28.4-34.3)	52.5 (44.6-63.1)	113 (80.9-141)	191 (101-905)	313
Mexican Americans	13-14	29.7 (27.6-31.9)	27.5 (25.2-32.2)	44.1 (39.8-50.3)	90.9 (71.9-112)	156 (95.7-252)	451
Mexican Americans	15-16	31.4 (29.2-33.8)	27.3 (24.7-30.1)	42.3 (38.5-49.8)	88.2 (67.3-101)	141 (109-200)	576
Non-Hispanic blacks	11-12	29 (25.8-32.6)	26.4 (23.4-30.3)	44.5 (40.6-49.0)	81.6 (66.6-93.8)	122 (93.8-167)	662
Non-Hispanic blacks	13-14	26.9 (23.5-30.8)	25.5 (21.1-29.1)	43.8 (35.3-52.1)	78.8 (57.7-108)	120 (83.9-173)	565
Non-Hispanic blacks	15-16	30.5 (27.3-34.1)	27.6 (24.6-30.0)	47.4 (41.2-53.4)	75.9 (64.1-92.0)	113 (86.1-148)	654
Non-Hispanic whites	11-12	39 (34.9-43.7)	31.9 (29.2-34.5)	60.7 (53.0-70.4)	143 (111-179)	267 (190-426)	808
Non-Hispanic whites	13-14	31.3 (27.5-35.6)	26.8 (24.0-29.8)	49.7 (41.7-60.5)	117 (96.6-149)	200 (156-241)	951
Non-Hispanic whites	15-16	36.1 (33.1-39.3)	29.7 (27.7-31.8)	53.2 (49.2-57.3)	123 (93.5-156)	217 (146-345)	912
All Hispanics	11-12	34.4 (31.1-38.0)	29.1 (27.6-31.2)	47.6 (42.6-56.1)	96.5 (74.3-128)	161 (106-291)	566
All Hispanics	13-14	29.8 (27.1-32.8)	27.2 (24.3-32.3)	46.3 (41.6-53.2)	92.1 (75.6-115)	166 (115-248)	694
All Hispanics	15-16	31.7 (29.8-33.8)	27.7 (25.9-30.2)	42.4 (39.0-50.2)	84.0 (68.6-95.5)	141 (109-176)	968
Asians	11-12	34.5 (28.7-41.4)	30.0 (24.7-35.9)	57.9 (45.3-71.1)	118 (84.8-209)	251 (134-373)	341
Asians	13-14	33 (26.1-41.9)	28.8 (21.1-37.5)	53.9 (42.5-73.4)	101 (62.1-303)	303 (93.6-846)	285
Asians	15-16	34.1 (30.2-38.5)	29.7 (26.9-32.2)	48.4 (43.8-55.3)	94.0 (76.1-128)	205 (97.3-491)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Urinary N-Acetyl-S-(1-phenyl-2-hydroxyethyl)-L-cysteine + N-Acetyl-S-(2-phenyl-2-hydroxyethyl)-L-cysteine (2011 - 2016)†

CAS Number 69278-53-1, 14510-10-2

Metabolite of Styrene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	.933 (.843-1.04)	1.90 (1.74-2.17)	3.20 (2.75-3.63)	2466
Total population	13-14	*	<LOD	1.03 (.885-1.18)	1.88 (1.73-2.10)	2.94 (2.55-3.42)	2569
Total population	15-16	*	<LOD	1.28 (1.14-1.40)	2.28 (1.98-2.64)	3.32 (2.90-4.23)	2947
Age 3-5 years	15-16	*	<LOD	1.24 (.997-1.43)	2.12 (1.64-3.08)	3.39 (2.53-3.77)	455
Age 6-11 years	11-12	*	<LOD	.929 (<LOD-1.12)	1.98 (1.42-3.06)	3.21 (1.98-5.67)	394
Age 6-11 years	13-14	*	<LOD	.864 (<LOD-1.00)	1.43 (1.18-1.52)	1.79 (1.43-3.57)	387
Age 6-11 years	15-16	*	.705 (<LOD-.831)	1.28 (1.09-1.40)	2.39 (1.61-3.26)	3.85 (2.61-5.78)	363
Age 12-19 years	11-12	*	<LOD	.882 (<LOD-1.11)	1.88 (1.42-2.16)	2.50 (1.90-4.61)	384
Age 12-19 years	13-14	*	<LOD	.986 (<LOD-1.21)	1.60 (1.27-1.94)	2.14 (1.75-3.14)	433
Age 12-19 years	15-16	*	<LOD	1.11 (.960-1.31)	2.31 (1.62-3.15)	3.92 (2.93-5.06)	379
Age 20+ years	11-12	*	<LOD	.942 (.819-1.08)	1.91 (1.66-2.32)	3.26 (2.71-3.93)	1688
Age 20+ years	13-14	*	<LOD	1.08 (.900-1.21)	2.04 (1.84-2.29)	3.18 (2.71-3.56)	1749
Age 20+ years	15-16	*	<LOD	1.31 (1.15-1.46)	2.26 (1.96-2.75)	3.22 (2.66-4.56)	1750
Males	11-12	*	<LOD	.988 (.820-1.19)	2.06 (1.80-2.70)	3.60 (2.71-5.41)	1251
Males	13-14	*	<LOD	1.03 (.866-1.21)	1.95 (1.67-2.17)	3.11 (2.45-3.71)	1273
Males	15-16	*	.783 (.708-.857)	1.43 (1.27-1.60)	2.32 (2.07-2.67)	3.47 (2.81-4.56)	1456
Females	11-12	*	<LOD	.887 (.807-.987)	1.75 (1.58-1.85)	2.95 (2.27-3.26)	1215
Females	13-14	*	<LOD	1.04 (.813-1.21)	1.85 (1.71-2.16)	2.87 (2.35-3.56)	1296
Females	15-16	*	<LOD	1.11 (1.03-1.25)	2.05 (1.74-2.71)	3.21 (2.77-3.98)	1491
Mexican Americans	11-12	*	<LOD	.887 (.706-1.09)	1.69 (1.51-1.93)	2.39 (1.73-3.87)	313
Mexican Americans	13-14	*	<LOD	1.03 (.887-1.19)	1.79 (1.50-2.15)	2.56 (2.02-3.05)	435
Mexican Americans	15-16	*	.728 (<LOD-.818)	1.35 (1.24-1.49)	2.44 (1.91-2.98)	3.82 (3.31-4.50)	541
Non-Hispanic blacks	11-12	*	<LOD	1.40 (1.23-1.58)	3.02 (2.39-3.56)	4.14 (3.56-5.65)	662
Non-Hispanic blacks	13-14	*	<LOD	1.63 (1.36-1.96)	3.39 (2.55-4.66)	4.78 (3.87-5.55)	547
Non-Hispanic blacks	15-16	1.11 (1.00-1.24)	.977 (.911-1.07)	1.77 (1.48-2.30)	3.29 (2.70-4.40)	5.08 (3.93-6.97)	648
Non-Hispanic whites	11-12	*	<LOD	.807 (<LOD-.920)	1.79 (1.57-1.93)	2.95 (2.13-3.57)	810
Non-Hispanic whites	13-14	*	<LOD	.949 (<LOD-1.19)	1.73 (1.54-1.98)	2.57 (2.08-3.37)	960
Non-Hispanic whites	15-16	*	<LOD	1.19 (1.06-1.38)	2.04 (1.81-2.49)	3.15 (2.52-3.70)	900
All Hispanics	11-12	*	<LOD	1.04 (.865-1.26)	1.93 (1.69-2.39)	2.99 (2.24-3.69)	566
All Hispanics	13-14	*	<LOD	1.10 (.930-1.29)	1.90 (1.57-2.59)	2.81 (2.14-3.79)	675
All Hispanics	15-16	*	<LOD	1.36 (1.25-1.47)	2.31 (2.03-2.58)	3.44 (2.91-3.83)	928
Asians	11-12	*	<LOD	<LOD	1.34 (1.01-1.73)	1.95 (1.35-2.83)	341
Asians	13-14	*	<LOD	<LOD	1.37 (1.16-1.49)	1.66 (1.46-2.08)	284
Asians	15-16	*	<LOD	.737 (<LOD-.931)	1.33 (1.07-1.71)	1.87 (1.54-2.35)	326

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.700, 0.700, and 0.700 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Styrene_BiomonitoringSummary.html

Urinary N-Acetyl-S-(1-phenyl-2-hydroxyethyl)-L-cysteine + N-Acetyl-S-(2-phenyl-2-hydroxyethyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 69278-53-1, 14510-10-2

Metabolite of Styrene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	1.34 (1.27-1.41)	2.28 (2.06-2.61)	3.34 (2.75-4.13)	2464
Total population	13-14	*	<LOD	1.41 (1.27-1.50)	2.36 (2.18-2.61)	3.30 (2.97-3.54)	2568
Total population	15-16	*	<LOD	1.55 (1.46-1.62)	2.43 (2.25-2.48)	3.29 (3.02-3.55)	2944
Age 3-5 years	15-16	*	<LOD	3.09 (2.53-3.52)	4.95 (3.56-6.38)	6.62 (4.95-8.25)	454
Age 6-11 years	11-12	*	<LOD	1.64 (<LOD-1.83)	2.61 (2.06-3.45)	3.81 (2.90-5.50)	393
Age 6-11 years	13-14	*	<LOD	1.65 (<LOD-1.84)	2.50 (1.98-3.09)	3.30 (2.74-4.50)	387
Age 6-11 years	15-16	*	1.18 (<LOD-1.30)	1.80 (1.65-2.02)	2.94 (2.48-3.45)	4.16 (2.91-7.52)	363
Age 12-19 years	11-12	*	<LOD	1.15 (<LOD-1.30)	1.96 (1.38-2.61)	3.09 (1.85-5.50)	384
Age 12-19 years	13-14	*	<LOD	.971 (<LOD-1.08)	1.41 (1.24-1.66)	1.98 (1.55-2.36)	433
Age 12-19 years	15-16	*	<LOD	1.21 (1.02-1.38)	1.95 (1.64-2.53)	2.86 (1.71-5.08)	379
Age 20+ years	11-12	*	<LOD	1.34 (1.27-1.43)	2.36 (2.06-2.64)	3.34 (2.75-4.13)	1687
Age 20+ years	13-14	*	<LOD	1.46 (1.30-1.60)	2.48 (2.25-2.75)	3.54 (3.02-3.84)	1748
Age 20+ years	15-16	*	<LOD	1.51 (1.41-1.60)	2.25 (2.07-2.48)	3.02 (2.75-3.49)	1748
Males	11-12	*	<LOD	1.13 (1.05-1.24)	1.96 (1.71-2.17)	2.91 (2.61-3.34)	1250
Males	13-14	*	<LOD	1.18 (1.08-1.32)	2.06 (1.73-2.36)	2.92 (2.40-3.54)	1272
Males	15-16	*	.845 (.777-.900)	1.38 (1.26-1.51)	2.17 (2.06-2.36)	3.01 (2.62-3.52)	1456
Females	11-12	*	<LOD	1.60 (1.40-1.77)	2.48 (2.17-2.85)	3.81 (2.75-4.88)	1214
Females	13-14	*	<LOD	1.59 (1.46-1.77)	2.62 (2.32-2.91)	3.69 (2.91-4.34)	1296
Females	15-16	*	<LOD	1.64 (1.55-1.79)	2.58 (2.43-2.75)	3.54 (3.09-3.81)	1488
Mexican Americans	11-12	*	<LOD	1.21 (1.10-1.38)	2.23 (1.77-2.61)	2.69 (2.29-3.30)	313
Mexican Americans	13-14	*	<LOD	1.34 (1.18-1.55)	1.98 (1.78-2.27)	2.75 (2.27-3.54)	435
Mexican Americans	15-16	*	.903 (<LOD-.994)	1.50 (1.30-1.70)	2.48 (2.24-2.71)	3.46 (2.85-3.91)	540
Non-Hispanic blacks	11-12	*	<LOD	1.17 (1.05-1.26)	1.89 (1.72-2.38)	2.91 (2.47-3.54)	662
Non-Hispanic blacks	13-14	*	<LOD	1.28 (1.11-1.39)	2.23 (1.86-2.66)	3.06 (2.66-3.83)	547
Non-Hispanic blacks	15-16	0.888 (.796-.990)	.864 (.712-1.06)	1.47 (1.31-1.59)	2.21 (1.87-2.48)	2.87 (2.47-3.30)	646
Non-Hispanic whites	11-12	*	<LOD	1.34 (<LOD-1.48)	2.35 (1.98-2.75)	3.45 (2.82-4.31)	808
Non-Hispanic whites	13-14	*	<LOD	1.41 (<LOD-1.56)	2.48 (2.25-2.75)	3.54 (2.91-4.00)	959
Non-Hispanic whites	15-16	*	<LOD	1.60 (1.46-1.71)	2.38 (2.14-2.63)	3.18 (2.79-3.72)	900
All Hispanics	11-12	*	<LOD	1.36 (1.20-1.46)	2.19 (1.98-2.59)	2.75 (2.61-3.09)	566
All Hispanics	13-14	*	<LOD	1.39 (1.21-1.58)	2.15 (1.94-2.48)	2.97 (2.48-4.11)	675
All Hispanics	15-16	*	<LOD	1.53 (1.40-1.68)	2.61 (2.43-2.85)	3.71 (3.30-4.13)	927
Asians	11-12	*	<LOD	<LOD	2.36 (1.71-3.30)	3.54 (2.61-4.95)	341
Asians	13-14	*	<LOD	<LOD	2.25 (1.83-3.61)	3.66 (2.36-4.32)	284
Asians	15-16	*	<LOD	1.34 (<LOD-1.50)	2.43 (1.90-2.91)	3.09 (2.53-3.81)	326

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Styrene_BiomonitoringSummary.html

Urinary Mandelic acid (2011 - 2016)†

CAS Number 90-64-2

Metabolite of Styrene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	123 (113-135)	128 (118-143)	223 (200-252)	360 (327-395)	501 (434-577)	2466
Total population	13-14	112 (102-123)	115 (105-128)	209 (187-234)	348 (329-370)	487 (431-573)	2541
Total population	15-16	123 (116-130)	131 (122-143)	224 (209-242)	350 (331-365)	460 (424-494)	3008
Age 3-5 years	15-16	79.5 (72.1-87.6)	81.3 (72.8-101)	152 (125-174)	211 (188-238)	275 (238-308)	458
Age 6-11 years	11-12	93.4 (86.4-101)	95.0 (86.6-110)	165 (146-188)	263 (199-304)	326 (269-406)	394
Age 6-11 years	13-14	86.6 (75.5-99.3)	90.0 (80.9-105)	159 (122-197)	262 (199-332)	339 (294-385)	380
Age 6-11 years	15-16	102 (93.9-110)	115 (96.2-123)	172 (154-185)	246 (209-284)	321 (263-388)	372
Age 12-19 years	11-12	110 (95.6-126)	118 (102-138)	200 (170-241)	284 (248-343)	357 (286-543)	384
Age 12-19 years	13-14	110 (91.7-131)	118 (93.4-142)	196 (167-248)	340 (236-389)	389 (337-448)	430
Age 12-19 years	15-16	113 (106-120)	123 (110-136)	189 (170-208)	271 (250-317)	333 (303-384)	394
Age 20+ years	11-12	129 (116-144)	134 (119-152)	233 (207-264)	384 (351-424)	543 (449-653)	1688
Age 20+ years	13-14	115 (105-127)	119 (106-130)	214 (194-243)	366 (337-387)	547 (442-673)	1731
Age 20+ years	15-16	129 (120-138)	138 (125-155)	239 (223-261)	373 (355-399)	488 (438-577)	1784
Males	11-12	143 (131-157)	148 (126-165)	241 (207-275)	384 (329-459)	577 (456-797)	1251
Males	13-14	120 (106-137)	128 (112-148)	216 (188-257)	356 (330-377)	472 (420-574)	1263
Males	15-16	138 (131-147)	148 (138-163)	245 (231-260)	364 (333-392)	467 (414-566)	1492
Females	11-12	106 (94.2-120)	114 (101-124)	207 (177-230)	348 (298-386)	434 (381-544)	1215
Females	13-14	104 (95.9-114)	105 (97.8-114)	196 (181-218)	340 (305-375)	501 (415-631)	1278
Females	15-16	110 (101-118)	114 (103-124)	206 (195-217)	336 (309-360)	453 (408-480)	1516
Mexican Americans	11-12	120 (106-136)	129 (117-143)	200 (171-220)	269 (244-300)	356 (277-771)	313
Mexican Americans	13-14	112 (99.8-127)	115 (95.7-143)	205 (181-233)	321 (273-359)	390 (340-443)	443
Mexican Americans	15-16	124 (107-144)	136 (120-147)	217 (196-242)	352 (283-439)	483 (368-656)	577
Non-Hispanic blacks	11-12	157 (143-173)	159 (138-183)	251 (226-295)	431 (380-476)	622 (499-721)	662
Non-Hispanic blacks	13-14	155 (140-172)	153 (142-165)	256 (231-292)	502 (417-567)	846 (547-992)	537
Non-Hispanic blacks	15-16	165 (150-181)	168 (148-190)	281 (257-320)	472 (398-567)	622 (515-772)	655
Non-Hispanic whites	11-12	119 (106-133)	123 (114-137)	220 (186-261)	365 (327-410)	488 (423-566)	810
Non-Hispanic whites	13-14	108 (94.2-124)	112 (95.9-128)	201 (177-241)	345 (324-376)	469 (407-592)	946
Non-Hispanic whites	15-16	119 (110-128)	127 (114-143)	221 (204-244)	346 (301-383)	426 (375-496)	909
All Hispanics	11-12	122 (104-143)	129 (114-148)	216 (173-251)	286 (251-410)	412 (302-771)	566
All Hispanics	13-14	113 (102-126)	117 (98.3-137)	209 (183-236)	322 (286-346)	390 (345-451)	684
All Hispanics	15-16	122 (111-135)	136 (120-147)	217 (201-233)	323 (286-399)	448 (360-653)	968
Asians	11-12	103 (91.3-115)	108 (95.9-123)	177 (153-215)	284 (237-335)	380 (296-505)	341
Asians	13-14	78.3 (63.8-96.1)	91.1 (79.4-106)	152 (135-165)	232 (194-266)	284 (236-463)	274
Asians	15-16	94.9 (85.9-105)	100 (86.9-110)	168 (151-193)	270 (238-321)	338 (302-407)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 12.0, 12.0, and 12.0 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Styrene_BiomonitoringSummary.html

Urinary Mandelic acid (creatinine corrected) (2011 - 2016)†

CAS Number 90-64-2

Metabolite of Styrene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	141 (131-151)	133 (123-142)	195 (182-212)	308 (281-335)	434 (373-512)	2464
Total population	13-14	129 (115-143)	126 (113-143)	193 (178-208)	307 (284-347)	414 (375-466)	2540
Total population	15-16	139 (135-143)	134 (129-140)	192 (185-199)	285 (267-303)	374 (349-399)	3005
Age 3-5 years	15-16	192 (180-206)	198 (185-213)	264 (244-287)	365 (309-408)	413 (368-478)	457
Age 6-11 years	11-12	133 (124-144)	136 (126-147)	186 (168-207)	244 (213-260)	283 (248-329)	393
Age 6-11 years	13-14	130 (112-151)	137 (118-161)	192 (165-228)	274 (236-315)	322 (284-375)	380
Age 6-11 years	15-16	149 (140-158)	150 (138-162)	199 (181-210)	245 (230-276)	296 (261-320)	372
Age 12-19 years	11-12	107 (97.3-117)	104 (94.4-114)	146 (124-166)	191 (181-197)	248 (191-275)	384
Age 12-19 years	13-14	97.8 (87.6-109)	104 (90.4-112)	134 (123-145)	186 (157-229)	229 (183-339)	430
Age 12-19 years	15-16	107 (101-113)	108 (97.9-117)	143 (129-158)	181 (167-196)	204 (193-226)	394
Age 20+ years	11-12	147 (137-159)	137 (125-151)	208 (190-229)	335 (308-367)	480 (407-531)	1687
Age 20+ years	13-14	134 (119-150)	131 (118-148)	202 (186-224)	333 (294-381)	451 (400-529)	1730
Age 20+ years	15-16	141 (137-146)	134 (128-143)	198 (188-204)	303 (279-314)	399 (371-416)	1782
Males	11-12	135 (126-143)	124 (116-134)	187 (161-210)	294 (266-334)	408 (358-480)	1250
Males	13-14	119 (107-133)	118 (107-130)	173 (161-189)	295 (244-333)	400 (339-451)	1262
Males	15-16	132 (127-139)	127 (120-134)	179 (165-196)	257 (233-293)	339 (310-373)	1492
Females	11-12	147 (133-162)	140 (126-155)	206 (186-238)	325 (282-357)	449 (347-531)	1214
Females	13-14	138 (122-156)	140 (122-155)	215 (192-235)	325 (284-373)	462 (367-628)	1278
Females	15-16	145 (138-154)	141 (133-149)	202 (192-213)	303 (275-326)	413 (348-449)	1513
Mexican Americans	11-12	136 (119-154)	125 (113-141)	174 (158-186)	246 (220-281)	334 (244-557)	313
Mexican Americans	13-14	128 (117-140)	124 (118-134)	179 (164-199)	296 (236-333)	371 (295-536)	443
Mexican Americans	15-16	137 (124-151)	135 (124-146)	188 (168-203)	260 (227-311)	335 (264-399)	576
Non-Hispanic blacks	11-12	123 (114-132)	119 (108-131)	163 (152-179)	250 (227-287)	369 (292-419)	662
Non-Hispanic blacks	13-14	118 (106-132)	108 (99.2-123)	179 (154-214)	320 (278-359)	425 (352-486)	537
Non-Hispanic blacks	15-16	132 (121-145)	131 (116-142)	180 (167-204)	265 (231-314)	345 (295-426)	653
Non-Hispanic whites	11-12	145 (132-159)	136 (121-155)	208 (188-240)	329 (301-383)	480 (384-556)	808
Non-Hispanic whites	13-14	132 (116-150)	130 (115-151)	196 (179-224)	319 (276-375)	434 (375-529)	945
Non-Hispanic whites	15-16	142 (135-149)	136 (127-145)	199 (184-207)	297 (261-320)	399 (348-428)	909
All Hispanics	11-12	137 (124-150)	128 (120-138)	177 (160-195)	260 (222-295)	337 (276-465)	566
All Hispanics	13-14	126 (114-140)	124 (116-132)	186 (165-203)	295 (233-339)	391 (302-536)	684
All Hispanics	15-16	139 (130-149)	136 (126-146)	190 (173-208)	272 (233-310)	339 (294-412)	967
Asians	11-12	137 (128-148)	134 (124-147)	190 (173-200)	249 (213-318)	332 (257-465)	341
Asians	13-14	121 (103-142)	126 (110-143)	190 (156-227)	291 (238-324)	333 (291-356)	274
Asians	15-16	131 (122-140)	126 (119-132)	177 (158-184)	246 (207-278)	316 (248-383)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Styrene_BiomonitoringSummary.html

Urinary N-Acetyl-S-(trichlorovinyl)-L-cysteine (2011 - 2016)†

CAS Number 111348-61-9

Metabolite of Tetrachloroethene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2466
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2619
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3015
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	459
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	394
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	395
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	446
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	395
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1688
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1778
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1788
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1251
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1302
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1499
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1215
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1317
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1516
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	450
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	578
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	572
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	656
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	810
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	958
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	912
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	696
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	970
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	289
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 3.00, 3.00, and 3.00 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Urinary N-Acetyl-S-(trichlorovinyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 111348-61-9

Metabolite of Tetrachloroethene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2464
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2618
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3012
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	458
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	393
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	395
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	446
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	395
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1687
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1777
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1786
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1250
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1301
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1499
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1214
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1317
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1513
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	450
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	577
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	572
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	654
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	808
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	957
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	912
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	696
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	969
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	289
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Urinary N-Acetyl-S-(benzyl)-L-cysteine (2011 - 2016)†

CAS Number 19542-77-9

Metabolite of Toluene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	6.47 (6.12-6.83)	6.45 (6.01-6.88)	12.3 (10.9-13.7)	23.6 (20.4-27.2)	37.9 (32.1-45.9)	2466
Total population	13-14	6.19 (5.63-6.79)	6.12 (5.49-6.64)	11.9 (11.0-13.5)	25.7 (22.8-28.1)	39.2 (36.7-42.5)	2622
Total population	15-16	6.13 (5.68-6.63)	5.98 (5.52-6.47)	11.6 (10.3-12.7)	21.0 (19.7-23.2)	30.8 (27.7-35.2)	3014
Age 3-5 years	15-16	5.96 (5.12-6.93)	5.71 (4.88-6.49)	10.9 (8.34-13.5)	19.9 (16.8-29.2)	38.2 (23.6-58.4)	459
Age 6-11 years	11-12	6.11 (5.37-6.96)	6.63 (5.60-7.34)	11.4 (9.82-14.2)	23.1 (16.9-25.3)	29.7 (24.9-48.2)	394
Age 6-11 years	13-14	5.90 (4.96-7.02)	6.04 (4.85-7.12)	11.5 (8.69-15.4)	21.8 (17.5-26.7)	30.0 (21.8-47.4)	396
Age 6-11 years	15-16	5.53 (4.89-6.24)	5.77 (5.08-6.28)	9.51 (7.92-11.2)	15.5 (13.2-19.6)	23.4 (16.5-30.2)	373
Age 12-19 years	11-12	6.51 (5.53-7.65)	6.66 (5.73-7.56)	12.8 (10.1-16.9)	23.2 (17.8-33.4)	36.5 (23.9-66.0)	384
Age 12-19 years	13-14	5.96 (5.04-7.04)	5.53 (4.63-6.59)	11.3 (9.76-13.9)	21.2 (16.0-27.4)	32.4 (21.9-38.4)	446
Age 12-19 years	15-16	5.53 (5.02-6.10)	5.28 (4.63-6.24)	9.31 (7.56-12.3)	17.6 (13.2-25.6)	27.5 (20.6-36.0)	395
Age 20+ years	11-12	6.50 (6.02-7.02)	6.31 (5.84-7.01)	12.3 (10.5-14.7)	23.7 (20.1-28.4)	38.7 (31.9-53.9)	1688
Age 20+ years	13-14	6.25 (5.62-6.96)	6.24 (5.52-6.71)	12.2 (11.0-13.8)	27.0 (24.2-31.7)	40.8 (38.2-50.0)	1780
Age 20+ years	15-16	6.30 (5.81-6.82)	6.16 (5.66-6.62)	12.1 (10.9-13.3)	22.3 (20.3-24.0)	32.3 (27.7-39.5)	1787
Males	11-12	6.81 (6.34-7.31)	6.83 (6.09-7.65)	12.5 (11.1-14.0)	23.6 (19.3-29.8)	39.7 (29.9-62.7)	1251
Males	13-14	5.80 (5.17-6.51)	5.90 (5.29-6.44)	10.7 (9.43-12.0)	22.2 (17.8-25.7)	37.1 (28.5-42.7)	1305
Males	15-16	6.64 (6.20-7.11)	6.35 (5.79-6.80)	12.5 (10.9-13.8)	22.1 (20.8-23.8)	31.6 (26.0-41.4)	1498
Females	11-12	6.15 (5.56-6.82)	6.15 (5.77-6.64)	12.1 (9.98-14.5)	23.2 (19.5-28.7)	35.4 (29.7-53.9)	1215
Females	13-14	6.59 (6.00-7.23)	6.36 (5.39-7.17)	13.8 (11.6-15.8)	30.1 (24.0-35.0)	40.8 (36.7-55.0)	1317
Females	15-16	5.69 (5.11-6.32)	5.71 (4.96-6.23)	11.0 (9.22-12.4)	19.9 (17.3-23.8)	30.4 (26.2-33.2)	1516
Mexican Americans	11-12	5.76 (4.82-6.87)	5.87 (5.02-6.50)	9.68 (7.99-12.3)	19.1 (15.9-23.6)	29.9 (19.1-42.8)	313
Mexican Americans	13-14	6.64 (5.75-7.67)	6.81 (5.86-7.36)	11.7 (9.72-14.7)	22.2 (17.3-30.5)	33.4 (22.5-54.6)	449
Mexican Americans	15-16	5.98 (5.38-6.64)	6.32 (5.53-7.07)	10.4 (9.09-11.5)	17.8 (14.6-21.4)	24.3 (21.4-29.6)	578
Non-Hispanic blacks	11-12	11.0 (10.1-11.9)	10.6 (9.57-11.9)	21.6 (17.8-24.8)	39.7 (34.2-45.5)	68.3 (52.3-95.4)	662
Non-Hispanic blacks	13-14	10.8 (9.58-12.2)	9.91 (9.03-11.1)	21.4 (16.7-26.4)	40.3 (37.1-57.5)	83.5 (59.9-97.2)	568
Non-Hispanic blacks	15-16	9.73 (8.48-11.2)	9.76 (8.52-11.2)	17.4 (15.4-19.4)	31.9 (25.8-40.3)	48.0 (36.6-60.3)	656
Non-Hispanic whites	11-12	5.90 (5.57-6.25)	5.92 (5.35-6.47)	10.9 (10.0-12.1)	19.5 (17.7-23.2)	32.1 (25.3-39.3)	810
Non-Hispanic whites	13-14	5.54 (4.81-6.39)	5.37 (4.77-6.26)	10.7 (8.96-12.6)	22.3 (18.9-27.1)	38.2 (27.4-45.7)	968
Non-Hispanic whites	15-16	5.81 (5.35-6.32)	5.66 (5.12-6.17)	10.9 (8.91-12.8)	20.8 (18.7-23.8)	29.7 (25.3-38.0)	911
All Hispanics	11-12	6.52 (5.53-7.70)	6.17 (5.50-7.39)	12.2 (9.53-15.4)	23.2 (18.3-31.6)	39.1 (24.7-56.9)	566
All Hispanics	13-14	6.71 (6.06-7.43)	6.81 (6.21-7.26)	11.8 (10.2-13.8)	22.5 (18.7-28.3)	35.4 (26.8-50.5)	697
All Hispanics	15-16	5.91 (5.47-6.37)	6.18 (5.78-6.64)	10.4 (9.42-11.2)	17.6 (15.3-20.6)	24.0 (22.1-26.1)	970
Asians	11-12	5.25 (4.39-6.28)	5.30 (4.17-6.82)	10.8 (8.50-12.9)	20.5 (16.9-26.1)	35.8 (23.1-51.5)	341
Asians	13-14	5.10 (4.41-5.91)	5.20 (4.56-6.06)	9.22 (7.25-11.6)	18.4 (14.2-29.9)	32.6 (19.1-37.3)	285
Asians	15-16	5.17 (4.67-5.72)	4.83 (4.45-5.33)	9.01 (7.45-11.2)	17.9 (14.3-22.9)	27.8 (20.1-51.4)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.500, 0.500, and 0.500 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Toluene_BiomonitoringSummary.html

Urinary N-Acetyl-S-(benzyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 19542-77-9

Metabolite of Toluene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	7.39 (7.07-7.72)	6.68 (6.36-7.00)	12.2 (11.1-13.1)	21.0 (19.3-23.9)	36.4 (29.2-44.7)	2464
Total population	13-14	7.14 (6.45-7.89)	6.58 (5.94-7.27)	11.9 (10.9-13.3)	24.6 (21.3-28.8)	37.9 (32.5-47.0)	2621
Total population	15-16	6.93 (6.66-7.22)	6.29 (6.05-6.59)	10.9 (10.3-11.4)	19.6 (17.8-21.4)	28.5 (25.3-33.5)	3011
Age 3-5 years	15-16	14.3 (13.0-15.7)	12.6 (11.1-13.7)	21.2 (17.7-24.4)	37.4 (31.1-47.1)	66.3 (41.9-116)	458
Age 6-11 years	11-12	8.78 (8.11-9.50)	7.88 (7.00-8.46)	12.8 (11.8-14.1)	24.5 (18.2-29.5)	33.1 (23.7-56.4)	393
Age 6-11 years	13-14	8.8 (7.42-10.4)	8.00 (6.49-9.87)	14.4 (11.8-18.6)	24.0 (19.3-29.7)	34.2 (24.3-62.8)	396
Age 6-11 years	15-16	8.07 (7.31-8.90)	7.60 (6.69-8.59)	11.3 (9.80-13.4)	19.6 (15.0-23.5)	24.4 (20.3-32.2)	373
Age 12-19 years	11-12	6.34 (5.51-7.29)	5.73 (4.72-6.94)	10.0 (8.30-12.3)	17.4 (13.3-20.2)	25.7 (17.7-32.4)	384
Age 12-19 years	13-14	5.37 (4.86-5.93)	4.86 (4.41-5.71)	8.35 (7.32-9.65)	13.8 (12.0-18.3)	20.3 (16.7-26.5)	446
Age 12-19 years	15-16	5.22 (4.74-5.75)	4.88 (4.27-5.59)	7.65 (6.71-8.92)	12.3 (10.6-15.5)	19.2 (13.9-26.7)	395
Age 20+ years	11-12	7.42 (6.98-7.89)	6.70 (6.23-7.24)	12.5 (11.1-13.7)	21.9 (19.1-25.1)	39.4 (30.1-49.1)	1687
Age 20+ years	13-14	7.28 (6.52-8.12)	6.77 (6.03-7.37)	12.4 (11.2-14.0)	26.0 (22.5-31.6)	44.1 (35.2-50.8)	1779
Age 20+ years	15-16	6.9 (6.63-7.18)	6.26 (5.86-6.62)	10.9 (10.2-11.7)	19.6 (17.0-21.8)	28.7 (25.0-36.9)	1785
Males	11-12	6.4 (6.04-6.78)	5.78 (5.41-6.09)	9.52 (8.74-10.5)	17.7 (15.3-21.7)	29.5 (21.3-39.6)	1250
Males	13-14	5.81 (5.21-6.49)	5.34 (4.84-5.97)	9.23 (8.25-10.5)	18.1 (14.8-22.9)	27.9 (22.9-33.0)	1304
Males	15-16	6.34 (6.02-6.69)	5.75 (5.36-6.24)	10.3 (9.00-11.3)	18.6 (16.1-19.6)	25.2 (22.2-30.9)	1498
Females	11-12	8.49 (7.86-9.17)	7.62 (7.11-8.30)	14.2 (12.7-15.5)	24.7 (22.2-27.0)	40.4 (31.4-49.1)	1214
Females	13-14	8.71 (7.80-9.73)	7.78 (7.20-8.73)	15.2 (13.1-17.2)	31.2 (25.7-37.2)	50.3 (38.2-61.6)	1317
Females	15-16	7.54 (7.08-8.04)	6.87 (6.35-7.09)	11.3 (10.7-12.1)	21.6 (18.2-24.4)	30.6 (26.1-39.6)	1513
Mexican Americans	11-12	6.5 (5.31-7.96)	5.99 (4.63-8.22)	10.4 (8.29-12.9)	17.9 (12.9-23.5)	24.1 (20.0-30.6)	313
Mexican Americans	13-14	7.58 (6.69-8.59)	7.00 (5.80-7.86)	11.8 (10.5-13.9)	23.5 (18.1-27.9)	34.2 (25.9-60.3)	449
Mexican Americans	15-16	6.57 (6.12-7.06)	6.27 (5.71-6.69)	10.4 (9.15-11.0)	16.2 (13.5-19.6)	24.0 (19.6-30.2)	577
Non-Hispanic blacks	11-12	8.56 (7.91-9.26)	7.73 (6.92-8.43)	14.4 (13.0-15.8)	26.0 (22.5-31.9)	46.9 (31.9-63.2)	662
Non-Hispanic blacks	13-14	8.27 (7.26-9.42)	7.59 (6.25-8.69)	14.4 (12.6-16.8)	28.3 (23.7-32.5)	46.6 (35.0-60.5)	568
Non-Hispanic blacks	15-16	7.73 (6.79-8.79)	7.37 (6.14-8.91)	12.5 (10.7-15.2)	24.6 (18.1-34.3)	37.4 (25.3-45.2)	654
Non-Hispanic whites	11-12	7.21 (6.86-7.58)	6.49 (5.91-6.98)	11.8 (10.0-13.1)	19.7 (17.3-24.5)	37.9 (25.7-50.1)	808
Non-Hispanic whites	13-14	6.8 (5.96-7.77)	6.33 (5.38-7.24)	11.4 (9.85-13.4)	24.0 (18.3-31.2)	37.2 (30.6-50.1)	967
Non-Hispanic whites	15-16	6.91 (6.56-7.28)	6.27 (5.86-6.75)	10.9 (10.1-11.8)	19.6 (16.6-21.6)	27.3 (23.9-36.2)	911
All Hispanics	11-12	7.3 (6.38-8.36)	6.67 (5.87-7.70)	11.4 (10.2-12.9)	21.9 (19.1-24.4)	30.4 (24.6-35.3)	566
All Hispanics	13-14	7.49 (6.85-8.19)	6.95 (5.97-7.71)	12.0 (10.7-13.9)	24.2 (19.6-29.0)	34.2 (30.2-48.1)	697
All Hispanics	15-16	6.73 (6.43-7.04)	6.24 (5.87-6.43)	10.4 (9.42-10.9)	16.6 (15.4-18.9)	25.2 (21.1-30.2)	969
Asians	11-12	7.02 (6.14-8.04)	6.59 (5.74-7.97)	11.9 (10.3-13.8)	24.6 (17.9-30.1)	35.5 (27.0-63.6)	341
Asians	13-14	7.97 (6.59-9.65)	7.46 (5.87-8.74)	12.8 (10.1-18.6)	25.1 (18.6-31.6)	37.2 (26.5-60.0)	285
Asians	15-16	7.13 (6.59-7.71)	6.57 (5.99-7.16)	10.7 (9.50-11.7)	23.9 (15.9-26.7)	32.1 (25.9-36.9)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Toluene_BiomonitoringSummary.html

Urinary N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine (2011 - 2016)†

CAS Number 2148-31-4

Metabolite of Trichloroethene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2466
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2475
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2886
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	431
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	394
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	378
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	356
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	424
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	385
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1688
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1673
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1714
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1251
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1232
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1432
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1215
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1243
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1454
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	559
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	559
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	619
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	810
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	874
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	865
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	669
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	949
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	279
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	312

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 12.6, 12.6, and 12.6 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Urinary N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 2148-31-4

Metabolite of Trichloroethene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2464
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2474
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2883
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	430
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	393
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	378
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	356
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	424
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	385
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1687
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1672
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1712
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1250
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1231
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1432
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1214
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1243
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1451
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	427
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	558
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	559
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	617
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	808
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	873
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	865
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	669
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	948
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	279
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	312

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Urinary N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine (2011 - 2016)†

CAS Number 126543-43-9

Metabolite of Trichloroethene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2466
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2551
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2831
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	429
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	394
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	381
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	354
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	436
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	372
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1688
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1734
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1676
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1251
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1275
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1413
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1215
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1276
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1418
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	443
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	532
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	544
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	616
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	810
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	942
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	855
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	906
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	283
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	315

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 4.70, 4.70, and 13.9 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Urinary N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 126543-43-9

Metabolite of Trichloroethene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2464
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2550
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2828
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	428
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	393
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	381
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	354
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	436
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	372
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1687
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1733
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1674
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1250
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1274
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1413
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1214
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1276
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1415
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	443
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	531
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	544
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	614
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	808
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	941
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	855
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	905
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	283
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	315

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/HalogenatedSolvents_BiomonitoringSummary.html

Urinary N-Acetyl-S-(dimethylphenyl)-L-cysteine (2011 - 2016)†

CAS Number 581076-69-9, 581076-70-2, 581076-72-4

Metabolite of Xylene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2466
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2471
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3015
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	459
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	394
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	368
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	414
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	395
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1688
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1689
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1788
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1251
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1225
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1499
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1215
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1246
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1516
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	442
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	578
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	515
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	656
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	810
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	910
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	912
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	970
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	271
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 0.500, 0.500, and 0.500 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Urinary N-Acetyl-S-(dimethylphenyl)-L-cysteine (creatinine corrected) (2011 - 2016)†

CAS Number 581076-69-9, 581076-70-2, 581076-72-4

Metabolite of Xylene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	*	<LOD	<LOD	<LOD	<LOD	2464
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	2470
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	3012
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	458
Age 6-11 years	11-12	*	<LOD	<LOD	<LOD	<LOD	393
Age 6-11 years	13-14	*	<LOD	<LOD	<LOD	<LOD	368
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	373
Age 12-19 years	11-12	*	<LOD	<LOD	<LOD	<LOD	384
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	414
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	395
Age 20+ years	11-12	*	<LOD	<LOD	<LOD	<LOD	1687
Age 20+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	1688
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1786
Males	11-12	*	<LOD	<LOD	<LOD	<LOD	1250
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	1224
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1499
Females	11-12	*	<LOD	<LOD	<LOD	<LOD	1214
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	1246
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1513
Mexican Americans	11-12	*	<LOD	<LOD	<LOD	<LOD	313
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	442
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	577
Non-Hispanic blacks	11-12	*	<LOD	<LOD	<LOD	<LOD	662
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	515
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	654
Non-Hispanic whites	11-12	*	<LOD	<LOD	<LOD	<LOD	808
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	909
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	912
All Hispanics	11-12	*	<LOD	<LOD	<LOD	<LOD	566
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	683
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	969
Asians	11-12	*	<LOD	<LOD	<LOD	<LOD	341
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	271
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	329

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Urinary 2-Methylhippuric acid (2011 - 2016)†

CAS Number 42013-20-7

Metabolite of Xylene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	32.8 (29.8-36.1)	30.4 (27.4-34.1)	76.1 (69.2-88.9)	161 (133-192)	221 (195-276)	2466
Total population	13-14	28.7 (25.4-32.3)	29.0 (24.9-32.9)	69.7 (59.6-79.1)	138 (122-152)	194 (173-221)	2370
Total population	15-16	29.3 (27.2-31.5)	28.9 (26.0-31.5)	70.2 (63.3-78.4)	144 (135-152)	206 (179-227)	3015
Age 3-5 years	15-16	18.2 (15.8-20.9)	16.8 (13.9-19.3)	32.5 (28.2-39.2)	70.9 (55.7-85.3)	111 (76.5-175)	459
Age 6-11 years	11-12	21.9 (19.6-24.4)	19.4 (16.6-23.4)	45.4 (35.8-54.9)	97.4 (61.8-114)	122 (97.2-168)	394
Age 6-11 years	13-14	16.3 (13.8-19.1)	16.5 (12.7-21.3)	34.6 (29.0-39.5)	55.5 (41.6-76.7)	79.2 (59.9-129)	355
Age 6-11 years	15-16	18.5 (15.3-22.4)	19.1 (14.7-24.0)	37.5 (29.6-48.9)	71.1 (50.7-84.2)	114 (71.1-170)	373
Age 12-19 years	11-12	31.0 (26.4-36.4)	27.7 (24.7-34.5)	68.3 (56.7-75.9)	146 (104-166)	173 (161-227)	384
Age 12-19 years	13-14	28.0 (23.6-33.2)	29.6 (23.8-35.0)	59.3 (51.4-74.8)	95.6 (81.6-117)	153 (95.6-241)	405
Age 12-19 years	15-16	23.4 (20.8-26.5)	23.7 (19.6-27.9)	50.6 (41.8-60.1)	112 (78.2-132)	144 (112-176)	395
Age 20+ years	11-12	34.6 (30.9-38.6)	32.8 (28.6-37.2)	83.2 (72.6-94.5)	170 (134-206)	232 (200-327)	1688
Age 20+ years	13-14	30.4 (26.7-34.7)	30.3 (26.0-36.1)	75.7 (64.6-88.2)	149 (134-161)	208 (187-233)	1610
Age 20+ years	15-16	32.2 (29.6-35.0)	32.5 (27.9-36.6)	79.6 (69.4-93.4)	152 (143-167)	220 (189-259)	1788
Males	11-12	37.7 (32.3-44.0)	33.0 (28.5-38.9)	86.8 (72.9-104)	180 (147-224)	269 (195-407)	1251
Males	13-14	31.8 (27.8-36.4)	32.0 (27.8-36.4)	74.7 (63.4-84.3)	148 (131-159)	208 (182-233)	1199
Males	15-16	33.2 (30.2-36.5)	32.9 (28.0-38.6)	78.5 (67.0-89.7)	149 (133-162)	209 (174-256)	1499
Females	11-12	28.6 (25.3-32.4)	28.5 (25.4-32.5)	69.2 (58.5-82.6)	135 (113-151)	197 (159-227)	1215
Females	13-14	25.8 (22.2-30.0)	25.8 (21.0-30.6)	64.0 (55.0-77.0)	126 (102-152)	185 (152-236)	1171
Females	15-16	25.9 (23.7-28.4)	25.2 (23.1-28.5)	59.6 (51.3-74.7)	141 (123-151)	206 (159-248)	1516
Mexican Americans	11-12	30.5 (24.7-37.7)	29.1 (24.9-34.1)	62.3 (51.0-72.0)	129 (84.1-171)	198 (133-250)	313
Mexican Americans	13-14	24.1 (19.5-29.7)	22.4 (18.7-26.1)	44.3 (35.6-62.6)	117 (58.6-156)	156 (117-270)	365
Mexican Americans	15-16	26.8 (22.0-32.6)	25.9 (20.4-33.6)	57.7 (43.1-75.8)	125 (91.8-143)	162 (128-250)	578
Non-Hispanic blacks	11-12	35.6 (31.2-40.6)	33.0 (28.2-40.7)	78.4 (66.9-97.5)	155 (131-192)	212 (181-269)	662
Non-Hispanic blacks	13-14	31.4 (28.0-35.3)	31.9 (27.7-39.4)	74.1 (60.4-96.8)	153 (137-168)	191 (160-260)	537
Non-Hispanic blacks	15-16	38.1 (33.7-43.2)	36.6 (31.1-42.5)	87.8 (72.9-105)	184 (147-218)	256 (198-394)	656
Non-Hispanic whites	11-12	33.5 (30.0-37.3)	31.5 (27.5-35.9)	82.6 (70.5-94.5)	166 (134-204)	232 (188-351)	810
Non-Hispanic whites	13-14	30.0 (25.7-35.0)	30.5 (26.0-36.1)	75.5 (63.8-88.2)	145 (126-164)	216 (182-241)	911
Non-Hispanic whites	15-16	29.9 (26.9-33.3)	29.9 (26.0-34.0)	74.6 (63.4-82.2)	145 (135-158)	191 (168-247)	912
All Hispanics	11-12	29.2 (25.0-34.1)	26.5 (22.5-32.3)	64.9 (51.0-72.7)	131 (92.5-166)	198 (144-227)	566
All Hispanics	13-14	25.6 (21.7-30.1)	23.8 (20.2-30.6)	53.0 (42.6-69.2)	108 (75.9-140)	144 (123-189)	572
All Hispanics	15-16	26.9 (23.6-30.6)	25.7 (22.2-29.0)	60.7 (48.4-71.3)	128 (112-146)	190 (156-241)	970
Asians	11-12	26.2 (21.5-32.0)	26.3 (20.9-33.8)	56.4 (47.4-75.4)	114 (79.4-155)	165 (126-195)	341
Asians	13-14	18.5 (14.2-24.0)	16.2 (11.6-23.2)	38.5 (26.9-67.9)	103 (55.2-171)	171 (88.9-256)	257
Asians	15-16	16.6 (14.1-19.5)	15.6 (13.2-18.1)	36.4 (29.8-44.8)	71.3 (55.6-85.5)	104 (77.7-136)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 5.00, 5.00, and 5.00 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Urinary 2-Methylhippuric acid (creatinine corrected) (2011 - 2016)†

CAS Number 42013-20-7

Metabolite of Xylene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	37.5 (33.9-41.4)	35.2 (31.5-39.3)	77.9 (69.0-87.6)	159 (140-184)	248 (187-303)	2464
Total population	13-14	32.9 (28.7-37.7)	33.0 (27.8-38.4)	72.3 (63.2-83.2)	140 (121-163)	213 (170-283)	2369
Total population	15-16	33.1 (30.8-35.5)	31.4 (29.0-34.8)	73.1 (65.7-79.2)	139 (118-161)	200 (165-237)	3012
Age 3-5 years	15-16	43.9 (38.2-50.4)	38.8 (34.4-44.7)	71.3 (55.1-94.9)	153 (112-220)	263 (185-397)	458
Age 6-11 years	11-12	31.2 (27.5-35.3)	26.9 (24.1-31.9)	48.5 (44.9-61.0)	101 (70.9-155)	173 (102-209)	393
Age 6-11 years	13-14	24.2 (19.3-30.5)	22.1 (18.6-26.6)	40.7 (30.1-58.0)	86.4 (41.6-263)	134 (63.3-282)	355
Age 6-11 years	15-16	27 (22.8-32.1)	25.3 (19.7-31.2)	47.9 (35.8-55.9)	91.4 (62.3-144)	157 (81.4-219)	373
Age 12-19 years	11-12	30.2 (25.4-35.9)	29.6 (22.7-38.6)	54.5 (47.6-68.9)	103 (74.3-160)	175 (106-277)	384
Age 12-19 years	13-14	25.2 (21.0-30.2)	23.1 (17.2-31.6)	51.5 (40.5-63.8)	117 (75.7-145)	163 (121-210)	405
Age 12-19 years	15-16	22.1 (19.6-25.0)	21.8 (19.3-24.9)	43.7 (37.4-52.1)	82.7 (72.7-92.1)	100 (87.1-129)	395
Age 20+ years	11-12	39.5 (35.5-43.9)	37.4 (33.6-42.1)	87.0 (77.3-96.9)	168 (142-201)	270 (190-331)	1687
Age 20+ years	13-14	35.3 (30.7-40.5)	36.4 (31.2-41.0)	77.8 (68.7-94.1)	145 (122-183)	223 (174-299)	1609
Age 20+ years	15-16	35.3 (32.7-38.2)	34.5 (29.9-39.2)	79.2 (72.6-86.0)	152 (125-167)	216 (178-245)	1786
Males	11-12	35.5 (30.8-40.8)	34.3 (28.6-39.8)	75.0 (62.5-86.4)	144 (121-171)	251 (161-336)	1250
Males	13-14	32 (28.5-36.0)	31.2 (27.3-36.9)	68.7 (58.1-79.3)	138 (118-158)	215 (158-290)	1198
Males	15-16	31.6 (28.9-34.6)	30.3 (26.4-34.4)	70.0 (59.7-78.8)	116 (107-132)	167 (150-200)	1499
Females	11-12	39.5 (35.2-44.2)	36.4 (31.2-41.1)	83.7 (69.0-97.2)	170 (146-198)	245 (187-301)	1214
Females	13-14	33.7 (28.0-40.7)	34.1 (26.1-44.4)	75.8 (64.3-94.3)	142 (119-177)	213 (155-294)	1171
Females	15-16	34.5 (31.1-38.2)	32.9 (29.4-38.0)	76.1 (63.6-87.4)	161 (114-206)	224 (177-294)	1513
Mexican Americans	11-12	34.5 (27.7-42.9)	29.3 (24.1-36.1)	62.9 (49.1-76.1)	127 (88.8-175)	188 (109-300)	313
Mexican Americans	13-14	27.4 (23.3-32.2)	25.0 (19.9-30.1)	56.4 (39.9-68.7)	103 (82.1-144)	186 (103-304)	365
Mexican Americans	15-16	29.6 (25.4-34.4)	27.7 (22.9-34.5)	60.1 (47.9-74.3)	105 (86.0-139)	149 (119-200)	577
Non-Hispanic blacks	11-12	27.7 (24.7-31.1)	26.2 (20.8-32.6)	58.9 (49.8-71.3)	104 (87.5-120)	146 (114-182)	662
Non-Hispanic blacks	13-14	23.8 (20.8-27.1)	25.3 (20.7-27.2)	52.7 (47.6-59.7)	96.6 (76.2-112)	129 (100-181)	537
Non-Hispanic blacks	15-16	30.6 (27.0-34.6)	31.4 (26.4-35.2)	63.8 (59.8-71.8)	124 (108-138)	180 (132-222)	654
Non-Hispanic whites	11-12	40.9 (36.9-45.4)	39.4 (34.3-43.6)	88.3 (76.3-99.7)	180 (146-233)	281 (201-333)	808
Non-Hispanic whites	13-14	36.8 (31.4-43.1)	38.3 (33.0-42.5)	81.4 (69.7-103)	158 (126-200)	255 (187-312)	910
Non-Hispanic whites	15-16	35.5 (32.1-39.3)	33.1 (29.0-40.2)	79.4 (71.4-86.7)	158 (126-178)	219 (178-245)	912
All Hispanics	11-12	32.7 (28.7-37.1)	27.6 (25.2-32.6)	60.8 (52.1-70.1)	127 (98.5-142)	170 (139-238)	566
All Hispanics	13-14	28 (24.4-32.2)	25.5 (21.4-29.9)	56.6 (45.9-68.7)	110 (86.4-146)	179 (136-268)	572
All Hispanics	15-16	30.7 (27.9-33.8)	27.9 (25.1-32.1)	63.7 (53.7-72.3)	109 (99.5-130)	170 (139-200)	969
Asians	11-12	35.1 (30.4-40.5)	34.3 (27.2-39.6)	71.3 (59.3-81.0)	123 (105-161)	177 (135-215)	341
Asians	13-14	28.8 (22.0-37.7)	26.2 (18.6-44.4)	63.4 (46.0-88.9)	121 (92.8-148)	169 (130-296)	257
Asians	15-16	22.9 (19.3-27.1)	20.7 (16.0-27.4)	43.1 (34.3-54.9)	78.7 (59.5-95.7)	100 (79.2-142)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Urinary 3-and 4-Methylhippuric acid (2011 - 2016)†

CAS Number 27115-49-7 or 27115-50-0

Metabolite of Xylene

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	221 (202-241)	212 (197-229)	563 (485-624)	1190 (1000-1410)	1710 (1520-2040)	2466
Total population	13-14	197 (179-217)	194 (172-224)	495 (426-584)	1060 (941-1180)	1540 (1330-1780)	2628
Total population	15-16	189 (174-206)	180 (161-202)	443 (396-502)	938 (833-1080)	1410 (1220-1620)	3014
Age 3-5 years	15-16	112 (98.3-128)	103 (88.1-120)	223 (187-251)	392 (335-529)	676 (482-919)	459
Age 6-11 years	11-12	152 (134-172)	136 (107-180)	311 (254-368)	616 (441-747)	889 (644-1140)	394
Age 6-11 years	13-14	120 (96.1-149)	116 (87.8-157)	245 (188-340)	428 (335-694)	836 (428-1590)	397
Age 6-11 years	15-16	123 (106-143)	132 (106-146)	203 (177-273)	460 (344-565)	683 (486-1090)	373
Age 12-19 years	11-12	214 (185-248)	209 (176-238)	499 (374-592)	1210 (879-1570)	1680 (1510-2100)	384
Age 12-19 years	13-14	200 (168-236)	196 (165-238)	423 (326-557)	890 (618-1340)	1450 (884-1700)	447
Age 12-19 years	15-16	162 (148-178)	155 (133-181)	314 (271-353)	636 (501-935)	1190 (709-1620)	394
Age 20+ years	11-12	231 (209-256)	222 (206-249)	601 (523-667)	1230 (1050-1470)	1740 (1560-2050)	1688
Age 20+ years	13-14	207 (185-233)	208 (176-246)	548 (458-630)	1130 (982-1280)	1630 (1350-2010)	1784
Age 20+ years	15-16	206 (186-229)	204 (175-238)	504 (436-588)	1040 (896-1180)	1550 (1260-1820)	1788
Males	11-12	251 (217-290)	224 (203-264)	590 (477-708)	1340 (1050-1590)	1720 (1470-2260)	1251
Males	13-14	214 (188-242)	208 (177-249)	498 (422-591)	1100 (929-1290)	1590 (1330-1940)	1304
Males	15-16	216 (194-241)	203 (173-238)	503 (443-550)	1020 (874-1150)	1450 (1220-1770)	1499
Females	11-12	195 (173-220)	202 (176-215)	547 (431-602)	1020 (866-1230)	1650 (1470-1890)	1215
Females	13-14	182 (164-204)	176 (153-208)	475 (404-595)	1050 (914-1140)	1460 (1250-1700)	1324
Females	15-16	167 (152-183)	161 (148-181)	396 (320-454)	891 (739-1060)	1300 (1150-1590)	1515
Mexican Americans	11-12	178 (141-224)	165 (118-224)	388 (288-446)	879 (569-1110)	1230 (886-2120)	313
Mexican Americans	13-14	169 (144-199)	156 (134-177)	358 (277-488)	855 (682-1090)	1270 (1050-1400)	451
Mexican Americans	15-16	169 (149-192)	156 (139-180)	350 (285-419)	739 (642-934)	1360 (1030-1450)	578
Non-Hispanic blacks	11-12	257 (226-293)	246 (200-275)	600 (495-725)	1270 (1090-1440)	1830 (1490-2060)	662
Non-Hispanic blacks	13-14	249 (221-281)	241 (205-274)	607 (517-693)	1180 (890-1710)	1930 (1300-2830)	571
Non-Hispanic blacks	15-16	245 (212-285)	223 (184-282)	575 (430-804)	1210 (1040-1520)	1820 (1360-2420)	656
Non-Hispanic whites	11-12	231 (209-256)	221 (205-251)	599 (499-681)	1250 (1050-1510)	1720 (1510-2190)	810
Non-Hispanic whites	13-14	206 (181-235)	208 (174-252)	538 (442-630)	1140 (1000-1350)	1650 (1310-2170)	968
Non-Hispanic whites	15-16	200 (177-225)	197 (163-236)	472 (397-562)	938 (811-1130)	1450 (1160-1830)	912
All Hispanics	11-12	176 (141-219)	161 (118-215)	400 (294-498)	886 (597-1230)	1290 (935-1920)	566
All Hispanics	13-14	177 (153-205)	170 (142-197)	390 (313-542)	837 (687-976)	1200 (963-1400)	698
All Hispanics	15-16	163 (146-181)	151 (136-164)	363 (306-417)	797 (699-964)	1370 (1100-1530)	969
Asians	11-12	141 (109-183)	128 (96.4-185)	346 (251-486)	760 (598-1030)	1160 (892-1610)	341
Asians	13-14	103 (74.0-143)	85.2 (62.6-140)	273 (142-498)	637 (445-954)	954 (636-1340)	287
Asians	15-16	93.8 (81.4-108)	87.4 (77.3-104)	216 (183-256)	460 (373-550)	676 (478-778)	329

Limit of detection (LOD, see Data Analysis section) for Survey years 11-12, 13-14, and 15-16 are 8.00, 8.00, and 8.00 respectively.

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Urinary 3-and 4-Methylhippuric acid (creatinine corrected) (2011 - 2016)†

CAS Number 27115-49-7 or 27115-50-0

Metabolite of Xylene

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	11-12	252 (232-275)	212 (185-241)	565 (510-617)	1050 (982-1130)	1540 (1370-1690)	2464
Total population	13-14	228 (205-255)	205 (176-234)	531 (460-600)	952 (862-1090)	1410 (1160-1600)	2627
Total population	15-16	214 (197-232)	186 (168-217)	461 (411-511)	837 (714-938)	1160 (1010-1330)	3011
Age 3-5 years	15-16	271 (243-302)	229 (202-260)	406 (335-465)	837 (573-1340)	1420 (946-2180)	458
Age 6-11 years	11-12	218 (192-247)	189 (153-230)	302 (258-376)	603 (477-669)	911 (603-1200)	393
Age 6-11 years	13-14	180 (138-233)	158 (126-196)	272 (184-468)	740 (348-1490)	1090 (740-1590)	397
Age 6-11 years	15-16	180 (158-205)	157 (132-181)	260 (219-337)	540 (424-585)	709 (551-1010)	373
Age 12-19 years	11-12	208 (178-244)	175 (136-227)	459 (314-585)	812 (660-982)	1130 (864-1500)	384
Age 12-19 years	13-14	182 (155-213)	151 (131-185)	417 (281-513)	852 (513-940)	993 (832-1250)	447
Age 12-19 years	15-16	153 (140-167)	135 (117-151)	280 (240-330)	571 (418-675)	812 (590-990)	394
Age 20+ years	11-12	264 (242-288)	227 (195-253)	612 (545-692)	1120 (1050-1220)	1610 (1420-1940)	1687
Age 20+ years	13-14	242 (216-273)	227 (197-264)	580 (505-648)	1000 (890-1160)	1450 (1230-1800)	1783
Age 20+ years	15-16	226 (206-248)	201 (175-236)	502 (450-575)	889 (766-989)	1240 (1020-1460)	1786
Males	11-12	236 (209-266)	197 (170-229)	511 (462-549)	930 (806-1030)	1420 (1110-1870)	1250
Males	13-14	214 (192-238)	191 (171-215)	468 (409-537)	842 (716-1040)	1340 (1040-1730)	1303
Males	15-16	206 (186-227)	187 (165-218)	428 (372-490)	746 (656-905)	1050 (931-1240)	1499
Females	11-12	269 (244-297)	226 (189-253)	631 (551-723)	1170 (1040-1360)	1660 (1470-1830)	1214
Females	13-14	243 (211-280)	219 (175-275)	611 (527-690)	1000 (910-1150)	1450 (1180-1600)	1324
Females	15-16	222 (201-245)	185 (161-223)	490 (438-555)	889 (738-1020)	1260 (1010-1580)	1512
Mexican Americans	11-12	201 (159-253)	144 (127-179)	415 (284-515)	798 (595-1020)	1050 (792-1920)	313
Mexican Americans	13-14	193 (172-217)	155 (134-178)	427 (315-544)	795 (624-957)	1180 (842-1990)	451
Mexican Americans	15-16	186 (169-203)	151 (138-165)	365 (306-415)	646 (553-714)	906 (724-1020)	577
Non-Hispanic blacks	11-12	201 (180-223)	182 (143-219)	442 (387-496)	763 (640-856)	1030 (841-1360)	662
Non-Hispanic blacks	13-14	190 (164-222)	167 (148-200)	413 (359-472)	806 (616-940)	1070 (934-1350)	571
Non-Hispanic blacks	15-16	197 (170-228)	174 (148-215)	439 (384-471)	747 (588-992)	1090 (818-1220)	654
Non-Hispanic whites	11-12	283 (262-306)	245 (214-287)	648 (553-723)	1210 (1050-1360)	1690 (1470-2050)	808
Non-Hispanic whites	13-14	255 (226-287)	234 (202-279)	623 (503-691)	1050 (884-1320)	1490 (1280-1950)	967
Non-Hispanic whites	15-16	237 (213-263)	218 (177-243)	517 (441-588)	928 (766-1020)	1270 (1020-1460)	912
All Hispanics	11-12	197 (168-230)	145 (128-175)	415 (284-492)	792 (660-942)	1040 (870-1350)	566
All Hispanics	13-14	198 (174-224)	158 (140-181)	442 (353-544)	803 (635-983)	1180 (858-1990)	698
All Hispanics	15-16	185 (171-200)	151 (138-168)	373 (335-413)	666 (589-750)	976 (822-1160)	968
Asians	11-12	189 (155-231)	159 (130-203)	447 (308-581)	767 (634-1070)	1110 (748-1380)	341
Asians	13-14	162 (122-217)	142 (100-215)	362 (220-587)	772 (539-1090)	1090 (790-1440)	287
Asians	15-16	129 (114-147)	109 (88.6-122)	261 (181-327)	519 (394-618)	659 (547-760)	329

† Participants are age 6+ in Survey 11-12 and 13-14, while participants are 3+ in Survey 15-16.

Biomonitoring Summary: https://www.cdc.gov/biomonitoring/Xylenes_BiomonitoringSummary.html

Aldehydes

Serum Benzaldehyde (2013 - 2014)

CAS Number 100-52-7

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.38 (1.23-1.56)	1.43 (1.28-1.59)	2.04 (1.74-2.38)	2.94 (2.55-3.52)	3.81 (3.12-4.51)	1468
Age 12-19 years	13-14	1.49 (1.26-1.76)	1.55 (1.30-1.69)	2.17 (1.66-2.83)	3.30 (2.33-4.32)	4.32 (2.97-4.48)	248
Age 20-59 years	13-14	1.37 (1.23-1.52)	1.40 (1.26-1.55)	2.00 (1.74-2.29)	2.89 (2.56-3.49)	3.67 (2.96-4.69)	843
Age 60+ years	13-14	1.39 (1.18-1.63)	1.46 (1.18-1.72)	2.11 (1.69-2.53)	3.01 (2.41-4.03)	4.03 (2.97-5.49)	377
Males	13-14	1.28 (1.14-1.44)	1.32 (1.18-1.44)	1.87 (1.66-2.10)	2.76 (2.32-3.32)	3.80 (2.80-4.87)	707
Females	13-14	1.49 (1.31-1.69)	1.56 (1.36-1.69)	2.21 (1.78-2.66)	3.09 (2.66-3.62)	3.81 (3.40-4.51)	761
Mexican Americans	13-14	1.58 (1.16-2.16)	1.62 (1.17-2.30)	2.32 (1.67-3.26)	3.49 (2.51-4.33)	4.03 (2.75-13.0)	251
Non-Hispanic blacks	13-14	1.29 (1.11-1.50)	1.30 (1.12-1.54)	1.96 (1.60-2.32)	2.83 (2.52-3.05)	3.36 (2.85-4.35)	245
Non-Hispanic whites	13-14	1.37 (1.20-1.57)	1.40 (1.25-1.61)	2.02 (1.69-2.40)	2.96 (2.44-3.73)	4.03 (3.12-4.69)	647
All Hispanics	13-14	1.47 (1.21-1.79)	1.52 (1.23-1.86)	2.17 (1.73-2.65)	2.90 (2.57-3.70)	3.85 (2.81-5.60)	377
Asians	13-14	1.60 (1.40-1.83)	1.59 (1.48-1.77)	2.21 (1.88-2.61)	2.88 (2.68-3.69)	3.69 (2.76-6.21)	150

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.461.

Serum Butyraldehyde (2013 - 2014)

CAS Number 123-72-8

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.475 (.431-.524)	.504 (.455-.545)	.664 (.617-.710)	.838 (.783-.915)	.993 (.944-1.07)	1740
Age 12-19 years	13-14	.451 (.411-.495)	.481 (.437-.520)	.615 (.551-.682)	.791 (.698-.958)	1.06 (.788-1.20)	313
Age 20-59 years	13-14	.481 (.430-.538)	.511 (.462-.560)	.673 (.626-.713)	.842 (.769-.931)	.980 (.924-1.08)	982
Age 60+ years	13-14	.473 (.427-.523)	.496 (.439-.545)	.655 (.605-.729)	.849 (.813-.944)	1.05 (.944-1.14)	445
Males	13-14	.496 (.445-.553)	.520 (.469-.571)	.683 (.636-.726)	.879 (.774-.995)	1.07 (.932-1.28)	844
Females	13-14	.457 (.415-.502)	.478 (.445-.523)	.643 (.595-.697)	.811 (.760-.869)	.958 (.856-1.07)	896
Mexican Americans	13-14	.518 (.500-.537)	.531 (.500-.573)	.733 (.684-.778)	.937 (.840-1.08)	1.19 (.965-1.36)	302
Non-Hispanic blacks	13-14	.426 (.373-.487)	.462 (.389-.511)	.612 (.518-.719)	.787 (.696-.924)	.980 (.793-1.14)	304
Non-Hispanic whites	13-14	.476 (.424-.534)	.506 (.451-.554)	.657 (.600-.713)	.825 (.739-.931)	.957 (.870-1.07)	733
All Hispanics	13-14	.493 (.466-.522)	.514 (.480-.542)	.696 (.649-.738)	.896 (.828-.993)	1.13 (.937-1.33)	457
Asians	13-14	.511 (.424-.616)	.518 (.404-.649)	.714 (.559-1.05)	1.07 (.692-1.55)	1.19 (1.06-1.55)	187

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.313.

Serum Crotonaldehyde (2013 - 2014)

CAS Number 123-73-9

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.160 (<LOD-.183)	.243 (.203-.301)	.337 (.277-.425)	1733
Age 12-19 years	13-14	*	<LOD	.147 (<LOD-.162)	.223 (.180-.268)	.284 (.219-.376)	316
Age 20-59 years	13-14	*	<LOD	.167 (.147-.185)	.257 (.202-.331)	.359 (.297-.446)	986
Age 60+ years	13-14	*	<LOD	.156 (<LOD-.187)	.232 (.196-.287)	.291 (.247-.397)	431
Males	13-14	*	<LOD	.164 (<LOD-.185)	.251 (.195-.342)	.359 (.260-.482)	844
Females	13-14	*	<LOD	.159 (<LOD-.183)	.237 (.202-.297)	.334 (.258-.402)	889
Mexican Americans	13-14	*	<LOD	.192 (.172-.228)	.342 (.199-.557)	.492 (.313-.736)	289
Non-Hispanic blacks	13-14	*	<LOD	.177 (<LOD-.224)	.259 (.200-.350)	.337 (.250-.432)	299
Non-Hispanic whites	13-14	*	<LOD	.151 (<LOD-.182)	.218 (.187-.292)	.302 (.225-.402)	750
All Hispanics	13-14	*	<LOD	.181 (.157-.203)	.313 (.199-.499)	.485 (.257-1.02)	444
Asians	13-14	*	<LOD	.174 (.163-.184)	.223 (.186-.277)	.277 (.204-.455)	183

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.147.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Serum Decanaldehyde (2013 - 2014)

CAS Number 112-31-2

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	1411
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	241
Age 20-59 years	13-14	*	<LOD	<LOD	<LOD	<LOD	808
Age 60+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	362
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	696
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	715
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	<LOD	209
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	<LOD	243
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	650
All Hispanics	13-14	*	<LOD	<LOD	<LOD	<LOD	331
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	139

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 3.90.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Serum Heptanaldehyde (2013 - 2014)

CAS Number 111-71-7

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.483 (.457-.511)	.504 (.471-.532)	.595 (.568-.618)	.700 (.646-.750)	.767 (.726-.809)	1527
Age 12-19 years	13-14	.508 (.473-.546)	.510 (.472-.556)	.611 (.564-.649)	.738 (.640-.799)	.799 (.767-.916)	275
Age 20-59 years	13-14	.487 (.458-.518)	.509 (.466-.543)	.602 (.567-.631)	.700 (.643-.752)	.764 (.721-.837)	874
Age 60+ years	13-14	.458 (.434-.484)	.485 (.460-.508)	.568 (.545-.590)	.651 (.617-.719)	.756 (.651-.808)	378
Males	13-14	.491 (.459-.526)	.519 (.477-.552)	.615 (.581-.641)	.700 (.651-.748)	.760 (.708-.853)	732
Females	13-14	.476 (.451-.501)	.490 (.463-.519)	.577 (.554-.601)	.699 (.631-.760)	.775 (.726-.827)	795
Mexican Americans	13-14	.516 (.486-.549)	.532 (.487-.555)	.608 (.574-.627)	.701 (.644-.744)	.745 (.722-.837)	255
Non-Hispanic blacks	13-14	.468 (.437-.502)	.480 (.437-.532)	.588 (.532-.637)	.669 (.641-.721)	.751 (.651-.776)	271
Non-Hispanic whites	13-14	.476 (.447-.507)	.499 (.463-.531)	.591 (.559-.617)	.694 (.631-.760)	.767 (.710-.808)	653
All Hispanics	13-14	.513 (.488-.540)	.531 (.486-.555)	.618 (.584-.637)	.718 (.664-.739)	.784 (.732-.857)	389
Asians	13-14	.506 (.457-.560)	.516 (.459-.566)	.597 (.564-.662)	.723 (.662-.741)	.767 (.708-.926)	162

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.312.

Serum Hexanaldehyde (2013 - 2014)

CAS Number 66-25-1

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	2.08 (2.00-2.17)	2.10 (2.01-2.20)	2.58 (2.48-2.69)	3.14 (3.02-3.28)	3.74 (3.32-4.73)	1571
Age 12-19 years	13-14	2.11 (1.88-2.36)	2.11 (1.98-2.26)	2.57 (2.40-2.84)	3.18 (2.89-4.07)	4.07 (3.18-4.86)	280
Age 20-59 years	13-14	2.10 (2.01-2.20)	2.12 (2.05-2.23)	2.64 (2.50-2.75)	3.14 (2.97-3.31)	3.71 (3.26-4.74)	890
Age 60+ years	13-14	2.01 (1.88-2.15)	2.01 (1.83-2.18)	2.43 (2.26-2.68)	3.08 (2.74-3.50)	3.73 (3.14-5.66)	401
Males	13-14	2.09 (1.98-2.19)	2.09 (1.99-2.21)	2.58 (2.49-2.72)	3.13 (2.99-3.44)	4.07 (3.25-5.81)	762
Females	13-14	2.08 (1.98-2.18)	2.12 (2.02-2.21)	2.57 (2.44-2.72)	3.15 (2.91-3.36)	3.63 (3.26-4.40)	809
Mexican Americans	13-14	2.27 (2.03-2.53)	2.28 (2.10-2.58)	2.75 (2.48-3.04)	3.15 (3.01-3.39)	3.78 (3.25-4.74)	262
Non-Hispanic blacks	13-14	2.02 (1.81-2.27)	2.11 (1.98-2.20)	2.55 (2.36-2.76)	3.10 (2.85-3.47)	4.07 (2.99-6.24)	259
Non-Hispanic whites	13-14	2.03 (1.93-2.15)	2.05 (1.93-2.18)	2.51 (2.39-2.68)	3.10 (2.88-3.36)	3.73 (3.16-4.84)	677
All Hispanics	13-14	2.20 (2.05-2.35)	2.24 (2.10-2.44)	2.72 (2.51-2.89)	3.14 (3.03-3.39)	3.67 (3.18-4.74)	404
Asians	13-14	2.36 (2.21-2.53)	2.31 (2.12-2.56)	2.97 (2.66-3.19)	3.55 (3.14-4.11)	4.05 (3.53-4.52)	179

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.693.

Serum Isopentanaldehyde (2013 - 2014)

CAS Number 590-86-3

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	.467 (.441-.494)	.416 (.389-.450)	.625 (.580-.687)	1.18 (1.03-1.38)	1.64 (1.42-1.79)	1798
Age 12-19 years	13-14	.385 (.355-.417)	.354 (.322-.398)	.460 (.430-.499)	.760 (.525-1.16)	1.22 (.760-1.66)	320
Age 20-59 years	13-14	.491 (.457-.528)	.440 (.396-.472)	.701 (.642-.769)	1.38 (1.16-1.54)	1.79 (1.61-1.89)	1018
Age 60+ years	13-14	.451 (.425-.478)	.417 (.390-.440)	.558 (.505-.635)	.790 (.699-1.08)	1.22 (.975-1.42)	460
Males	13-14	.497 (.463-.533)	.441 (.407-.474)	.673 (.612-.732)	1.29 (1.00-1.59)	1.75 (1.37-2.02)	882
Females	13-14	.440 (.411-.472)	.396 (.367-.427)	.594 (.506-.679)	1.07 (.963-1.21)	1.49 (1.32-1.76)	916
Mexican Americans	13-14	.399 (.359-.443)	.382 (.349-.409)	.496 (.455-.549)	.689 (.560-.930)	.973 (.681-1.40)	304
Non-Hispanic blacks	13-14	.437 (.403-.473)	.364 (.339-.400)	.619 (.506-.767)	1.22 (.932-1.38)	1.65 (1.22-1.79)	309
Non-Hispanic whites	13-14	.496 (.464-.531)	.442 (.417-.467)	.679 (.614-.755)	1.32 (1.08-1.48)	1.76 (1.48-1.91)	778
All Hispanics	13-14	.401 (.369-.435)	.384 (.354-.412)	.510 (.467-.549)	.724 (.620-.918)	.988 (.810-1.39)	459
Asians	13-14	.395 (.356-.439)	.365 (.321-.422)	.524 (.427-.617)	.750 (.597-1.14)	1.16 (.786-1.50)	198

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.119.

Serum Nonanaldehyde (2013 - 2014)

CAS Number 124-19-6

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	3.19 (2.91-3.44)	4.26 (3.88-4.72)	5.20 (4.65-5.84)	1534
Age 12-19 years	13-14	*	<LOD	3.39 (2.98-3.72)	4.69 (4.27-5.12)	5.68 (4.90-7.73)	281
Age 20-59 years	13-14	*	<LOD	3.13 (2.86-3.46)	4.22 (3.71-5.05)	5.26 (4.41-6.15)	870
Age 60+ years	13-14	*	<LOD	3.19 (2.79-3.39)	3.93 (3.72-4.34)	4.67 (4.18-5.42)	383
Males	13-14	*	<LOD	3.27 (2.90-3.54)	4.34 (3.84-4.85)	5.27 (4.62-5.94)	752
Females	13-14	*	<LOD	3.10 (2.87-3.36)	4.23 (3.75-4.86)	5.05 (4.40-6.22)	782
Mexican Americans	13-14	*	<LOD	3.36 (3.16-3.55)	4.39 (3.92-5.26)	5.40 (4.50-6.16)	224
Non-Hispanic blacks	13-14	*	<LOD	3.19 (<LOD-3.71)	4.63 (3.84-5.01)	5.26 (4.57-6.78)	278
Non-Hispanic whites	13-14	*	<LOD	3.15 (2.78-3.47)	4.19 (3.75-4.67)	4.99 (4.34-5.84)	692
All Hispanics	13-14	*	<LOD	3.38 (3.18-3.55)	4.69 (4.15-5.33)	5.56 (4.50-7.86)	361
Asians	13-14	*	<LOD	3.12 (2.78-3.33)	4.03 (3.28-5.28)	5.28 (4.01-6.05)	151

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 2.63.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Serum Octanaldehyde (2013 - 2014)

CAS Number 124-13-0

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	.793 (<LOD-.982)	.995 (.793-1.36)	1456
Age 12-19 years	13-14	*	<LOD	<LOD	.997 (<LOD-1.54)	1.54 (.965-1.74)	246
Age 20-59 years	13-14	*	<LOD	<LOD	.764 (<LOD-.933)	.954 (.771-1.20)	842
Age 60+ years	13-14	*	<LOD	<LOD	.758 (<LOD-.959)	.959 (.705-1.36)	368
Males	13-14	*	<LOD	<LOD	.801 (.669-.995)	.995 (.794-1.28)	704
Females	13-14	*	<LOD	<LOD	.751 (<LOD-.925)	.981 (.757-1.40)	752
Mexican Americans	13-14	*	<LOD	<LOD	.740 (<LOD-.937)	.933 (.756-1.03)	247
Non-Hispanic blacks	13-14	*	<LOD	<LOD	.921 (<LOD-1.42)	1.25 (.812-1.86)	240
Non-Hispanic whites	13-14	*	<LOD	<LOD	.771 (<LOD-1.01)	.981 (.764-1.31)	642
All Hispanics	13-14	*	<LOD	<LOD	.740 (<LOD-.933)	.937 (.756-1.19)	372
Asians	13-14	*	<LOD	<LOD	.806 (<LOD-1.00)	1.00 (.719-1.83)	152

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.660.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Serum Pentanaldehyde (2013 - 2014)

CAS Number 110-62-3

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	.375 (<LOD-.428)	.492 (.443-.562)	.582 (.510-.679)	1768
Age 12-19 years	13-14	*	<LOD	.364 (.325-.386)	.478 (.411-.548)	.589 (.478-.657)	315
Age 20-59 years	13-14	*	<LOD	.392 (.322-.448)	.502 (.455-.565)	.585 (.523-.700)	1004
Age 60+ years	13-14	*	<LOD	.332 (<LOD-.400)	.484 (.384-.565)	.564 (.443-.693)	449
Males	13-14	*	<LOD	.376 (.322-.428)	.494 (.452-.583)	.600 (.498-.762)	859
Females	13-14	*	<LOD	.373 (<LOD-.429)	.491 (.432-.554)	.564 (.512-.616)	909
Mexican Americans	13-14	*	<LOD	.408 (<LOD-.492)	.510 (.441-.612)	.606 (.529-.845)	294
Non-Hispanic blacks	13-14	*	<LOD	.357 (<LOD-.423)	.502 (.456-.565)	.594 (.509-.679)	306
Non-Hispanic whites	13-14	*	<LOD	.361 (<LOD-.434)	.483 (.409-.582)	.565 (.479-.698)	766
All Hispanics	13-14	*	<LOD	.383 (.318-.449)	.495 (.441-.591)	.599 (.519-.767)	454
Asians	13-14	*	<LOD	.453 (.370-.489)	.553 (.490-.631)	.639 (.548-.842)	186

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.316.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Serum Propanaldehyde (2013 - 2014)

CAS Number 123-38-6

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.82 (1.70-1.96)	1.90 (1.76-2.03)	2.40 (2.26-2.54)	3.03 (2.76-3.29)	3.56 (3.29-3.83)	1714
Age 12-19 years	13-14	1.66 (1.52-1.81)	1.73 (1.59-1.86)	2.21 (2.01-2.41)	2.67 (2.44-3.08)	3.08 (2.66-3.54)	311
Age 20-59 years	13-14	1.87 (1.72-2.03)	1.96 (1.79-2.09)	2.47 (2.31-2.64)	3.11 (2.78-3.47)	3.72 (3.35-4.15)	969
Age 60+ years	13-14	1.79 (1.70-1.89)	1.85 (1.76-1.97)	2.29 (2.20-2.40)	2.85 (2.62-3.19)	3.39 (3.12-3.63)	434
Males	13-14	1.88 (1.72-2.04)	1.95 (1.81-2.08)	2.45 (2.27-2.63)	3.20 (2.74-3.63)	3.71 (3.21-4.34)	833
Females	13-14	1.78 (1.66-1.90)	1.85 (1.71-2.01)	2.36 (2.24-2.49)	2.86 (2.66-3.08)	3.39 (3.04-3.79)	881
Mexican Americans	13-14	1.87 (1.75-2.01)	1.96 (1.82-2.13)	2.43 (2.29-2.60)	2.81 (2.67-3.00)	3.11 (2.85-3.33)	299
Non-Hispanic blacks	13-14	1.72 (1.53-1.93)	1.78 (1.63-1.98)	2.33 (1.98-2.67)	3.00 (2.65-3.17)	3.30 (3.07-3.79)	288
Non-Hispanic whites	13-14	1.82 (1.66-1.99)	1.88 (1.70-2.04)	2.41 (2.22-2.57)	3.19 (2.76-3.51)	3.75 (3.39-4.15)	736
All Hispanics	13-14	1.86 (1.76-1.95)	1.95 (1.85-2.08)	2.37 (2.29-2.51)	2.81 (2.67-3.00)	3.11 (2.99-3.38)	451
Asians	13-14	1.94 (1.81-2.08)	2.02 (1.90-2.18)	2.46 (2.22-2.60)	2.78 (2.61-3.03)	3.04 (2.79-3.44)	185

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.16.

Serum o-Tolualdehyde (2013 - 2014)

CAS Number 529-20-4

Geometric mean and selected percentiles of serum concentrations (in ng/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	<LOD	<LOD	<LOD	<LOD	1561
Age 12-19 years	13-14	*	<LOD	<LOD	<LOD	<LOD	283
Age 20-59 years	13-14	*	<LOD	<LOD	<LOD	<LOD	880
Age 60+ years	13-14	*	<LOD	<LOD	<LOD	<LOD	398
Males	13-14	*	<LOD	<LOD	<LOD	<LOD	761
Females	13-14	*	<LOD	<LOD	<LOD	<LOD	800
Mexican Americans	13-14	*	<LOD	<LOD	<LOD	.171 (<LOD-.243)	227
Non-Hispanic blacks	13-14	*	<LOD	<LOD	<LOD	.160 (<LOD-.206)	279
Non-Hispanic whites	13-14	*	<LOD	<LOD	<LOD	<LOD	704
All Hispanics	13-14	*	<LOD	<LOD	<LOD	.172 (<LOD-.303)	368
Asians	13-14	*	<LOD	<LOD	<LOD	<LOD	158

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 0.142.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Aromatic Amines

Urinary 4-Aminobiphenyl in Non-smokers (2013 - 2014)

CAS Number 92-67-1

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	4.20 (3.88-4.53)	4.87 (4.37-5.28)	7.91 (7.42-8.23)	11.3 (10.5-12.4)	15.5 (13.6-16.7)	1838
Age 6-11 years	13-14	4.80 (4.38-5.25)	5.37 (4.97-6.05)	8.12 (7.43-9.20)	10.9 (10.3-12.7)	13.7 (11.8-16.4)	293
Age 12-19 years	13-14	4.80 (4.15-5.55)	5.47 (4.79-6.20)	8.24 (7.36-9.37)	12.9 (9.57-15.3)	15.7 (13.6-20.8)	340
Age 20+ years	13-14	4.04 (3.69-4.43)	4.55 (3.99-5.20)	7.84 (7.21-8.23)	11.1 (10.3-12.3)	15.6 (13.4-17.4)	1205
Males	13-14	4.39 (4.00-4.82)	5.25 (4.52-5.67)	8.09 (7.80-8.76)	11.4 (10.3-13.4)	15.7 (13.2-17.4)	860
Females	13-14	4.03 (3.63-4.47)	4.52 (4.06-5.05)	7.50 (6.56-8.26)	11.0 (10.1-12.8)	15.5 (12.9-18.9)	978
Non-Hispanic blacks	13-14	4.87 (4.27-5.55)	5.54 (5.02-6.20)	8.62 (7.86-9.40)	12.8 (10.6-15.2)	16.2 (14.2-24.7)	345
Non-Hispanic whites	13-14	4.18 (3.72-4.68)	4.86 (4.24-5.34)	7.96 (7.24-8.49)	11.0 (10.3-12.8)	14.9 (13.2-16.6)	642
All Hispanics	13-14	4.10 (3.73-4.50)	4.87 (4.08-5.55)	7.53 (6.78-8.30)	11.0 (9.73-12.6)	14.5 (12.4-18.8)	559

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.75.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 4-Aminobiphenyl in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 92-67-1

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	5.06 (4.71-5.44)	5.01 (4.75-5.51)	8.98 (8.37-9.81)	14.5 (13.4-15.9)	20.0 (18.0-23.3)	1838
Age 6-11 years	13-14	7.12 (6.17-8.21)	7.29 (6.21-8.63)	11.3 (10.2-12.8)	17.3 (13.2-24.2)	24.2 (15.8-40.2)	293
Age 12-19 years	13-14	4.44 (3.86-5.10)	4.59 (3.88-5.59)	7.86 (6.26-9.22)	11.9 (10.2-14.2)	15.1 (11.4-21.2)	340
Age 20+ years	13-14	4.97 (4.61-5.36)	4.96 (4.62-5.39)	8.91 (8.14-9.70)	14.7 (13.6-16.1)	20.0 (18.0-23.8)	1205
Males	13-14	4.45 (4.12-4.81)	4.53 (4.13-4.94)	8.02 (7.08-8.88)	12.6 (11.8-14.1)	18.1 (15.1-20.8)	860
Females	13-14	5.67 (5.10-6.30)	5.65 (5.18-6.18)	10.1 (8.84-10.9)	16.1 (13.8-19.0)	22.4 (18.5-31.4)	978
Non-Hispanic blacks	13-14	3.84 (3.45-4.28)	4.18 (3.76-4.74)	7.02 (6.31-7.70)	10.4 (8.98-11.7)	14.2 (10.9-16.8)	345
Non-Hispanic whites	13-14	5.32 (4.78-5.93)	5.50 (4.86-5.98)	9.52 (8.57-10.5)	15.1 (13.3-18.8)	22.2 (18.2-29.9)	642
All Hispanics	13-14	4.68 (4.25-5.14)	4.66 (4.25-4.98)	7.94 (6.62-9.51)	13.2 (11.4-15.5)	16.7 (15.5-19.6)	559

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 4-Aminobiphenyl in Smokers (2013 - 2014)

CAS Number 92-67-1

Geometric mean and selected percentiles of urine concentrations of (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	21.8 (19.2-24.8)	23.6 (20.8-26.9)	41.4 (35.2-46.7)	60.5 (50.6-75.0)	81.2 (59.1-99.7)	388
Age 18-49 years	13-14	22.2 (18.7-26.3)	24.5 (20.9-29.4)	43.2 (34.9-50.1)	66.9 (51.0-75.0)	81.2 (60.5-105)	261
Age 50+ years	13-14	21.0 (17.6-25.1)	20.8 (16.4-29.3)	37.0 (27.2-44.6)	55.6 (37.2-89.9)	78.3 (53.4-98.0)	127
Males	13-14	19.6 (16.5-23.1)	20.8 (15.7-26.1)	41.4 (32.3-50.1)	60.9 (53.4-73.6)	82.3 (59.0-96.8)	222
Females	13-14	24.6 (20.5-29.4)	27.5 (21.4-30.4)	40.2 (33.7-47.2)	60.5 (43.8-85.2)	81.0 (51.2-230)	166
Non-Hispanic blacks	13-14	28.2 (23.5-33.8)	31.0 (23.1-37.2)	47.2 (37.6-53.6)	75.0 (48.1-97.8)	86.7 (58.2-124)	94
Non-Hispanic whites	13-14	22.3 (18.5-27.0)	24.4 (19.5-29.5)	43.2 (35.0-51.0)	61.9 (51.2-82.3)	82.3 (58.9-134)	198
All Hispanics	13-14	14.7 (10.1-21.3)	16.8 (9.82-25.0)	27.5 (19.8-38.6)	41.0 (26.1-85.2)	49.7 (31.6-105)	52

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.75.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 4-Aminobiphenyl in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 92-67-1

Geometric mean and selected percentiles of urine concentrations of (in ng/g of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	23.1 (20.6-25.9)	23.9 (20.9-27.7)	42.6 (37.9-49.5)	71.7 (58.7-82.2)	89.7 (72.9-109)	388
Age 18-49 years	13-14	21.3 (18.4-24.6)	21.7 (17.4-25.7)	40.1 (31.2-45.8)	70.2 (58.7-82.2)	86.5 (69.0-109)	261
Age 50+ years	13-14	28.8 (23.2-35.8)	34.2 (21.7-41.4)	49.5 (36.6-69.7)	71.7 (51.4-106)	106 (71.7-222)	127
Males	13-14	18.9 (15.4-23.1)	18.9 (14.8-22.7)	37.9 (28.5-47.6)	74.0 (58.7-79.3)	85.4 (65.8-120)	222
Females	13-14	28.7 (24.7-33.4)	30.0 (24.9-35.3)	45.4 (38.2-58.4)	69.0 (54.3-106)	104 (67.2-155)	166
Non-Hispanic blacks	13-14	22.5 (18.9-26.7)	23.1 (18.5-29.4)	38.0 (32.9-42.8)	61.6 (42.4-67.9)	67.9 (51.4-77.6)	94
Non-Hispanic whites	13-14	25.4 (21.6-29.9)	26.3 (21.2-34.6)	46.2 (38.5-59.6)	78.8 (61.9-97.0)	104 (79.3-124)	198
All Hispanics	13-14	14.4 (10.5-19.7)	12.5 (7.10-24.1)	30.5 (17.1-45.8)	48.2 (28.8-85.4)	85.4 (33.1-95.0)	52

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 1-Aminonaphthalene in Non-smokers (2013 - 2014)

CAS Number 134-32-7

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	1.88 (1.78-1.99)	1.57 (1.43-1.71)	2.83 (2.65-3.05)	5.68 (4.70-6.37)	9.53 (7.50-12.1)	1838
Age 6-11 years	13-14	1.96 (1.71-2.25)	1.77 (1.36-2.10)	3.17 (2.43-4.05)	6.31 (4.60-6.96)	7.61 (6.31-9.74)	302
Age 12-19 years	13-14	2.01 (1.82-2.22)	1.84 (1.52-2.10)	3.14 (2.61-3.93)	6.24 (4.63-7.10)	9.74 (6.94-14.8)	349
Age 20+ years	13-14	*	1.52 (1.39-1.67)	2.72 (2.55-2.97)	5.28 (4.42-6.26)	10.2 (7.64-13.5)	1187
Males	13-14	1.99 (1.84-2.15)	1.66 (1.51-1.78)	3.08 (2.68-3.39)	5.93 (4.80-7.01)	10.8 (7.64-15.0)	863
Females	13-14	*	1.46 (1.35-1.64)	2.65 (2.31-3.00)	5.11 (4.05-6.26)	8.67 (6.57-13.8)	975
Non-Hispanic blacks	13-14	2.58 (2.37-2.81)	2.37 (2.06-2.64)	3.76 (3.35-4.12)	7.74 (4.84-13.8)	14.9 (8.53-26.5)	349
Non-Hispanic whites	13-14	*	1.46 (1.29-1.66)	2.60 (2.31-3.02)	5.28 (4.18-6.26)	8.23 (6.72-10.8)	632
All Hispanics	13-14	1.96 (1.78-2.15)	1.62 (1.48-1.82)	2.82 (2.50-3.14)	5.75 (4.10-7.64)	11.1 (6.86-19.0)	565

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.29.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 1-Aminonaphthalene in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 134-32-7

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	2.28 (2.13-2.45)	2.02 (1.82-2.28)	3.91 (3.64-4.21)	7.58 (6.59-8.28)	13.5 (11.2-14.6)	1838
Age 6-11 years	13-14	2.93 (2.57-3.34)	2.84 (2.47-3.25)	4.93 (4.18-5.89)	8.71 (6.61-13.5)	14.5 (10.8-14.9)	302
Age 12-19 years	13-14	1.85 (1.54-2.22)	1.62 (1.43-2.06)	3.58 (2.72-4.39)	5.64 (4.51-7.86)	9.31 (5.56-15.9)	349
Age 20+ years	13-14	*	2.02 (1.82-2.24)	3.79 (3.60-4.14)	7.67 (6.59-8.72)	13.9 (10.6-16.0)	1187
Males	13-14	2.04 (1.87-2.22)	1.75 (1.57-1.96)	3.50 (2.84-4.18)	6.59 (6.02-7.55)	12.6 (9.10-14.6)	863
Females	13-14	*	2.32 (2.11-2.61)	4.14 (3.79-4.56)	8.00 (6.85-9.58)	13.9 (9.58-18.2)	975
Non-Hispanic blacks	13-14	2.04 (1.82-2.29)	1.86 (1.60-2.18)	3.25 (2.75-3.73)	7.26 (4.84-8.80)	11.2 (7.75-21.2)	349
Non-Hispanic whites	13-14	*	2.02 (1.76-2.40)	4.01 (3.64-4.41)	7.58 (6.28-9.10)	13.5 (9.58-15.0)	632
All Hispanics	13-14	2.22 (1.91-2.57)	2.00 (1.72-2.33)	3.78 (3.32-4.11)	7.10 (5.35-10.6)	13.5 (8.27-21.0)	565

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 1-Aminonaphthalene in Smokers (2013 - 2014)

CAS Number 134-32-7

Geometric mean and selected percentiles of urine concentrations of (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	34.5 (27.7-42.9)	42.4 (35.4-48.9)	83.4 (68.5-98.4)	140 (111-181)	185 (147-208)	379
Age 18-49 years	13-14	34.1 (26.4-43.9)	41.5 (34.0-50.6)	86.6 (69.0-107)	147 (122-185)	194 (147-211)	256
Age 50+ years	13-14	35.5 (26.2-48.2)	44.2 (27.6-61.0)	78.3 (52.4-100)	121 (92.6-156)	156 (108-215)	123
Males	13-14	32.2 (24.3-42.5)	41.4 (27.4-57.5)	89.0 (60.6-122)	161 (131-185)	194 (161-210)	213
Females	13-14	37.0 (28.5-48.1)	44.1 (37.2-48.9)	77.9 (65.1-95.1)	123 (95.1-181)	181 (111-266)	166
Non-Hispanic blacks	13-14	49.5 (39.5-61.9)	53.1 (40.0-75.4)	99.9 (75.4-133)	168 (101-201)	190 (134-379)	90
Non-Hispanic whites	13-14	37.0 (27.3-50.1)	44.2 (34.7-58.7)	86.6 (65.1-106)	147 (114-183)	194 (140-228)	196
All Hispanics	13-14	15.1 (9.85-23.3)	13.0 (4.84-36.9)	58.1 (25.6-87.9)	93.0 (58.1-166)	129 (82.2-200)	52

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 1.29.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 1-Aminonaphthalene in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 134-32-7

Geometric mean and selected percentiles of urine concentrations of (in ng/g of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	36.2 (28.9-45.2)	44.0 (33.6-60.0)	106 (84.9-118)	186 (141-225)	257 (202-352)	379
Age 18-49 years	13-14	32.1 (25.5-40.5)	35.1 (28.3-44.8)	90.4 (73.5-114)	179 (134-225)	257 (189-352)	256
Age 50+ years	13-14	49.2 (35.2-68.7)	67.8 (57.8-92.2)	122 (104-145)	202 (122-278)	278 (202-708)	123
Males	13-14	30.1 (22.4-40.4)	33.6 (19.9-56.7)	86.6 (65.4-111)	189 (111-222)	257 (189-450)	213
Females	13-14	43.7 (32.9-57.9)	60.0 (38.9-70.9)	114 (88.9-134)	178 (131-278)	298 (155-478)	166
Non-Hispanic blacks	13-14	38.6 (29.4-50.9)	40.1 (26.5-63.7)	96.1 (66.9-117)	158 (107-225)	223 (125-289)	90
Non-Hispanic whites	13-14	42.0 (30.9-57.0)	57.8 (36.4-70.7)	111 (90.4-136)	198 (152-310)	343 (198-478)	196
All Hispanics	13-14	14.3 (9.16-22.5)	12.9 (4.56-53.3)	56.8 (20.5-97.0)	119 (53.3-257)	219 (78.5-652)	52

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 2-Aminonaphthalene in Non-smokers (2013 - 2014)

CAS Number 91-59-8

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	4.16 (3.86-4.48)	3.92 (3.47-4.31)	6.65 (6.11-7.47)	10.4 (9.43-11.3)	14.0 (11.8-17.0)	1843
Age 6-11 years	13-14	4.35 (3.72-5.08)	4.25 (3.12-5.82)	7.52 (6.10-8.90)	10.7 (8.65-12.9)	12.9 (10.7-16.4)	301
Age 12-19 years	13-14	4.36 (3.95-4.81)	4.31 (3.99-4.84)	6.87 (5.88-8.45)	10.2 (8.59-12.0)	15.6 (10.5-19.1)	349
Age 20+ years	13-14	4.10 (3.78-4.46)	3.82 (3.29-4.26)	6.51 (6.03-7.19)	10.4 (9.29-11.2)	14.0 (11.4-17.0)	1193
Males	13-14	4.48 (4.15-4.83)	4.22 (3.89-4.69)	7.41 (6.51-8.04)	12.0 (9.81-13.9)	15.3 (13.2-19.0)	862
Females	13-14	3.89 (3.56-4.25)	3.62 (3.05-4.16)	6.28 (5.56-6.96)	9.29 (8.25-10.5)	11.8 (10.9-15.3)	981
Non-Hispanic blacks	13-14	5.81 (5.08-6.64)	5.66 (4.73-6.49)	9.20 (7.52-11.9)	15.7 (12.5-18.7)	26.1 (17.0-36.7)	342
Non-Hispanic whites	13-14	4.04 (3.72-4.38)	3.85 (3.26-4.29)	6.50 (6.06-7.17)	9.97 (8.94-10.8)	12.7 (10.6-15.5)	641
All Hispanics	13-14	4.07 (3.74-4.43)	3.87 (3.32-4.48)	6.46 (5.60-7.50)	10.1 (8.84-11.1)	13.9 (11.4-17.1)	570

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 2.79.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 2-Aminonaphthalene in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 91-59-8

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	5.09 (4.85-5.35)	5.05 (4.69-5.36)	7.69 (7.04-8.20)	11.5 (10.8-12.3)	16.4 (14.4-18.1)	1843
Age 6-11 years	13-14	6.52 (5.76-7.39)	7.02 (5.97-8.23)	10.8 (9.12-11.9)	14.9 (11.2-20.2)	19.4 (14.7-25.1)	301
Age 12-19 years	13-14	4.08 (3.68-4.53)	4.02 (3.79-4.28)	6.16 (5.31-6.98)	9.38 (7.58-10.9)	11.6 (9.38-18.7)	349
Age 20+ years	13-14	5.13 (4.88-5.39)	5.05 (4.73-5.36)	7.58 (7.03-7.97)	11.3 (10.4-12.0)	16.2 (14.1-18.9)	1193
Males	13-14	4.62 (4.33-4.92)	4.46 (4.13-4.86)	6.92 (6.16-7.81)	10.4 (8.73-11.9)	14.1 (10.8-19.7)	862
Females	13-14	5.56 (5.23-5.90)	5.51 (5.05-5.97)	8.21 (7.58-9.23)	12.3 (11.1-15.1)	17.9 (15.5-19.7)	981
Non-Hispanic blacks	13-14	4.67 (4.09-5.34)	4.69 (3.88-5.51)	7.26 (6.07-8.45)	10.7 (9.24-12.8)	14.4 (11.7-19.1)	342
Non-Hispanic whites	13-14	5.26 (4.95-5.59)	5.12 (4.69-5.54)	7.88 (7.04-8.73)	11.7 (10.6-14.2)	17.5 (14.1-20.2)	641
All Hispanics	13-14	4.63 (4.40-4.88)	4.69 (4.34-5.04)	6.94 (6.32-7.58)	10.1 (9.38-11.3)	13.1 (11.4-16.3)	570

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 2-Aminonaphthalene in Smokers (2013 - 2014)

CAS Number 91-59-8

Geometric mean and selected percentiles of urine concentrations of (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	15.8 (13.9-18.0)	15.1 (13.7-18.2)	31.5 (24.7-38.4)	54.4 (41.1-77.6)	77.7 (54.4-116)	380
Age 18-49 years	13-14	16.6 (13.8-19.9)	17.1 (13.4-20.0)	32.9 (24.9-42.6)	59.1 (41.1-78.8)	77.6 (54.1-111)	255
Age 50+ years	13-14	14.1 (11.7-17.0)	13.0 (9.16-16.8)	23.0 (21.3-30.6)	42.2 (35.1-77.7)	83.0 (40.4-123)	125
Males	13-14	15.2 (13.0-17.9)	14.6 (12.6-19.1)	32.4 (25.7-40.4)	59.1 (40.4-77.7)	77.7 (57.2-98.9)	217
Females	13-14	16.5 (13.7-19.9)	15.6 (13.4-18.5)	30.0 (20.0-43.5)	51.0 (32.0-111)	78.8 (48.5-299)	163
Non-Hispanic blacks	13-14	19.4 (15.3-24.5)	17.5 (14.4-24.4)	34.9 (22.5-48.5)	51.5 (36.4-89.5)	78.9 (48.5-114)	92
Non-Hispanic whites	13-14	16.7 (14.0-20.0)	15.6 (12.7-19.4)	33.9 (25.5-41.1)	60.4 (39.8-98.9)	83.2 (54.1-123)	196
All Hispanics	13-14	9.89 (7.49-13.1)	10.8 (7.05-13.1)	19.1 (13.0-26.3)	30.3 (19.1-54.4)	43.5 (20.1-57.2)	50

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 2.79.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 2-Aminonaphthalene in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 91-59-8

Geometric mean and selected percentiles of urine concentrations of (in ng/g of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	16.6 (14.9-18.5)	17.8 (15.0-19.5)	28.0 (25.2-32.5)	47.0 (40.0-54.6)	62.2 (52.5-84.8)	380
Age 18-49 years	13-14	15.6 (13.6-17.8)	16.0 (13.5-19.2)	26.1 (22.5-37.2)	43.5 (38.4-54.6)	57.1 (45.8-84.8)	255
Age 50+ years	13-14	19.4 (16.2-23.4)	20.9 (15.2-26.2)	31.9 (26.2-40.0)	52.3 (37.8-84.1)	84.1 (41.7-146)	125
Males	13-14	14.4 (12.5-16.5)	14.2 (12.5-16.9)	26.5 (20.9-37.7)	51.7 (38.4-57.1)	57.3 (49.4-84.8)	217
Females	13-14	19.2 (16.5-22.5)	20.2 (16.9-23.8)	28.6 (25.0-35.4)	41.7 (32.9-70.9)	80.0 (41.7-145)	163
Non-Hispanic blacks	13-14	15.7 (12.9-19.1)	16.9 (14.7-21.4)	26.5 (20.5-31.2)	33.9 (27.2-40.0)	39.4 (32.0-58.2)	92
Non-Hispanic whites	13-14	18.7 (16.1-21.7)	19.4 (13.9-23.2)	31.3 (26.1-38.5)	52.3 (42.0-68.1)	80.0 (54.6-106)	196
All Hispanics	13-14	9.64 (7.49-12.4)	9.93 (5.31-15.0)	17.6 (12.5-28.5)	29.1 (17.5-52.5)	52.5 (20.7-103)	50

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary o-Anisidine in Non-smokers (2013 - 2014)

CAS Number 90-04-0

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	46.6 (43.2-50.2)	45.6 (41.3-49.3)	87.1 (79.3-93.4)	146 (137-159)	205 (186-232)	1727
Age 6-11 years	13-14	49.1 (42.9-56.1)	48.9 (39.5-63.0)	85.8 (77.4-101)	124 (109-157)	176 (125-205)	283
Age 12-19 years	13-14	42.0 (34.0-51.9)	42.6 (34.4-50.4)	77.0 (58.9-95.6)	132 (89.9-191)	170 (132-252)	326
Age 20+ years	13-14	47.1 (44.0-50.4)	45.9 (41.3-49.9)	88.1 (82.8-94.8)	152 (138-172)	218 (187-246)	1118
Males	13-14	52.2 (48.6-56.2)	50.7 (47.4-55.0)	93.4 (87.1-102)	159 (142-172)	211 (186-253)	813
Females	13-14	42.1 (38.3-46.2)	40.8 (36.9-45.2)	80.4 (70.0-88.1)	136 (117-158)	204 (152-235)	914
Non-Hispanic blacks	13-14	45.1 (40.0-50.9)	44.9 (36.7-50.4)	82.0 (63.0-93.1)	134 (107-161)	179 (143-270)	323
Non-Hispanic whites	13-14	50.6 (46.1-55.6)	48.0 (43.4-55.0)	93.4 (84.6-104)	159 (137-187)	232 (195-269)	611
All Hispanics	13-14	40.0 (36.4-44.1)	40.9 (35.2-50.4)	75.3 (64.3-86.7)	122 (103-142)	180 (139-218)	516

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 7.02.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary o-Anisidine in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 90-04-0

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	57.8 (54.1-61.7)	50.6 (46.2-56.2)	100 (89.3-109)	202 (179-225)	338 (263-397)	1727
Age 6-11 years	13-14	76.0 (69.5-83.1)	73.6 (60.9-84.4)	117 (104-126)	179 (136-239)	267 (151-297)	283
Age 12-19 years	13-14	39.9 (35.4-44.9)	36.6 (32.7-40.8)	64.1 (46.8-77.2)	103 (77.2-133)	133 (99.1-191)	326
Age 20+ years	13-14	59.4 (55.5-63.6)	50.8 (46.4-57.6)	103 (90.0-118)	222 (198-256)	381 (270-454)	1118
Males	13-14	54.7 (51.6-57.9)	47.4 (43.9-52.3)	94.8 (80.8-104)	168 (146-198)	320 (229-414)	813
Females	13-14	60.7 (54.8-67.1)	51.5 (47.7-60.0)	105 (91.6-122)	222 (201-245)	342 (247-412)	914
Non-Hispanic blacks	13-14	36.1 (32.8-39.7)	35.2 (31.2-40.5)	54.5 (49.0-70.4)	102 (86.8-126)	148 (114-171)	323
Non-Hispanic whites	13-14	66.8 (61.6-72.4)	58.4 (50.6-68.2)	115 (99.1-141)	245 (202-297)	392 (270-475)	611
All Hispanics	13-14	47.1 (43.0-51.5)	42.7 (38.1-47.1)	77.2 (69.3-89.4)	140 (120-170)	217 (160-250)	516

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary o-Anisidine in Smokers (2013 - 2014)

CAS Number 90-04-0

Geometric mean and selected percentiles of urine concentrations of (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	57.1 (48.0-67.9)	56.5 (46.6-68.1)	104 (82.3-125)	183 (153-209)	236 (194-392)	355
Age 18-49 years	13-14	59.4 (48.6-72.5)	57.4 (46.6-71.5)	110 (82.3-147)	186 (161-229)	236 (183-481)	235
Age 50+ years	13-14	51.7 (40.9-65.4)	54.8 (44.0-68.1)	86.2 (68.1-125)	139 (119-201)	201 (135-363)	120
Males	13-14	61.3 (50.9-73.8)	56.6 (49.1-71.5)	112 (82.3-125)	189 (126-233)	233 (168-2050)	205
Females	13-14	52.7 (42.5-65.5)	54.8 (40.5-68.1)	93.9 (69.5-135)	167 (135-202)	236 (167-370)	150
Non-Hispanic blacks	13-14	54.8 (42.7-70.2)	64.3 (42.2-78.7)	107 (71.6-147)	149 (108-179)	178 (130-202)	90
Non-Hispanic whites	13-14	57.1 (46.6-70.0)	54.8 (44.2-68.1)	110 (82.3-130)	186 (153-231)	233 (183-392)	182
All Hispanics	13-14	67.4 (36.0-126)	60.9 (38.7-103)	136 (60.9-368)	368 (73.6-1220)	1220 (87.6-1220)	45

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 7.02.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary o-Anisidine in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 90-04-0

Geometric mean and selected percentiles of urine concentrations of (in ng/g of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	64.9 (56.2-75.0)	61.3 (48.9-71.1)	106 (83.6-152)	195 (161-317)	338 (183-534)	355
Age 18-49 years	13-14	61.6 (52.0-73.1)	54.0 (43.5-68.8)	107 (77.6-149)	194 (159-317)	350 (174-1110)	235
Age 50+ years	13-14	74.0 (60.2-90.9)	78.2 (45.8-97.2)	105 (92.8-166)	231 (154-338)	322 (157-411)	120
Males	13-14	61.7 (52.7-72.2)	54.1 (43.0-70.5)	102 (83.2-135)	225 (152-317)	350 (183-1350)	205
Females	13-14	68.7 (54.5-86.7)	68.0 (43.1-94.2)	107 (76.3-169)	174 (115-338)	338 (161-534)	150
Non-Hispanic blacks	13-14	44.3 (37.2-52.7)	41.8 (30.9-54.1)	72.4 (55.4-91.1)	98.9 (80.7-128)	148 (96.2-350)	90
Non-Hispanic whites	13-14	72.4 (61.3-85.5)	69.4 (49.1-83.6)	112 (92.6-166)	233 (161-348)	348 (183-1350)	182
All Hispanics	13-14	68.3 (36.6-127)	53.3 (29.4-135)	135 (53.3-314)	314 (96.4-1110)	1110 (107-1110)	45

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 2,6-Dimethylaniline in Non-smokers (2013 - 2014)

CAS Number 87-62-7

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	20.6 (17.4-23.3)	45.6 (41.3-50.9)	100 (81.9-156)	381 (230-479)	1763
Age 6-11 years	13-14	*	18.7 (<LOD-24.7)	45.4 (37.9-56.4)	89.6 (67.5-132)	141 (89.6-395)	283
Age 12-19 years	13-14	33.4 (23.5-47.5)	22.2 (17.1-32.2)	52.9 (40.3-69.0)	130 (62.1-1650)	1200 (84.2-6320)	330
Age 20+ years	13-14	*	20.6 (17.2-23.2)	43.9 (38.7-50.7)	103 (78.4-168)	332 (185-484)	1150
Males	13-14	29.7 (26.2-33.8)	22.4 (19.1-26.6)	49.5 (43.1-53.7)	99.0 (75.5-168)	318 (132-479)	819
Females	13-14	*	18.5 (<LOD-21.5)	43.8 (37.0-51.3)	109 (78.4-185)	448 (211-852)	944
Non-Hispanic blacks	13-14	31.7 (26.1-38.4)	26.2 (18.6-33.5)	49.5 (40.0-66.0)	107 (73.0-230)	245 (127-453)	324
Non-Hispanic whites	13-14	*	20.0 (16.0-24.5)	46.2 (40.8-53.1)	113 (78.2-185)	448 (185-1180)	619
All Hispanics	13-14	28.7 (25.7-32.2)	22.2 (17.8-24.6)	47.4 (39.3-56.2)	98.2 (78.0-129)	252 (115-682)	543

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 15.7.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 2,6-Dimethylaniline in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 87-62-7

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	*	26.8 (24.5-29.4)	50.0 (44.3-56.2)	133 (107-166)	486 (365-611)	1763
Age 6-11 years	13-14	*	34.6 (<LOD-39.6)	52.8 (46.2-63.8)	85.2 (65.6-118)	139 (92.8-353)	283
Age 12-19 years	13-14	30.9 (21.1-45.4)	21.7 (17.9-26.8)	40.3 (31.7-56.6)	162 (47.7-1210)	628 (76.5-11100)	330
Age 20+ years	13-14	*	26.9 (24.1-29.2)	50.4 (44.8-57.3)	139 (104-189)	486 (306-670)	1150
Males	13-14	30.6 (27.2-34.4)	23.6 (21.3-25.7)	42.8 (34.9-56.2)	103 (73.2-175)	381 (123-726)	819
Females	13-14	*	31.7 (<LOD-33.6)	52.6 (48.3-61.4)	159 (115-208)	566 (404-1070)	944
Non-Hispanic blacks	13-14	25.6 (21.6-30.4)	20.7 (18.3-24.6)	36.7 (30.9-43.0)	77.8 (50.4-154)	213 (66.2-755)	324
Non-Hispanic whites	13-14	*	28.1 (24.1-32.6)	53.2 (48.5-61.6)	162 (104-254)	544 (307-772)	619
All Hispanics	13-14	33.4 (29.3-38.0)	26.0 (23.3-29.2)	44.3 (39.6-50.2)	94.9 (73.2-158)	551 (139-807)	543

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary 2,6-Dimethylaniline in Smokers (2013 - 2014)

CAS Number 87-62-7

Geometric mean and selected percentiles of urine concentrations of (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	46.4 (37.9-56.8)	36.2 (30.4-44.7)	73.2 (61.4-89.5)	203 (117-426)	574 (243-1300)	362
Age 18-49 years	13-14	43.1 (34.8-53.2)	38.3 (30.5-51.3)	70.5 (58.4-83.3)	148 (88.2-226)	308 (148-625)	242
Age 50+ years	13-14	56.1 (39.6-79.3)	30.4 (24.6-42.9)	96.0 (65.7-177)	470 (199-1300)	1300 (220-20100)	120
Males	13-14	47.1 (35.7-62.1)	39.4 (30.4-51.3)	70.1 (55.7-99.6)	203 (99.6-574)	637 (243-3250)	207
Females	13-14	45.7 (38.5-54.2)	34.3 (26.2-44.9)	76.4 (62.4-99.9)	199 (119-360)	360 (197-1300)	155
Non-Hispanic blacks	13-14	68.7 (45.2-104)	56.1 (33.1-68.9)	86.5 (65.7-226)	433 (96.0-7330)	7330 (199-26300)	88
Non-Hispanic whites	13-14	46.0 (36.7-57.8)	36.2 (29.3-48.4)	73.2 (61.4-99.6)	197 (99.9-360)	453 (185-1300)	182
All Hispanics	13-14	35.9 (22.3-57.7)	29.3 (16.9-58.1)	61.3 (30.5-86.4)	86.4 (58.1-2290)	139 (65.7-2290)	50

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 15.7.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary 2,6-Dimethylaniline in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 87-62-7

Geometric mean and selected percentiles of urine concentrations of (in ng/g of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	49.2 (40.5-59.9)	36.1 (30.3-46.2)	65.9 (57.6-79.1)	183 (107-461)	900 (222-1520)	362
Age 18-49 years	13-14	41.3 (34.9-49.0)	32.8 (28.3-39.0)	59.3 (53.3-74.0)	120 (79.1-188)	249 (144-1170)	242
Age 50+ years	13-14	76.6 (57.5-102)	49.2 (38.2-63.1)	92.3 (64.8-216)	900 (216-1520)	1690 (222-26600)	120
Males	13-14	45.2 (34.7-58.9)	35.5 (28.0-46.2)	64.7 (53.3-79.1)	156 (107-667)	1170 (156-1690)	207
Females	13-14	54.0 (46.0-63.5)	40.0 (31.7-55.4)	73.0 (60.3-88.5)	188 (94.2-259)	800 (188-1140)	155
Non-Hispanic blacks	13-14	54.4 (32.4-91.2)	30.8 (22.7-50.6)	70.1 (46.3-127)	612 (74.0-12300)	3670 (170-30000)	88
Non-Hispanic whites	13-14	53.3 (41.6-68.2)	39.9 (31.6-57.6)	73.0 (60.3-88.5)	188 (95.9-667)	800 (188-1170)	182
All Hispanics	13-14	34.2 (22.6-51.9)	29.6 (20.8-38.1)	46.2 (32.8-83.7)	86.4 (42.7-1520)	116 (43.3-1520)	50

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary o-Toluidine in Non-smokers (2013 - 2014)

CAS Number 95-53-4

Geometric mean and selected percentiles of urine concentrations (in pg/mL) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	293 (269-319)	290 (256-317)	556 (513-591)	1010 (950-1080)	1560 (1230-2050)	1794
Age 6-11 years	13-14	314 (264-374)	292 (234-367)	593 (498-739)	1200 (834-1380)	1490 (1100-2390)	286
Age 12-19 years	13-14	359 (287-450)	374 (306-462)	626 (536-834)	1260 (834-2180)	2180 (1190-3750)	340
Age 20+ years	13-14	281 (258-305)	273 (244-306)	533 (488-585)	979 (907-1050)	1460 (1150-1870)	1168
Males	13-14	319 (293-348)	315 (292-340)	588 (540-643)	1100 (930-1300)	1860 (1200-2610)	834
Females	13-14	271 (241-306)	258 (218-312)	532 (472-590)	959 (855-1050)	1360 (1070-1830)	960
Non-Hispanic blacks	13-14	420 (359-491)	453 (357-551)	749 (628-865)	1150 (948-1520)	1890 (1260-3080)	337
Non-Hispanic whites	13-14	279 (252-308)	271 (240-302)	527 (474-584)	998 (865-1110)	1490 (1130-2300)	627
All Hispanics	13-14	298 (273-325)	293 (244-337)	546 (459-660)	1010 (815-1170)	1560 (1170-2140)	552

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 111.

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary o-Toluidine in Non-smokers (creatinine corrected, 2013 - 2014)

CAS Number 95-53-4

Geometric mean and selected percentiles of urine concentrations (in ng/g of creatinine) for the non-smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	355 (338-373)	332 (314-357)	525 (492-555)	865 (765-947)	1240 (1050-1580)	1794
Age 6-11 years	13-14	462 (403-530)	462 (379-496)	647 (535-760)	1020 (772-1640)	1680 (1020-1890)	286
Age 12-19 years	13-14	327 (286-375)	302 (259-340)	462 (389-598)	850 (584-1240)	1240 (862-1580)	340
Age 20+ years	13-14	349 (332-368)	328 (310-353)	517 (474-541)	846 (715-941)	1220 (997-1500)	1168
Males	13-14	325 (304-347)	303 (272-330)	485 (443-526)	765 (660-874)	1180 (865-1680)	834
Females	13-14	384 (361-409)	359 (335-389)	559 (517-597)	923 (794-1050)	1400 (1070-1590)	960
Non-Hispanic blacks	13-14	336 (293-387)	313 (286-358)	495 (449-571)	859 (654-1070)	1280 (824-1960)	337
Non-Hispanic whites	13-14	358 (338-380)	340 (315-364)	529 (475-566)	865 (730-977)	1230 (1020-1580)	627
All Hispanics	13-14	341 (322-361)	311 (294-334)	496 (442-567)	796 (715-991)	1230 (994-1550)	552

^ Non-smoking is defined as a serum cotinine concentration of 10 ng/mL or less.

Urinary o-Toluidine in Smokers (2013 - 2014)

CAS Number 95-53-4

Geometric mean and selected percentiles of urine concentrations of (in pg/mL) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	458 (402-522)	468 (393-512)	798 (705-935)	1410 (1050-1860)	1960 (1460-2930)	359
Age 18-49 years	13-14	469 (398-553)	493 (389-562)	906 (721-1050)	1390 (1080-1680)	1680 (1330-2530)	239
Age 50+ years	13-14	431 (341-544)	393 (348-510)	668 (548-769)	1480 (725-3520)	3030 (918-4700)	120
Males	13-14	461 (389-545)	494 (432-547)	795 (705-993)	1470 (993-2400)	2400 (1460-3520)	202
Females	13-14	455 (393-527)	396 (352-514)	798 (586-1040)	1330 (1050-1680)	1840 (1130-2690)	157
Non-Hispanic blacks	13-14	598 (455-785)	580 (374-900)	1090 (715-1570)	1680 (1290-2930)	2930 (1600-4720)	88
Non-Hispanic whites	13-14	445 (377-527)	468 (349-514)	746 (629-1050)	1330 (881-1960)	1840 (1150-3030)	180
All Hispanics	13-14	455 (359-577)	455 (337-629)	651 (535-1000)	1130 (579-2530)	2400 (775-2530)	51

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 is 111.

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Urinary o-Toluidine in Smokers (creatinine corrected, 2013 - 2014)

CAS Number 95-53-4

Geometric mean and selected percentiles of urine concentrations of (in ng/g of creatinine) for the smoking^ U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	485 (449-525)	485 (438-538)	715 (607-804)	1070 (881-1230)	1330 (1150-1680)	359
Age 18-49 years	13-14	446 (404-492)	438 (389-514)	694 (571-785)	938 (800-1070)	1140 (922-1460)	239
Age 50+ years	13-14	601 (540-670)	575 (490-607)	813 (655-1160)	1450 (1020-1680)	1760 (1450-4190)	120
Males	13-14	443 (392-500)	410 (380-534)	696 (570-822)	981 (826-1230)	1680 (984-2090)	202
Females	13-14	532 (492-574)	514 (454-573)	767 (623-885)	1080 (804-1270)	1230 (1070-1570)	157
Non-Hispanic blacks	13-14	483 (418-557)	476 (388-534)	647 (559-777)	981 (724-1760)	1460 (800-4190)	88
Non-Hispanic whites	13-14	512 (458-573)	538 (449-573)	746 (607-938)	1140 (813-1450)	1330 (1120-1680)	180
All Hispanics	13-14	432 (358-522)	394 (324-511)	654 (436-787)	984 (654-1220)	1030 (692-1220)	51

^ Smoking is defined as a serum cotinine concentration more than 10 ng/mL in participants from the National Health and Nutrition Examination Survey, excluding those who used other tobacco products.

Aromatic Diamines

Urinary 4,4'-Diaminodiphenylmethane (4MDA) (2015 - 2016)

CAS Number 101-77-9

Metabolite of 4,4-Methylenediphenyl diisocyanate

Geometric mean and selected percentiles of concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	.059 (<LOD-.072)	.171 (.139-.200)	.294 (.258-.336)	.378 (.336-.441)	2831
Age 3-5 years	15-16	.091 (.080-.104)	.079 (.062-.110)	.204 (.166-.245)	.326 (.305-.371)	.413 (.369-.503)	405
Age 6-11 years	15-16	.093 (.081-.107)	.087 (.066-.112)	.195 (.143-.229)	.363 (.286-.412)	.450 (.397-.490)	353
Age 12-19 years	15-16	.095 (.085-.106)	.101 (.074-.116)	.212 (.157-.245)	.338 (.270-.389)	.429 (.350-.480)	375
Age 20+ years	15-16	*	.050 (<LOD-.062)	.156 (.130-.192)	.282 (.243-.327)	.367 (.316-.428)	1698
Males	15-16	*	.064 (.052-.082)	.166 (.144-.202)	.293 (.258-.330)	.384 (.327-.459)	1419
Females	15-16	*	.053 (<LOD-.068)	.174 (.127-.210)	.296 (.255-.350)	.373 (.330-.448)	1412
Mexican Americans	15-16	*	.064 (<LOD-.085)	.167 (.114-.212)	.305 (.228-.361)	.389 (.320-.515)	553
Non-Hispanic blacks	15-16	*	.070 (.060-.086)	.192 (.157-.227)	.320 (.289-.352)	.419 (.357-.472)	601
Non-Hispanic whites	15-16	*	.055 (<LOD-.074)	.174 (.132-.216)	.286 (.243-.349)	.373 (.316-.441)	858
All Hispanics	15-16	*	.065 (.050-.079)	.163 (.124-.202)	.299 (.229-.351)	.404 (.331-.490)	923
Asians	15-16	*	<LOD	.114 (.067-.154)	.248 (.183-.319)	.384 (.292-.457)	313

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.048.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 4,4'-Diaminodiphenylmethane (4MDA) (creatinine corrected) (2015 - 2016)

CAS Number 101-77-9

Metabolite of 4,4-Methylenediphenyl diisocyanate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	.086 (<LOD-.094)	.179 (.153-.205)	.379 (.306-.434)	.564 (.449-.648)	2828
Age 3-5 years	15-16	0.232 (.207-.260)	.222 (.200-.252)	.425 (.357-.488)	.782 (.619-.969)	1.21 (.918-1.62)	404
Age 6-11 years	15-16	0.141 (.121-.165)	.136 (.110-.170)	.260 (.205-.356)	.481 (.390-.564)	.733 (.544-.959)	353
Age 12-19 years	15-16	0.092 (.078-.107)	.083 (.069-.103)	.193 (.148-.220)	.354 (.265-.414)	.480 (.310-.786)	375
Age 20+ years	15-16	*	.078 (<LOD-.087)	.162 (.136-.189)	.343 (.267-.424)	.535 (.413-.640)	1696
Males	15-16	*	.068 (.061-.079)	.152 (.135-.176)	.338 (.254-.424)	.552 (.414-.640)	1419
Females	15-16	*	.097 (<LOD-.110)	.205 (.167-.247)	.413 (.303-.515)	.576 (.437-.881)	1409
Mexican Americans	15-16	*	.081 (<LOD-.092)	.179 (.142-.246)	.365 (.262-.487)	.500 (.374-.695)	552
Non-Hispanic blacks	15-16	*	.065 (.057-.080)	.144 (.116-.174)	.266 (.222-.320)	.465 (.336-.535)	599
Non-Hispanic whites	15-16	*	.090 (<LOD-.106)	.183 (.155-.208)	.387 (.305-.440)	.576 (.424-.778)	858
All Hispanics	15-16	*	.083 (.075-.091)	.194 (.143-.253)	.393 (.299-.505)	.570 (.468-.763)	922
Asians	15-16	*	<LOD	.162 (.136-.198)	.309 (.233-.430)	.531 (.349-.733)	313

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 1,5-Diaminonaphthalene (5NDA) (2015 - 2016)

CAS Number 2243-62-1

Metabolite of 1,5-Naphthalene diisocyanate

Geometric mean and selected percentiles of concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2758
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	400
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	348
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	374
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1636
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1387
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1371
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	579
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	814
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	919
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	312

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 1.00.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 1,5-Diaminonaphthalene (5NDA) (creatinine corrected) (2015 - 2016)

CAS Number 2243-62-1

Metabolite of 1,5-Naphthalene diisocyanate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2756
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	399
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	348
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	374
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1635
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1387
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1369
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	546
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	577
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	814
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	919
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	312

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2,4-Diaminotoluene (4TDA) (2015 - 2016)

CAS Number 95-80-7

Metabolite of 2,4-Toluene diisocyanate

Geometric mean and selected percentiles of concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	.785 (<LOD-1.14)	2595
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	387
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	341
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	.683 (<LOD-.727)	360
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	.895 (<LOD-1.26)	1507
Males	15-16	*	<LOD	<LOD	<LOD	.892 (.651-1.19)	1315
Females	15-16	*	<LOD	<LOD	<LOD	.686 (<LOD-1.05)	1280
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	.882 (<LOD-1.21)	509
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	.758 (<LOD-.972)	557
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	.756 (<LOD-1.20)	782
All Hispanics	15-16	*	<LOD	<LOD	<LOD	.826 (<LOD-1.07)	843
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	292

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.640.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2,4-Diaminotoluene (4TDA) (creatinine corrected) (2015 - 2016)

CAS Number 95-80-7

Metabolite of 2,4-Toluene diisocyanate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	2.27 (<LOD-2.47)	2592
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	386
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	341
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	1.42 (<LOD-2.06)	360
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	2.27 (<LOD-2.52)	1505
Males	15-16	*	<LOD	<LOD	<LOD	1.97 (1.56-2.27)	1315
Females	15-16	*	<LOD	<LOD	<LOD	2.47 (<LOD-2.87)	1277
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	2.27 (<LOD-2.38)	508
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	1.62 (<LOD-2.06)	555
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	2.27 (<LOD-2.52)	782
All Hispanics	15-16	*	<LOD	<LOD	<LOD	2.27 (<LOD-2.83)	842
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	292

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2,6-Diaminotoluene (6TDA) (2015 - 2016)

CAS Number 823-40-5

Metabolite of 2,6-Toluene diisocyanate

Geometric mean and selected percentiles of concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2430
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	358
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	306
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	336
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1430
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1235
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1195
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	401
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	554
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	751
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	704
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	296

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 0.640.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary 2,6-Diaminotoluene (6TDA) (creatinine corrected) (2015 - 2016)

CAS Number 823-40-5

Metabolite of 2,6-Toluene diisocyanate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	<LOD	<LOD	2430
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	<LOD	358
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	<LOD	306
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	<LOD	336
Age 20+ years	15-16	*	<LOD	<LOD	<LOD	<LOD	1430
Males	15-16	*	<LOD	<LOD	<LOD	<LOD	1235
Females	15-16	*	<LOD	<LOD	<LOD	<LOD	1195
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	<LOD	401
Non-Hispanic blacks	15-16	*	<LOD	<LOD	<LOD	<LOD	554
Non-Hispanic whites	15-16	*	<LOD	<LOD	<LOD	<LOD	751
All Hispanics	15-16	*	<LOD	<LOD	<LOD	<LOD	704
Asians	15-16	*	<LOD	<LOD	<LOD	<LOD	296

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary p-Phenylenediamine (PPDA) (2015 - 2016)

CAS Number 106-50-3

Metabolite of p-Phenylene diisocyanate

Geometric mean and selected percentiles of concentrations (in µg/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	3.63 (2.73-4.80)	13.0 (8.08-16.2)	2608
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	2.72 (<LOD-6.05)	389
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	2.23 (<LOD-3.99)	316
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	2.40 (<LOD-4.86)	345
Age 20+ years	15-16	*	<LOD	<LOD	4.98 (3.83-6.53)	16.2 (10.8-23.5)	1558
Males	15-16	*	<LOD	<LOD	<LOD	5.44 (2.87-9.18)	1301
Females	15-16	*	<LOD	<LOD	5.93 (4.20-11.3)	21.9 (14.2-27.0)	1307
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	5.58 (2.55-10.2)	502
Non-Hispanic blacks	15-16	*	<LOD	<LOD	3.45 (2.23-6.55)	11.7 (4.98-17.1)	582
Non-Hispanic whites	15-16	*	<LOD	<LOD	4.19 (2.73-5.68)	15.1 (8.06-24.2)	786
All Hispanics	15-16	*	<LOD	<LOD	2.00 (<LOD-2.88)	7.36 (3.06-9.59)	839
Asians	15-16	*	<LOD	<LOD	<LOD	3.68 (<LOD-17.7)	277

Limit of detection (LOD, see Data Analysis section) for Survey year 15-16 is 2.00.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Urinary p-Phenylenediamine (PPDA) (creatinine corrected) (2015 - 2016)

CAS Number 106-50-3

Metabolite of p-Phenylene diisocyanate

Geometric mean and selected percentiles of urine concentrations (in µg/g of creatinine) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	15-16	*	<LOD	<LOD	7.05 (6.01-8.29)	16.0 (10.8-21.4)	2606
Age 3-5 years	15-16	*	<LOD	<LOD	<LOD	15.7 (<LOD-20.1)	388
Age 6-11 years	15-16	*	<LOD	<LOD	<LOD	7.83 (<LOD-12.9)	316
Age 12-19 years	15-16	*	<LOD	<LOD	<LOD	4.41 (<LOD-7.42)	345
Age 20+ years	15-16	*	<LOD	<LOD	7.61 (6.13-10.3)	21.0 (14.2-28.5)	1557
Males	15-16	*	<LOD	<LOD	<LOD	7.83 (6.64-10.8)	1301
Females	15-16	*	<LOD	<LOD	10.1 (7.42-17.6)	32.9 (16.7-61.6)	1305
Mexican Americans	15-16	*	<LOD	<LOD	<LOD	9.40 (7.29-14.6)	502
Non-Hispanic blacks	15-16	*	<LOD	<LOD	5.04 (4.10-6.16)	9.15 (6.16-16.7)	580
Non-Hispanic whites	15-16	*	<LOD	<LOD	7.05 (6.10-9.40)	19.6 (10.8-32.9)	786
All Hispanics	15-16	*	<LOD	<LOD	6.85 (<LOD-7.83)	11.8 (8.81-14.6)	839
Asians	15-16	*	<LOD	<LOD	<LOD	11.8 (<LOD-20.3)	277

<LOD means less than the limit of detection for the urine levels not corrected for creatinine.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Sex Steroid Hormones

Total Estradiol (2013 - 2016)

CAS Number 50-28-2

Geometric mean and selected percentiles of serum concentrations (in pg/mL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	19.9 (19.1-20.7)	22.4 (21.7-23.2)	35.7 (34.0-37.3)	97.9 (87.7-109)	163 (157-173)	7269
Total population	15-16	19.8 (18.6-21.0)	22.1 (21.2-23.1)	36.7 (34.4-39.2)	102 (89.4-114)	161 (151-173)	7150
Age 6-11 years	13-14	*	<LOD	3.42 (<LOD-5.55)	16.9 (8.45-27.4)	30.7 (24.0-43.0)	962
Age 6-11 years	15-16	*	<LOD	3.24 (<LOD-3.96)	19.0 (11.3-27.5)	38.6 (29.2-46.2)	964
Age 12-19 years	13-14	27.1 (24.8-29.7)	26.7 (24.6-28.1)	47.6 (43.0-56.1)	121 (97.8-145)	193 (161-223)	1186
Age 12-19 years	15-16	26.5 (24.4-28.8)	25.1 (23.3-27.1)	50.4 (45.1-57.0)	120 (103-142)	182 (152-204)	1092
Age 20+ years	13-14	22.1 (21.1-23.2)	23.2 (22.3-24.3)	36.2 (34.1-38.6)	100 (88.4-113)	165 (157-177)	5121
Age 20+ years	15-16	22.0 (20.5-23.7)	23.1 (22.1-24.1)	37.2 (34.8-39.8)	107 (91.5-118)	165 (154-179)	5094
Males	13-14	18.5 (18.0-19.0)	22.3 (21.7-22.9)	28.2 (27.4-28.9)	34.6 (33.5-35.2)	39.0 (37.3-40.5)	3569
Males	15-16	18.8 (18.1-19.5)	22.4 (21.7-22.9)	28.6 (27.8-29.7)	35.4 (33.9-37.1)	41.2 (39.2-43.0)	3516
Females	13-14	21.3 (19.8-22.8)	23.4 (20.8-26.6)	77.3 (69.0-85.5)	162 (155-171)	221 (206-249)	3700
Females	15-16	20.8 (18.6-23.2)	20.7 (16.4-25.6)	77.7 (67.6-89.4)	159 (149-173)	232 (205-257)	3634
Mexican Americans	13-14	20.7 (18.7-22.9)	21.8 (20.4-24.0)	38.9 (35.2-42.2)	128 (104-144)	191 (165-215)	1242
Mexican Americans	15-16	22.5 (20.2-25.1)	23.1 (21.2-24.7)	41.3 (36.1-46.7)	126 (105-145)	187 (157-211)	1401
Non-Hispanic blacks	13-14	23.5 (21.8-25.4)	26.2 (24.5-28.4)	46.6 (40.0-52.8)	115 (100-130)	180 (153-193)	1504
Non-Hispanic blacks	15-16	24.3 (22.8-25.9)	25.4 (24.4-26.9)	46.4 (41.7-52.3)	128 (108-143)	200 (159-226)	1477
Non-Hispanic whites	13-14	18.9 (18.0-19.9)	21.8 (21.0-22.7)	32.7 (31.6-34.4)	86.7 (73.0-100)	158 (133-169)	2804
Non-Hispanic whites	15-16	18.3 (17.0-19.8)	20.9 (19.9-22.3)	34.1 (31.3-37.4)	87.8 (76.2-105)	149 (130-167)	2232
All Hispanics	13-14	21.1 (19.6-22.8)	22.7 (21.3-24.0)	40.7 (36.5-45.0)	118 (99.3-136)	190 (170-209)	1910
All Hispanics	15-16	21.6 (20.2-23.0)	23.1 (21.8-24.0)	39.5 (36.9-43.4)	116 (99.2-126)	169 (151-197)	2361
Asians	13-14	20.7 (18.2-23.5)	22.2 (20.6-24.1)	40.8 (34.8-48.8)	114 (83.2-152)	175 (125-233)	772
Asians	15-16	21.8 (18.8-25.1)	23.9 (21.6-25.4)	39.9 (33.7-49.3)	132 (100-148)	196 (163-229)	775

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 2.99 and 2.99 respectively.

<LOD means less than the limit of detection, which may vary for some chemicals by year and by individual sample.

* Not calculated: proportion of results below limit of detection was too high to provide a valid result.

Sex hormone-binding globulin (SHBG) (2013 - 2016)

Geometric mean and selected percentiles of serum concentrations (in nmol/L) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	50.6 (49.1-52.2)	48.8 (47.4-50.4)	77.7 (74.6-80.9)	120 (114-128)	160 (149-171)	6578
Total population	15-16	52.2 (49.8-54.7)	50.9 (47.6-53.8)	79.9 (74.9-84.5)	123 (113-131)	163 (150-173)	6959
Age 6-11 years	13-14	81.0 (73.7-89.1)	91.7 (80.5-101)	126 (119-135)	161 (151-169)	175 (169-185)	868
Age 6-11 years	15-16	84.7 (79.1-90.6)	90.3 (84.1-97.3)	132 (120-140)	163 (153-176)	180 (167-192)	920
Age 12-19 years	13-14	41.9 (39.5-44.3)	41.9 (38.7-45.2)	61.1 (56.7-66.9)	91.1 (83.7-98.8)	111 (101-141)	1058
Age 12-19 years	15-16	44.9 (42.1-47.9)	42.8 (39.9-46.3)	68.7 (63.2-74.9)	105 (93.5-126)	138 (110-195)	1070
Age 20+ years	13-14	49.8 (48.4-51.3)	47.7 (46.5-49.1)	75.1 (71.9-78.3)	116 (109-124)	159 (142-174)	4652
Age 20+ years	15-16	51.2 (48.7-53.9)	49.8 (46.4-53.2)	76.8 (70.7-81.3)	115 (106-125)	159 (143-175)	4969
Males	13-14	38.9 (37.7-40.1)	37.8 (36.4-39.6)	54.8 (52.8-56.7)	79.3 (75.1-84.0)	109 (98.7-117)	3189
Males	15-16	41.0 (39.2-42.8)	39.8 (37.7-42.4)	59.2 (56.1-62.9)	85.3 (80.6-94.2)	110 (104-118)	3390
Females	13-14	64.8 (62.0-67.8)	64.1 (60.8-67.8)	97.9 (93.4-104)	151 (135-164)	187 (177-199)	3389
Females	15-16	65.8 (62.4-69.4)	63.9 (60.3-67.9)	96.3 (90.6-104)	151 (139-165)	193 (180-209)	3569
Mexican Americans	13-14	41.9 (40.6-43.2)	40.4 (38.5-43.0)	63.4 (59.6-68.3)	96.2 (89.0-103)	133 (110-141)	1089
Mexican Americans	15-16	43.6 (41.0-46.3)	41.1 (38.5-44.3)	65.3 (62.0-69.6)	102 (92.1-111)	135 (120-150)	1391
Non-Hispanic blacks	13-14	52.5 (50.4-54.6)	49.9 (48.2-51.9)	76.6 (71.7-81.3)	117 (106-131)	151 (135-180)	1366
Non-Hispanic blacks	15-16	53.2 (51.8-54.6)	51.5 (49.2-53.2)	81.1 (77.2-84.1)	117 (110-124)	153 (142-165)	1406
Non-Hispanic whites	13-14	53.3 (51.6-55.1)	51.3 (49.7-53.0)	82.0 (78.9-86.1)	128 (119-138)	170 (158-181)	2533
Non-Hispanic whites	15-16	55.2 (52.3-58.2)	54.2 (50.4-58.1)	83.4 (77.4-90.1)	129 (117-140)	170 (153-183)	2136
All Hispanics	13-14	42.5 (41.2-44.0)	41.1 (38.9-43.4)	64.4 (60.7-68.7)	96.5 (90.9-102)	131 (114-141)	1712
All Hispanics	15-16	44.5 (42.5-46.5)	42.0 (40.3-44.3)	67.9 (64.4-71.8)	106 (99.2-112)	140 (128-154)	2346
Asians	13-14	44.3 (42.0-46.7)	43.4 (40.0-47.3)	69.0 (63.5-74.1)	105 (97.1-115)	139 (119-154)	712
Asians	15-16	46.4 (44.0-48.8)	43.6 (41.1-46.8)	70.6 (65.3-77.1)	113 (101-122)	152 (132-173)	776

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.800 and 0.800 respectively.

Total Testosterone (2013 - 2016)

CAS Number 58-22-0

Geometric mean and selected percentiles of serum concentrations (in ng/dL) for the U.S. population from the National Health and Nutrition Examination Survey.

Demographic Categories	Survey (years)	Geometric mean (95% CI)	50th Percentile (95% CI)	75th Percentile (95% CI)	90th Percentile (95% CI)	95th Percentile (95% CI)	Sample size
Total population	13-14	66.5 (63.9-69.2)	41.4 (38.6-46.2)	365 (356-373)	523 (514-532)	623 (609-639)	7559
Total population	15-16	69.4 (66.0-72.9)	40.5 (37.4-47.0)	369 (356-386)	541 (517-569)	661 (641-684)	7207
Age 6-11 years	13-14	4.72 (4.23-5.27)	4.26 (3.76-4.77)	7.77 (6.91-9.22)	17.5 (13.7-21.6)	34.0 (20.9-40.9)	1034
Age 6-11 years	15-16	4.76 (4.38-5.19)	4.03 (3.89-4.33)	7.65 (6.84-8.71)	17.6 (15.5-19.8)	32.1 (22.6-43.7)	972
Age 12-19 years	13-14	82.8 (75.9-90.3)	51.3 (41.9-71.6)	380 (358-399)	550 (505-597)	650 (596-688)	1220
Age 12-19 years	15-16	89.9 (83.1-97.1)	58.5 (45.2-106)	380 (358-406)	569 (526-588)	663 (619-704)	1101
Age 20+ years	13-14	81.6 (78.4-85.0)	63.0 (51.4-94.6)	380 (368-392)	530 (520-545)	631 (612-647)	5305
Age 20+ years	15-16	83.6 (79.9-87.5)	63.5 (47.5-107)	388 (370-401)	550 (522-581)	673 (646-699)	5134
Males	13-14	257 (246-270)	369 (360-379)	497 (484-507)	628 (612-642)	712 (694-733)	3682
Males	15-16	271 (254-289)	374 (360-390)	510 (489-527)	666 (642-688)	767 (736-795)	3523
Females	13-14	18.3 (17.5-19.1)	19.3 (18.4-20.3)	29.0 (27.5-30.8)	41.6 (39.6-43.4)	54.2 (51.0-56.2)	3877
Females	15-16	18.8 (18.1-19.6)	19.9 (19.0-20.6)	28.4 (27.4-29.4)	40.1 (37.6-42.5)	53.1 (44.8-63.5)	3684
Mexican Americans	13-14	61.4 (56.7-66.6)	35.6 (31.0-43.4)	367 (343-381)	527 (491-549)	599 (574-636)	1264
Mexican Americans	15-16	62.9 (55.5-71.2)	37.1 (31.4-62.0)	361 (330-392)	506 (467-567)	648 (576-695)	1409
Non-Hispanic blacks	13-14	65.1 (61.6-68.8)	41.0 (36.7-49.2)	361 (336-389)	548 (518-575)	652 (614-694)	1588
Non-Hispanic blacks	15-16	64.3 (56.9-72.6)	35.6 (31.5-44.0)	371 (331-401)	576 (527-643)	722 (669-793)	1493
Non-Hispanic whites	13-14	68.5 (64.5-72.8)	43.4 (37.9-53.3)	366 (350-380)	516 (503-527)	621 (598-639)	2914
Non-Hispanic whites	15-16	72.5 (66.8-78.6)	41.8 (36.7-63.5)	375 (356-394)	544 (513-580)	658 (620-692)	2243
All Hispanics	13-14	61.7 (57.3-66.4)	37.3 (32.6-43.8)	364 (343-379)	532 (510-555)	609 (580-640)	1962
All Hispanics	15-16	62.0 (57.6-66.7)	36.5 (33.6-41.7)	358 (342-375)	509 (471-562)	629 (567-682)	2380
Asians	13-14	62.0 (56.1-68.6)	32.4 (28.3-41.6)	355 (322-385)	511 (461-539)	588 (535-632)	801
Asians	15-16	67.6 (59.5-76.7)	39.2 (30.4-63.4)	361 (339-391)	538 (503-576)	637 (593-699)	782

Limit of detection (LOD, see Data Analysis section) for Survey year 13-14 and 15-16 are 0.750 and 0.750 respectively.

Appendices

Appendix A. Procedure to Estimate Percentiles

Includes procedures for percentiles whose estimate falls on a value that is repeated multiple times in the dataset

A common practice to calculate confidence intervals from survey data is to use large-sample normal approximations. Ninety-five percent confidence intervals on point estimates of percentiles are often computed by adding and subtracting from the point estimate a quantity equal to twice its standard error. This normal approximation method may not be adequate, however, when estimating the proportion of subjects above or below a selected value, especially when the proportion is near 0.0 or 1.0 or when the effective sample size is small. In addition, confidence intervals on proportions deviating from 0.5 are not theoretically expected to be symmetric around the point estimate. Further, adding and subtracting a multiple of the standard error to an estimate near 0.0 or 1.0 can lead to impossible confidence limits (i.e., proportion estimates below 0.0 or above 1.0). The approach used for the *Report* data tables (and for previous *Reports*) produces asymmetric confidence intervals consistent with skewed (non-normal) biologic data distributions.

The method we use to estimate percentiles and their confidence limits for the *Report* data tables and for previous reports is adapted from a method proposed by Woodruff (1952) for percentile estimation and a method described by Korn and Graubard (1998) for estimating confidence intervals for proportions. This method involves first obtaining an empirical point estimate of the desired percentile by creating a rank ordered listing of the sampled observations along with their sampling weights. From this listing and the sampling weights, it is possible to determine an empirical percentile estimate for the target population. After this point estimate of the percentile has been obtained, the fraction of results below the estimate is calculated. The fraction below the point estimate should be very close to the proportion corresponding to the desired percentile, but can deviate from this proportion depending on the frequency of non-unique sampled observations in the vicinity of the empirical percentile estimate and depending on the sampling weight associated with the sampled observation.

For example, when measuring some compounds as part of NHANES there may be multiple results below a common limit of detection (LOD) or multiple results with identical measured values due to the reporting limitations of the instrument. This phenomenon coupled with the sampling weight assigned to each measured result can lead to difficulties in accurately estimating some percentiles and their corresponding confidence limits because an exact percentile may fall within a large group of results with identical measured values. We circumvented this potential problem for the *Report* data tables by adding a unique, negligibly small number to each measured result. This small number was later subtracted from the percentile estimate without affecting the percentile estimate and without altering any of the original measured results.

By adding a unique, negligibly small number to each sampled observation, it was possible to associate a single sampled observation with the percentile estimate and thus to minimize the difference between the fraction below the point estimate and the proportion corresponding to the desired percentile. However, due to sample weighting, it is still possible to obtain a different point estimate (which will only differ by the difference between numerically adjacent analyte values) depending on how the data are sorted before adding the unique number to each result. We circumvented this potential problem by replacing actual sample weights with an average sample weight where the average is computed across subjects in the same

demographic domain who have identical measured results. We computed standard error estimates in a separate step using the original (unaltered) data. Clopper-Pearson 95% confidence intervals around the estimated proportion are obtained using the method described by Korn and Graubard (1998).

We describe below how SAS Proc Univariate and SUDAAN can be used to carry out this method of percentile and confidence interval estimation. SAS code for calculating these confidence intervals can be downloaded from https://www.cdc.gov/exposurereport/. In the narrative that follows, the term 'demographic domain' refers to a demographic group of interest, for example non-Hispanic blacks. The term 'set of subsample weights' refers to the sampling weights that correspond to the variable for which percentiles will be estimated, for example the set of subsample weights associated with total blood mercury measurements. The term 'analyte' refers to the biological or chemical compound measured in a group of subjects and for which percentiles are to be estimated.

Procedure to calculate percentile estimates and their confidence intervals

Step 1: Obtain a percentile estimate using the original (unaltered data):

Create a separate file with original data (ORIG_DATA). Use SAS (SAS Institute Inc. 1999) Proc Univariate (with default percentile definition equivalent to option PCTLDEF = 5 and with the Freq option variable equal to the original subsample sampling weight) to obtain a point estimate of the percentile (PTLE_ORIG) of an analyte's original results for the demographic domain of interest, for example, the 95th percentile of total blood mercury results for adults aged 20+ years.

Step 2: Obtain a percentile estimate using the altered data:

Create a separate file for use with altered data (ALTR_DATA). Sort the data by analyte measured value separately for each demographic domain and set of subsample weights. Use SAS Proc Means to compute the average sampling weight (WT_{AVE}) for each unique measured result. For each unique measured result, use a counter from 1 to the total number of subjects with identical values to create a unique integer to associate with each measured observation. Each of these numbers should then be divided by 1,000,000,000 and added to the corresponding measured observation. This will result in each measured observation having an additional fractional amount beyond the fourth decimal as long as there are less than 10,000 subjects with the same measured result. Use SAS Proc Univariate (again with default percentile definition equivalent to option PCTLDEF = 5 but now with the Freq option variable equal to WT_{AVE}) to obtain a point estimate of the percentile (PTLE_ALTR) of an analyte's altered results for the demographic domain of interest.

Step 3: Sort the data in the ORIG_DATA file by the stratum (sdmvstra) and primary sampling unit (sdmvpsu) variables. Use SUDAAN (SUDAAN User's Manual, 2001) Proc Descript with Taylor Linearization DESIGN = WR (i.e., sampling with replacement), with proper NEST statement, and with the original subsample sampling weight variable to estimate the proportion (P_ORIG) of subjects with results below the percentile estimate (PTLE_ORIG) obtained in Step 1 and discard P_ORIG but retain the standard error (SEMEAN_ORIG) associated with PTLE_ORIG.

Step 4: Sort the data in the ALTR_DATA file by the stratum (sdmvstra) and primary sampling unit (sdmvpsu) variables. Use SUDAAN (SUDAAN User's Manual, 2001) Proc Descript with Taylor Linearization DESIGN = WR (i.e., sampling with replacement), with proper NEST statement, and with the average sampling weight variable (WT_AVE) to estimate the proportion (P_ALTR) of

subjects with results below the percentile estimate (PTLE_ALTR) obtained in Step 2 and keep P_ALTR but discard the standard error (SEMEAN_ALTR) associated with PTLE_ALTR. Compute the degrees-of-freedom adjusted effective sample size:

(1) $n_{df} = ((t_{num}/t_{denom})^2)P_ALTR(1 - P_ALTR)/(SEMEAN_ORIG^2)$

where t_{num} and t_{denom} are 0.975 critical values of the Student's t distribution with degrees of freedom equal to the actual sample size minus 1 and the number of primary sampling units (PSUs) minus the number of strata, respectively. Note: the degrees of freedom for t_{denom} can vary with the demographic domain of interest (e.g., males).

Step 5: After obtaining an estimate of P_ALTR (i.e., the proportion obtained in Step 4), compute the Clopper-Pearson 95% confidence interval ($P_L(x,n_{df})$, $P_U(x,n_{df})$) as follows:

(2) $P_L(x,n_{df}) = v_1F_{v1,v2}(0.025)/(v_2 + v_1F_{v1,v2}(0.025))$

&

$P_U(x,n_{df}) = v_3F_{v3,v4}(0.975)/(v_4 + v_3F_{v3,v4}(0.975))$

where x is equal to P_ALTR times n_{df}, $v_1 = 2x$, $v_2 = 2(n_{df} - x + 1)$, $v_3 = 2(x + 1)$, $v_4 = 2(n_{df} - x)$, and $F_{d1,d2}(\beta)$ is the β quantile of an F distribution with d_1 and d_2 degrees of freedom. (Note: If n_{df} is greater than the actual sample size or if P_ALTR is equal to zero, then the actual sample size should be used in place of n_{df}.) This step will produce a lower and an upper limit for the estimated proportion obtained in Step 4.

Step 6: Use SAS Proc Univariate (again with default percentile definition equivalent to option PCTLDEF = 5 and with the Freq option variable equal to WT_{AVE}) to determine the analyte values that correspond to the desired percentile (proportion) and to the lower and upper proportion limits obtained in Step 5. Round these results to 2 or 3 decimals depending on the significant figures associated with the original measured values.

Example:

To estimate the 95th percentile of total blood mercury in adults 20+ years of age in the 2013-2014 survey, create two separate files: name one ORIG_DATA and the other ALTR_DATA. For the ORIG_DATA file use SAS Proc Univariate with the Freq option and the subsample sampling weight (or in this case the full sample sampling weight because total blood mercury is the analyte of interest) to get a weighted point estimate of the analyte value that corresponds to the 95th percentile (PTLE_ORIG). For this example, the value is 4.88 µg/L.

Sort the results in the ALTR_DATA file by analyte measured value. Use SAS Proc Means to compute the average sampling weight (WT_{AVE}) for each unique analyte measured value. For each unique measured result, use a counter from 1 to the total number of subjects with identical values to create a unique integer to associate with each measured observation. Divide each counter value by 1,000,000,000 and add this amount to the corresponding measured observation. For this altered data file (ALTR_DATA) use SAS Proc Univariate with the Freq option and WT_AVE to get a weighted point estimate of the analyte value that corresponds to the 95th percentile (PTLE_ALTR). For this example, the value is also 4.88 µg/L.

For the ORIG_DATA file use SUDAAN to estimate the weighted proportion (P_ORIG) of subjects with results below the value of PTLE_ORIG (which can differ from 0.95 depending on the number of results with identical values; for this example the proportion is 0.9491) and the

standard error (SEMEAN_ORIG) associated with P_ORIG (for this example SEMEAN_ORIG = 0.0044).

For the ALTR_DATA file use SUDAAN to estimate the weighted proportion of subjects (P_ALTR) with results below the value of PTLE_ALTR (which should also be very close to 0.95 regardless of the number of original results with identical values; for this example the proportion is also 0.9491). Then obtain a confidence interval on P_ALTR by computing the weighted Clopper-Pearson 95% confidence limits (equation 2 above) using the degrees-of-freedom adjusted effective sample size as described in equation 1 above. For this example, the effective sample size is 2113.64 resulting in lower and upper confidence limits of 0.93885 and 0.95808, respectively. Then use SAS Proc Univariate (with the Freq option variable equal to WT_{AVE}) to determine the analyte values corresponding to the weighted 93.9^{th} and 95.8^{th} percentiles. These point estimates are the lower and upper confidence limits on the 95th percentile estimate. Round the 95th percentile estimate and its confidence limits to 2 or 3 decimals depending on the significant figures associated with the original measured values. For this example, the rounded point estimate is 4.88 µg/L with lower and upper confidence limits of 4.36 and 5.21 µg/L, respectively.

Appendix C. Limit of Detection Table

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The analytical limit of detection (LOD) for each of the different chemical measurements is presented in the table below. The LOD is the concentration at which the measurement has a 95% probability of being greater than zero (Taylor, 1987). As analytical methods improve, LODs will often change. For this reason, LOD values are reported by survey periods (e.g., 1999-2000, 2001-2002, etc.).

Adducts of Hemoglobin

Chemical, in packed red blood cells, pmol/g hemoglobin	2011-2012	2013-2014	2015-2016
Acrylamide	--	0.110	0.110
Formaldehyde	--	0.670	--
Glycidamide	--	0.660	0.660

Tobacco Alkaloids and Metabolites

Chemical, matrix, units	2011-2012	2013-2014	2015-2016
Anabasine, Total in urine, µg/L	--	0.510	0.510
Anatabine, Total in urine, µg/L	--	0.390	0.390
Cotinine in serum, ng/mL	0.015	0.015	0.015
Cotinine, Total in urine, µg/L	--	0.030	0.030
Cotinine-N-Oxide, Total in urine, µg/L	--	2.02	2.02
trans-3'-Hydroxycotinine in serum, ng/mL	--	0.015	0.015
trans-3'-Hydroxycotinine, Total in urine, µg/L	--	0.030	0.030
1-(3-Pyridyl)-1-butanol-4-carboxylic acid in urine, µg/L	--	--	1.38
Nicotine, Total in urine, µg/L	--	10.5	10.5
Nicotine-N'-Oxide, Total in urine, µg/L	--	2.50	2.50
Nornicotine, Total in urine, µg/L	--	2.50	2.50

Tobacco-Specific Nitrosamines (TSNAs)

Chemical, in urine, pg/mL	2011-2012	2013-2014	2015-2016
N'-Nitrosoanabasine (NAB)	--	1.60	--
N'-Nitrosoanatabine (NAT)	--	4.20	--
N'-Nitrosonornicotine (NNN)	--	2.80	--
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL), Total	0.600	0.600	--

Volatile N-Nitrosamines (VNAs)

Chemical, in urine, ng/L	2011-2012	2013-2014	2015-2016
N-Nitrosodiethylamine (NDEA)	--	5.02	--
N-Nitrosoethylmethylamine (NMEA)	--	3.64	--
N-Nitrosomorpholine (NMOR)	--	7.84	--
N-Nitrosopiperidine (NPIP)	--	5.08	--
N-Nitrosopyrrolidine (NPYR)	--	8.15	--

Disinfection By-Products

Chemical, in blood, pg/mL	2011-2012	2013-2014	2015-2016
Bromodichloromethane	0.620	6.00	6.00
Dibromochloromethane	0.620	5.00	5.00
Tribromomethane (Bromoform)	1.00	8.00	8.00
Trichloromethane (Chloroform)	2.10	8.00	8.00

Personal Care and Consumer Product Chemicals and Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Benzophenone-3	0.400	0.400	0.400
Bisphenol A	0.400	0.200	0.200
Bisphenol F	--	0.200	0.200
Bisphenol S	--	0.100	0.100
Triclocarban	--	0.100	0.100
Triclosan	2.30	1.70	1.70
Butyl paraben	0.200	0.100	0.100
Ethyl paraben	1.00	1.00	1.00
Methyl paraben	1.00	1.00	1.00
n-Propyl paraben	0.200	0.100	0.100
2,4-Dichlorophenol	0.200	0.100	0.100
2,5-Dichlorophenol	0.200	0.100	0.100

Flame Retardant Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Bis(1-chloro-2-propyl) phosphate (BCPP)	0.100	0.100	--
Bis(2-chloroethyl) phosphate (BCEtP)	0.100	0.080	--
Bis(1,3-dichloro-2-propyl) phosphate (BDCPP)	0.100	0.110	--
Dibenzyl phosphate (DBzP)	0.050	0.050	--
Dibutyl phosphate (DBuP)	0.100	0.050	--
Di-o-cresylphosphate (DoCP)	--	0.050	--
Di-p-cresylphosphate (DpCP)	--	0.050	--
Dicresyl phosphates (DCP)	0.500	--	--
Diphenyl phosphate (DPhP)	0.100	0.160	--
2,3,4,5-Tetrabromobenzoic acid (TBBA)	0.050	0.050	--

Herbicides

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
2,4-Dichlorophenoxyacetic acid	0.150	0.150	--

Insect Repellent and Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
N,N-Diethyl-meta-toluamide (DEET)	0.083	0.083	--
3-(Diethylcarbamoyl) benzoic acid (DCBA)	0.475	0.475	0.200
3-(Ethylcarbamoyl)benzoic acid (ECBA)	--	--	0.200
N,N-Diethyl-3-(hydroxymethyl) benzamide (DHMB)	0.089	0.089	--

Neonicotinoid Insecticides

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Acetamiprid	--	--	0.300
Clothianidin	--	--	0.200
N-Desmethylacetamiprid	--	--	0.200
5-Hydroxyimidacloprid	--	--	0.400
Imidacloprid	--	--	0.400
Thiacloprid	--	--	0.030

Organophosphorus Insecticides: Specific Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
2-Isopropyl-4-methyl-6-hydroxypyrimidine (IMPY)	0.100	0.100	--
para-Nitrophenol	0.100	0.100	--

Organophosphorus Insecticides: Dialkyl Phosphate Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Diethylphosphate (DEP)	0.370	--	--
Dimethylphosphate (DMP)	0.470	--	--
Diethylthiophosphate (DETP)	0.560	--	--
Dimethylthiophosphate (DMTP)	0.550	--	--
Diethyldithiophosphate (DEDTP)	0.390	--	--
Dimethyldithiophosphate (DMDTP)	0.510	--	--

Pyrethroid Insecticide Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
trans-3-(2,2-Dichlorovinyl)-2,2-dimethylcyclopropane carboxylic acid	0.600	0.600	--
4-Fluoro-3-phenoxy-benzoic acid	0.100	0.100	--
3-Phenoxybenzoic acid	0.100	0.100	--

Metals and Metalloids

Chemical, matrix, units	2011-2012	2013-2014	2015-2016
Antimony in urine, µg/L	0.041	0.022	0.022
Arsenic, Total in urine, µg/L	1.250	0.260	0.260
Arsenic (V) Acid in urine, µg As/L	0.870	0.790	0.790

Chemical, matrix, units	2011-2012	2013-2014	2015-2016
Arsenobetaine in urine, µg As/L	1.19	1.16	1.16
Arsenocholine in urine, µg As/L	0.280	0.110	0.110
Arsenous (III) Acid in urine, µg As/L	0.480	0.120	0.120
Dimethylarsinic Acid in urine, µg As/L	1.80	1.91	1.91
Monomethylarsonic Acid in urine, µg As/L	0.890	0.200	0.200
Inorganic-related Arsenic Species, in urine, µg As/g	4.04	3.02	3.02
Trimethylarsine oxide in urine, µg As/L	0.250	--	--
Barium in urine, µg/L	0.100	0.060	0.060
Cadmium in blood, µg/L	0.160	0.100	0.100
Cadmium in urine, µg/L	0.056	0.036	0.036
Cesium in urine, µg/L	0.120	0.086	0.086
Chromium in blood, µg/L	--	--	0.410
Cobalt in blood, µg/L	--	--	0.60
Cobalt in urine, µg/L	0.048	0.023	0.023
Copper in serum, µg/dL	2.50	2.50	2.50
Lead in blood, µg/dL	0.250	0.070	0.070
Lead in urine, µg/L	0.080	0.030	0.030
Manganese in blood, µg/L	1.060	0.990	0.990
Manganese in urine, µg/L	0.080	0.130	0.130
Mercury, Total in blood, µg/L	0.160	0.280	0.280
Mercury, Inorganic in blood, µg/L	0.270	0.270	0.270
Mercury, Ethyl in blood, µg/L	0.160	0.160	0.160
Mercury, Methyl in blood, µg/L	0.120	0.120	0.120
Mercury in urine, µg/L	0.050	0.130	0.130
Molybdenum in urine, µg/L	0.990	0.800	0.800
Selenium in blood, µg/L	30.0	24.5	24.5
Selenium in serum, µg/L	4.50	4.50	4.50
Strontium in urine, µg/L	2.50	2.34	2.34
Thallium in urine, µg/L	0.020	0.018	0.018
Tin in urine, µg/L	0.220	0.090	0.090
Tungsten in urine, µg/L	0.026	0.018	0.018
Uranium in urine, µg/L	0.003	0.002	0.002
Zinc in serum, µg/dL	2.90	2.90	2.90

Perchlorate and Other Anions

Chemical, in urine, units	2011-2012	2013-2014	2015-2016
Nitrate, mg/L	0.700	0.700	0.700
Perchlorate, µg/L	0.050	0.050	0.050
Thiocyanate, mg/L	0.020	0.020	0.020

Perfluoroalkyl and Polyfluoroalkyl Substances: Surfactants

Chemical, in serum, µg/L	2011-2012	2013-2014	2015-2016
Perfluorobutane sulfonic acid (PFBS)	0.100	0.100	--
Perfluorodecanoic acid (PFDA)	0.100	0.100	0.100
Perfluorododecanoic acid (PFDoDa)	0.100	0.100	0.100
Perfluoroheptanoic acid (PFHpA)	0.100	0.100	--
Perfluorohexane sulfonic acid (PFHxS)	0.100	0.100	0.100
Perfluorononanoic acid (PFNA)	0.082	0.100	0.100

Chemical, in serum, µg/L	2011-2012	2013-2014	2015-2016
Perfluorooctanoic acid (PFOA)	0.100	0.100	0.100
n-Perfluorooctanoic acid (n-PFOA)	--	0.100	0.100
Branched Perfluorooctanoic acid isomers (Sb-PFOA)	--	0.100	0.100
Perfluorooctane sulfonic acid (PFOS)	0.200	0.200	0.200
n-Perfluorooctane sulfonic acid (n-PFOS)	--	0.100	0.100
Perfluoromethylheptane sulfonic acid isomers (Sm-PFOS)	--	0.100	0.100
Perfluorooctane sulfonamide (PFOSA or FOSA)	0.100	0.100	--
2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid (EtFOSAA)	0.100	0.100	--
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-A)	0.087	0.100	0.100
Perfluoroundecanoic acid (PUFA or PFUnDA)	0.100	0.100	0.100

Perfluoroalkyl and Polyfluoroalkyl Substances: Urine

Chemical, in serum, µg/L	2011-2012	2013-2014	2015-2016
Perfluorobutanoic acid (PFBA)	--	0.100	--
Perfluorobutane sulfonic acid (PFBS)	--	0.100	--
Perfluorodecanoic acid (PFDA)	--	0.100	--
Perfluoroheptane sulfonic acid (PFHpS)	--	0.100	--
Perfluoroheptanoic acid (PFHpA)	--	0.100	--
Perfluorohexane sulfonic acid (PFHxS)	--	0.100	--
Perfluorohexanoic acid (PFHxA)	--	0.100	--
Perfluorononanoic acid (PFNA)	--	0.100	--
n-Perfluorooctanoic acid (n-PFOA)	--	0.100	--
Branched Perfluorooctanoic acid isomers (Sb-PFOA)	--	0.100	--
n-Perfluorooctane sulfonic acid (n-PFOS)	--	0.100	--
Branched Perfluoromethylheptane sulfonic acid isomers (Sm-PFOS)	--	0.100	--
Perfluoropentanoic acid (PFPeA)	--	0.100	--
Perfluoroundecanoic acid (PFUnDA)	--	0.100	--
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	--	0.100	--
Adona (ammonium salt of 4,8-dioxa-3H-perfluorononanoic acid)	--	0.100	--
GenX (ammonium salt of 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (HFPO-DA))	--	0.100	--

Phthalate and Phthalate Alternatives Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Mono-benzyl phthalate (MBzP)	0.300	0.300	0.300
Mono-3-hydroxybutyl phthalate (MHBP)	--	0.400	0.400
Mono-n-butyl phthalate (MnBP)	0.400	0.400	0.400
Mono-isobutyl phthalate (MiBP)	0.200	0.800	0.800
Mono-2-methyl-2-hydroxypropyl phthalate (MHiBP)	--	0.400	0.400
Mono-ethyl phthalate (MEP)	0.600	1.20	1.20
Mono-2-ethylhexyl phthalate (MEHP)	0.500	0.800	0.800
Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)	0.200	0.400	0.400
Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)	0.200	0.200	0.200
Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)	0.200	0.400	0.400
Mono-(carboxynonyl) phthalate (MCNP)	0.200	0.200	0.200
Mono-isononyl phthalate (MiNP)	0.600	0.900	0.900
Mono-oxoisononyl phthalate (MONP)	--	--	0.400
Mono-(carboxyoctyl) phthalate (MCOP)	0.200	0.300	0.300

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Mono-methyl phthalate (MMP)	0.500	--	--
Mono-(3-carboxypropyl) phthalate (MCPP)	0.200	0.400	0.400
Cyclohexane-1,2-dicarboxylic acid mono hydroxyisononyl ester (MHNCH)	0.400	0.400	0.400
Cyclohexane-1,2-dicarboxylic acid mono carboxyisooctyl ester (MCOCH)	--	--	0.500
Mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP)	--	--	0.200
Mono-2-ethyl-5-hydroxyhexyl terephthalate (MEHHTP)	--	--	0.400

Polycyclic Aromatic Hydrocarbon Metabolites

Chemical, in urine, units	2011-2012	2013-2014	2015-2016
2-Hydroxyfluorene, ng/L	10.0	8.00	--
3-Hydroxyfluorene, ng/L	10.0	8.00	--
9-Hydroxyfluorene, ng/L	10.0	--	--
1-Hydroxyphenanthrene, ng/L	10.0	9.00	--
2-Hydroxyphenanthrene, ng/L	10.0	--	--
3-Hydroxyphenanthrene, ng/L	10.0	--	--
2- & 3-Hydroxyphenanthrene, ng/L	--	10.0	--
4-Hydroxyphenanthrene, ng/L	10.0	--	--
1-Hydroxypyrene, ng/L	10.0	70.0	--
1-Hydroxynaphthalene (1-Naphthol), µg/L	0.044	0.060	--
2-Hydroxynaphthalene (2-Naphthol), µg/L	0.042	0.090	--

Heterocyclic Amines

Chemical, in urine, ng/L	2011-2012	2013-2014	2015-2016
3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole (Trp-P-1)	--	0.790	--
2-Amino-3-methyl-9H-pyriodo[2,3-b]indole (MeA-α-C)	--	0.330	--
2-Amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (Ph1P)	--	0.340	--
2-Amino-9H-pyrido[2,3-b]indole (A-α-C)	--	0.620	--
2-Amino-3-methylimidazo[4,5-f]quinoline (IQ)	--	0.370	--
2-Amino-6-methyldipyrido[1,2-a:3',2'-d]imidazole (Glu-P1)	--	0.310	--
2-Aminodipyrido[1,2-a:3',2'-d] imidazole (GLU-P2)	--	0.830	--
1-Methyl-9H-pyrido[3,4-b]indole (Harman)	--	4.59	--
1-Methyl-3-amino-5H-pyrido[4,3-b]indole (Trp-P-2)	--	0.630	--
9H-pyrido[3,4-b]indole (Norharman)	--	12.6	--

Volatile Organic Compounds (VOCs)

Chemical, in whole blood, ng/mL except as noted	2011-2012	2013-2014	2015-2016
1,1,1-Trichloroethane (Methyl chloroform)	0.010	0.010	0.010
1,1,1,2-Tetrachloroethane	0.040	0.040	0.040
1,1,2,2-Tetrachloroethane	0.010	--	--
1,1,2-Trichloroethane	0.010	--	--
trans-1,2-Trichloroethylene	0.010	--	--
1,2,3-Trichloropropane	0.040	0.040	0.040
1,1-Dichloroethane	0.010	--	--
1,1-Dichloroethene (Vinylidene chloride; 1,1-Dichloroethylene)	0.009	--	--
1,2-Dibromoethane	0.015	0.015	0.015
1,2-Dichlorobenzene (o-Dichlorobenzene)	0.025	0.025	0.025
1,2-Dichloroethane (Ethylene dichloride)	0.010	0.010	0.010
cis-1,2-Dichloroethene (cis-1,2-Dichloroethylene)	0.010	--	--
trans-1,2-Dichloroethene	0.010	--	--
1,2-Dichloropropane	0.010	--	--
1,3-Dichlorobenzene	0.025	0.025	0.025
1,4-Dichlorobenzene (Paradichlorobenzene)	0.040	0.040	0.040
1,4-Dioxane	0.500	0.500	0.500
2,5-Dimethylfuran	0.011	0.011	0.011
Benzene	0.024	0.024	0.024
Benzonitrile	--	--	0.150
Chlorobenzene	0.011	0.011	0.011
Chloroethane	--	0.045	0.045
Cyclohexane	--	0.020	0.020
Dibromomethane	0.030	--	--
Dichloromethane (Methylene chloride)	0.250	0.250	0.250
Diethyl ether	--	0.040	0.040
Ethyl acetate	--	0.158	0.158
Ethylbenzene	0.024	0.024	0.024
Furan	0.025	0.025	0.025
Heptane	--	0.100	0.100
Hexachloroethane	0.011	--	--
Hexane	0.122	0.122	0.122
Isobutyronitrile	--	--	0.040
Isopropylbenzene (Cumene)	0.040	0.040	0.040
Methyl-tert-butyl ether (MTBE), pg/mL	1.40	10.0	10.0
Methylcyclopentane	--	0.020	0.020
Nitrobenzene	0.320	0.320	0.320
Nitromethane, pg/mL	65.0	--	--
Octane	--	0.100	0.100
Tetrachloroethene (Perchloroethylene)	0.048	0.048	0.048
Tetrachloromethane (Carbon tetrachloride)	0.005	0.005	0.005
Tetrahydrofuran	--	0.125	0.125
Toluene	--	0.025	0.025
Trichloroethene (Trichloroethylene)	0.012	0.012	0.012
ααα-Trifluorotoluene	--	0.040	0.040
Vinyl Bromide	--	0.045	0.045
m-/p-Xylene	0.034	0.034	0.034
o-Xylene	0.024	0.024	0.024

Volatile Organic Compound (VOC) Metabolites

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
N-Acetyl-S-(2-carboxyethyl)-L-cysteine	6.96	6.96	6.96
N-Acetyl-S-(3-hydroxypropyl)-L-cysteine	13.0	13.0	13.0
N-Acetyl-S-(2-carbamoylethyl)-L-cysteine	2.20	2.20	2.20
N-Acetyl-S-(2-carbamoyl-2-hydroxyethyl)-L-cysteine	9.40	9.40	9.40
N-Acetyl-S-(1-cyano-2-hydroxyethyl)-L-cysteine	--	--	2.60
N-Acetyl-S-(2-cyanoethyl)-L-cysteine	0.500	0.500	0.500
N-Acetyl-S-(2-hydroxyethyl)-L-cysteine	0.791	0.791	0.791
N-Acetyl-S-(phenyl)-L-cysteine	0.600	0.600	0.600
N-Acetyl-S-(n-propyl)-L-cysteine	1.20	1.20	1.20
N-Acetyl-S-(3,4-dihydroxybutyl)-L-cysteine	5.25	5.25	5.25
N-Acetyl-S-(1-hydroxymethyl-2-propenyl)-L-cysteine	0.700	0.700	0.700
N-Acetyl-S-(2-hydroxy-3-butenyl)-L-cysteine	0.700	0.700	0.700
N-Acetyl-S-(2-hydroxy-3-methyl-3-buten-1-yl)-L-cysteine + N-Acetyl-S-[1-(hydroxymethyl)-2-methyl-2-propen-1-yl]-L-cysteine	--	--	1.43
N-Acetyl-S-(4-hydroxy-2-butenyl)-L-cysteine	0.600	0.600	0.600
N-Acetyl-S-(4-hydroxy-2-methyl-2 buten-1-yl)-L-cysteine	--	--	1.20
2-Thioxothiazolidine-4 carboxylic acid	11.2	11.2	11.2
N-Acetyl-S-(3-hydroxypropyl-1-methyl)-L-cysteine	2.00	3.00	3.00
2-Aminothiazoline-4-carboxylic acid	15.0	15.0	15.0
N-Acetyl-S-(N-methylcarbamoyl)-L-cysteine	6.26	6.26	6.26
Phenylglyoxylic acid	12.0	12.0	12.0
N-Acetyl-S-(2-hydroxypropyl)-L-cysteine	5.30	5.30	5.30
N-Acetyl-S-(1-phenyl-2-hydroxyethyl)-L-cysteine + N-Acetyl-S-(2-phenyl-2-hydroxyethyl)-L-cysteine	0.700	0.700	0.700
N-Acetyl-S-(phenyl-2-hydroxyethyl)-L-cysteine	0.700	0.700	0.700
Mandelic acid	12.0	12.0	12.0
N-Acetyl-S-(trichlorovinyl)-L-cysteine	3.00	3.00	3.00
N-Acetyl-S-(benzyl)-L-cysteine	0.500	0.500	0.500
N-Acetyl-S-(1,2-dichlorovinyl)-L-cysteine	12.6	12.6	12.6
N-Acetyl-S-(2,2-dichlorovinyl)-L-cysteine	4.70	4.70	13.9
N-Acetyl-S-(dimethylphenyl)-L-cysteine	0.500	0.500	0.500
2-Methylhippuric acid	5.00	5.00	5.00
3- & 4-Methylhippuric acid	8.00	8.00	8.00

Aldehydes

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
Benzaldehyde	--	0.461	--
Butyraldehyde	--	0.313	--
Crotonaldehyde	--	0.147	--
Decanaldehyde	--	3.90	--
Heptanaldehyde	--	0.312	--
Hexanaldehyde	--	0.693	--
Isopentanaldehyde	--	0.119	--
Nonanaldehyde	--	2.63	--
Octanaldehyde	--	0.660	--
Pentanaldehyde	--	0.316	--
Propanaldehyde	--	1.16	--
o-Tolualdehyde	--	0.142	--

Aromatic Amines

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
4-Aminobiphenyl	--	1.75	--
1-Aminonaphthalene	--	1.29	--
2-Aminonaphthalene	--	2.79	--
o-Anisidine	--	7.02	--
2,6-Dimethylaniline	--	15.7	--
o-Toluidine	--	111	--

Aromatic Diamines

Chemical, in urine, µg/L	2011-2012	2013-2014	2015-2016
4,4'-Diaminodiphenylmethane (4MDA)	--	--	0.048
1,5-Diaminonaphthalene (5NDA)	--	--	1.00
2,4-Diaminotoluene (4TDA)	--	--	0.640
2,6-Diaminotoluene (6TDA)	--	--	0.640
p-Phenylenediamine (PPDA)	--	--	2.00

Sex Steroid Hormones and Binding Protein

Chemical, in urine, units	2011-2012	2013-2014	2015-2016
Estradiol, Total, pg/mL	--	2.99	2.99
Sex hormone-binding globulin (SHBG), nmol/L	--	0.800	0.800
Testosterone, Total, ng/dL	--	0.750	0.750

Appendix D. References for Biomonitoring Analytical Methods

Adducts of Hemoglobin

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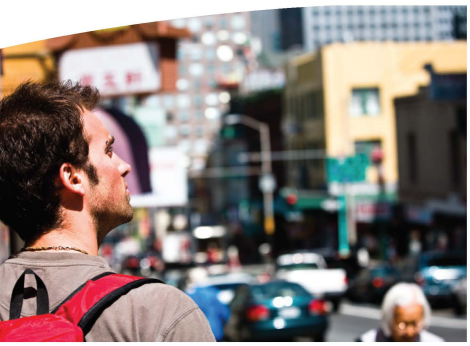

Centers for Disease Control and Prevention
National Center for Environmental Health
Division of Laboratory Sciences
Mail Stop F-20
4770 Buford Highway, NE
Atlanta, GA 30341-3724

Telephone: (toll free) 1-800-CDC-INFO (1-800-232-4636)
Email: CDCINFO@cdc.gov
Website: https://www.cdc.gov/exposurereport

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