**Exposure to Organophosphate Flame Retardant Chemicals in the U.S. General Population: Data from the 2013-2014 National Health and Nutrition Examination Survey**

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**SUPPLEMENTAL INFORMATION**

Table S1. Geometric mean and selected percentiles of dibenzyl phosphate (DBzP) concentrations in urine (in µg/L first row and in µg/g creatinine second row) for the U.S. population six years of age and older. Data from the National Health and Nutrition Examination Survey 2013-2014.

|  |  |  |
| --- | --- | --- |
|  | ***Geometric mean*** | ***Selected percentile (95% CI)*** | ***N*** |
|  | ***(95% CI)*** | ***50th*** | ***75th*** | ***90th*** | ***95th*** |  |
| ***Total*** | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *2666* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *2666* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| ***Age group*** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *6-11 years* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *421* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *421* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *12-19 years* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *427* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *427* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *20-59 years* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1266* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1266* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *60 years and older* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *552* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *552* |
| ***Gender*** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *Males* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1344* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1344* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *Females* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1322* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1322* |
| ***Race/ethnicity*** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *All Hispanic* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *671* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *671* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *Non-Hispanic Blacks* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *587* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *587* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *Non-Hispanic Whites* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1015* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *1015* |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *Others* | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *393* |
|  | ***\**** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | ***< LOD*** |  | *393* |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *CI, confidence interval; N, sample size; %, detection frequency< LOD means less than the limit of detection* (LOD= 0.05 µg/L)*.\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result.* |

Table S2. Geometric mean and selected percentiles of di-o-cresyl phosphate (DoCP) concentrations in urine (in µg/L first row and in µg/g creatinine second row) for the U.S. population six years of age and older. Data from the National Health and Nutrition Examination Survey 2013-2014.

|  |  |  |
| --- | --- | --- |
|  | **Geometric mean** | **Selected percentile (95% CI)** | **N** |
|  | **(95% CI)** | **50th** | **75th** |  **90th** |  **95th** |  |
| **Total** | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 2666 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 2666 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Age group** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 6-11 years | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 421 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 421 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 12-19 years | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 427 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 427 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 20-59 years | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1266 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1266 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 60 years and older | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 552 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 552 |
| **Gender** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Males | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1344 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1344 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Females | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1322 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1322 |
| **Race/ethnicity** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| All Hispanic | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 671 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 671 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Blacks | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 587 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 587 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Whites | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1015 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1015 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Others | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 393 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 393 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CI, confidence interval; N, sample size; %, detection frequency< LOD means less than the limit of detection (LOD= 0.05 µg/L).\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result. |

Table S3. Geometric mean and selected percentiles of 2.3.4.5-tetrabromobenzoic acid (TBBA) concentrations in urine (in µg/L first row and in µg/g creatinine second row) for the U.S. population six years of age and older. Data from the National Health and Nutrition Examination Survey 2013-2014

|  |  |  |
| --- | --- | --- |
|  | **Geometric mean** | **Selected percentile (95% CI)** | **N** |
|  | **(95% CI)** |  **50th** |  **75th** |  **90th** | **95th** |  |
| **Total** | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.050** | (<LOD-.060) | 2666 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.174** | (<LOD-.190) | 2666 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Age group** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 6-11 years | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.070** | (.050-.090) | 421 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.235** | (.167-.286) | 421 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 12-19 years | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 427 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 427 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 20-59 years | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1266 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1266 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 60 years and older | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 552 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 552 |
| **Gender** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Males | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.060** | (<LOD-.070) | 1344 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.143** | (<LOD-.182) | 1344 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Females | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1322 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 1322 |
| **Race/ethnicity** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| All Hispanic | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 671 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | 671 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Blacks | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.060** | (<LOD-.090) | 587 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.122** | (<LOD-.154) | 587 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Whites | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.050** | (<LOD-.070) | 1015 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.182** | (<LOD-.200) | 1015 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Others | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.070** | (<LOD-.110) | 393 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.190** | (<LOD-.265) | 393 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CI, confidence interval; N, sample size; %, detection frequency< LOD means less than the limit of detection (LOD= 0.05 µg/L) .\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result. |

Table S4. Geometric mean and selected percentiles of di-p-cresyl phosphate (DpCP) concentrations in urine (in µg/L first row and in µg/g creatinine second row) for the U.S. population six years of age and older. Data from the National Health and Nutrition Examination Survey 2013-2014.

|  |  |  |
| --- | --- | --- |
|  | **Geometric mean** | **Selected percentile (95% CI)** | **N** |
|  | **(95% CI)** | **50th** | **75th** | **90th** | **95th** |  |
| **Total** | **\*** |  | **< LOD** |  | **< LOD** |  | **.070** | (.060-.080) | **.110** | (.090-.160) | 2666 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.133** | (.125-.152) | **.200** | (.182-.219) | 2666 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Age group** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 6-11 years | **\*** |  | **< LOD** |  | **.060** | (<LOD-.080) | **.150** | (.090-.210) | **.240** | (.160-.490) | 421 |
|  | **\*** |  | **< LOD** |  | **.125** | (<LOD-.174) | **.247** | (.182-.361) | **.361** | (.222-.500) | 421 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 12-19 years | **\*** |  | **< LOD** |  | **< LOD** |  | **.090** | (.060-.130) | **.140** | (.080-.270) | 427 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.108** | (.085-.174) | **.200** | (.108-.267) | 427 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 20-59 years | **\*** |  | **< LOD** |  | **< LOD** |  | **.050** | (<LOD-.070) | **.100** | (.070-.200) | 1266 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.129** | (<LOD-.135) | **.182** | (.146-.192) | 1266 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 60 years and older | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.090** | (.050-.120) | 552 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **< LOD** |  | **.200** | (.160-.235) | 552 |
| **Gender** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Males | **\*** |  | **< LOD** |  | **< LOD** |  | **.070** | (.050-.090) | **.130** | (.100-.200) | 1344 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.121** | (.103-.138) | **.174** | (.135-.222) | 1344 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Females | **\*** |  | **< LOD** |  | **< LOD** |  | **.070** | (.050-.080) | **.100** | (.080-.140) | 1322 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.154** | (.133-.182) | **.211** | (.190-.235) | 1322 |
| **Race/ethnicity** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| All Hispanic | **\*** |  | **< LOD** |  | **< LOD** |  | **.060** | (<LOD-.070) | **.100** | (.070-.150) | 671 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.138** | (<LOD-.170) | **.190** | (.174-.222) | 671 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Blacks | **\*** |  | **< LOD** |  | **< LOD** |  | **.060** | (<LOD-.080) | **.100** | (.080-.160) | 587 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.082** | (<LOD-.101) | **.114** | (.093-.143) | 587 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Non-Hispanic Whites | **\*** |  | **< LOD** |  | **< LOD** |  | **.070** | (.060-.090) | **.130** | (.090-.190) | 1015 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.138** | (.125-.167) | **.211** | (.182-.235) | 1015 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Others | **\*** |  | **< LOD** |  | **< LOD** |  | **.060** | (<LOD-.080) | **.100** | (.050-.210) | 393 |
|  | **\*** |  | **< LOD** |  | **< LOD** |  | **.154** | (<LOD-.175) | **.200** | (.174-.333) | 393 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| CI, confidence interval; N, sample size; %, detection frequency< LOD means less than the limit of detection (LOD= 0.05 µg/L).\* Not calculated. Proportion of results below limit of detection was too high to provide a valid result. |

Table S5. Observed statistical significance values (p-value) for differences between least squares geometric mean concentrations of contemporary FRs for various demographic groupsa.

|  |  |
| --- | --- |
| **DIFFERENCE** | **BIOMARKER** |
| **BDCIPP** | **DPHP** | **BCEP** | **DNBP** | **BCIPP** |
| Male vs Female | 0.0004 |  |  | 0.0005 | 0.0563 |
| HIispanic vs Non-Hispanic white |  |  |  | 0.2979 | 0.0057 |
| HIispanic vs Non-Hispanic black |  |  |  | 0.9624 | 0.2520 |
| HIispanic vs Other race/ethnicity |  |  |  | 0.0173 | 0.0169 |
| Non-Hispanic white vs Non-Hispanic black |  |  |  | 0.1785 | 0.0003 |
| Non-Hispanic white vs Other race/ethnicity |  |  |  | 0.0003 | 0.4226 |
| Non-Hispanic black vs Other race/ethnicity |  |  |  | <0.0001  | 0.0005 |
| 6-11 years vs 12-19 years |  |  |  | 0.0001 | <0.0001  |
| 6-11 years vs 20-59 years |  |  |  | <0.0001  | <0.0001  |
| 6-11 years vs ≥60 years |  |  |  | 0.0118 | <0.0001  |
| 12-19 years vs 20-59 years |  |  |  | 0.2324 | 0.2212 |
| 12-19 years vs ≥60 years |  |  |  | 0.0078 | 0.9491 |
| 20-59 years vs ≥60 years |  |  |  | 0.0012 | 0.1510 |
| Male: HIispanic - Non-Hispanic white |  | 0.0335 |  |  |  |
| Male: HIispanic - Non-Hispanic black  |  | 0.3860 |  |  |  |
| Male: HIispanic - Other race/ethnicity |  | 0.7226 |  |  |  |
| Male: Non-Hispanic white - Other race/ethnicity |  | 0.0575 |  |  |  |
| Male: Non-Hispanic white - Non-Hispanic black |  | 0.0071 |  |  |  |
| Male: Non-Hispanic black - Other race/ethnicity |  | 0.3114 |  |  |  |
| Female: HIispanic - Non-Hispanic white |  | 0.5733 |  |  |  |
| Female: HIispanic - Non-Hispanic black |  | 0.4286 |  |  |  |
| Female: HIispanic - Other race/ethnicity |  | 0.0025 |  |  |  |
| Female: Non-Hispanic white - Other race/ethnicity |  | 0.0004 |  |  |  |
| Female: Non-Hispanic white - Non-Hispanic black |  | 0.2788 |  |  |  |
| Female: Non-Hispanic black - Other race/ethnicity |  | 0.1823 |  |  |  |
| Male, 6-11 years vs 12-19 years |  | <0.0001  | 0.2035 |  |  |
| Male, 6-11 years vs 20-59 years |  | <0.0001  | 0.0001 |  |  |
| Male, 6-11 years vs ≥60 years  |  | <0.0001  | 0.3210 |  |  |
| Male, 12-19 years vs 20-59 years |  | 0.0002 | 0.0007 |  |  |
| Male, 12-19 years vs ≥60 years  |  | 0.0023 | 0.7254 |  |  |
| Male, 20-59 years vs ≥60 years  |  | 0.3786 | 0.1529 |  |  |
| Female, 6-11 years vs 12-19 years |  | 0.0022 | 0.0151 |  |  |
| Female, 6-11 years vs 20-59 years |  | <0.0001  | 0.0027 |  |  |
| Female, 6-11 years vs ≥60 years  |  | <0.0001  | 0.1804 |  |  |
| Female, 12-19 years vs 20-59 years |  | <0.0001  | 0.1366 |  |  |
| Female, 12-19 years vs ≥60 years  |  | 0.0008 | 0.7979 |  |  |
| Female, 20-59 years vs ≥60 years  |  | 0.6448 | 0.2061 |  |  |
| 6-11 years : male vs female |  | 0.9825 | 0.2932 |  |  |
| 12-19 years: male vs female |  | 0.0262 | 0.0637 |  |  |
| 20-59 years: male vs female |  | 0.0002 | 0.0111 |  |  |
| ≥60 years : male vs female |  | 0.0066 | 0.4943 |  |  |
| Hispanic: male vs female |  | <0.0001  |  |  |  |
| Non-Hispanic white: male vs female |  | <0.0001  |  |  |  |
| Non-Hispanic black: male vs female |  | <0.0001  |  |  |  |
| Other race/ethnicity: male vs female |  | 0.0066 |  |  |  |
| Hispanic, 6-11 years vs 12-19 years | <0.0001 |  | 0.0471 |  |  |
| Hispanic, 6-11 years vs 20-59 years | <0.0001  |  | 0.0002 |  |  |
| Hispanic, 6-11 years vs ≥60 years  | <0.0001  |  | 0.0008 |  |  |
| Hispanic, 12-19 years vs 20-59 years | 0.6066 |  | 0.4374 |  |  |
| Hispanic, 12-19 years vs ≥60 years  | 0.0007 |  | 0.3633 |  |  |
| Hispanic, 20-59 years vs ≥60 years  | 0.0003 |  | 0.7677 |  |  |
| Non-Hispanic white, 6-11 years vs 12-19 years | <0.0001  |  | 0.0005 |  |  |
| Non-Hispanic white, 6-11 years vs 20-59 years | <0.0001  |  | <0.0001  |  |  |
| Non-Hispanic white, 6-11 years vs ≥60 years | <0.0001  |  | <0.0001  |  |  |
| Non-Hispanic white, 12-19 years vs 20-59 years | 0.0052 |  | 0.8846 |  |  |
| Non-Hispanic white, 12-19 years vs ≥60 years  | 0.0002 |  | 0.1911 |  |  |
| Non-Hispanic white, 20-59 years vs ≥60 years  | 0.0047 |  | 0.0914 |  |  |
| Non-Hispanic black, 6-11 years vs 12-19 years | <0.0001  |  | 0.0343 |  |  |
| Non-Hispanic black, 6-11 years vs 20-59 years | <0.0001  |  | 0.0007 |  |  |
| Non-Hispanic black, 6-11 years vs ≥60 years  | <0.0001  |  | 0.0101 |  |  |
| Non-Hispanic black, 12-19 years vs 20-59 years | 0.1001 |  | 0.9506 |  |  |
| Non-Hispanic black, 12-19 years vs ≥60 years  | 0.0005 |  | 0.7526 |  |  |
| Non-Hispanic black, 20-59 years vs ≥60 years  | 0.0103 |  | 0.6907 |  |  |
| Other race/ethnicity, 6-11 years vs 12-19 years | 0.0085 |  | 0.0151 |  |  |
| Other race/ethnicity, 6-11 years vs 20-59 years | <0.0001  |  | 0.0027 |  |  |
| Other race/ethnicity, 6-11 years vs ≥60 years  | 0.0007 |  | 0.1804 |  |  |
| Other race/ethnicity, 12-19 years vs 20-59 years | 0.0058 |  | 0.1366 |  |  |
| Other race/ethnicity, 12-19 years vs ≥60 years  | 0.0142 |  | 0.7979 |  |  |
| Other race/ethnicity, 20-59 years vs ≥60 years  | 0.4215 |  | 0.2061 |  |  |
| 6-11 years: HIispanic vs Non-Hispanic white | 0.0207 |  | 0.8250 |  |  |
| 6-11 years: HIispanic vs Non-Hispanic black | 0.1012 |  | 0.0518 |  |  |
| 6-11 years: HIispanic vs Other race/ethnicity | 0.9218 |  | 0.7923 |  |  |
| 6-11 years: Non-Hispanic white vs Non-Hispanic black | 0.0001 |  | 0.0056 |  |  |
| 6-11 years: Non-Hispanic white vs Other race/ethnicity | 0.1226 |  | 0.4831 |  |  |
| 6-11 years: Non-Hispanic black vs Other race/ethnicity | 0.3767 |  | 0.0411 |  |  |
| 12-19 years: HIispanic vs Non-Hispanic white | 0.0434 |  | 0.5588 |  |  |
| 12-19 years: HIispanic vs Non-Hispanic black | 0.1786 |  | 0.0435 |  |  |
| 12-19 years: HIispanic vs Other race/ethnicity | 0.3778 |  | 0.9732 |  |  |
| 12-19 years: Non-Hispanic white vs Non-Hispanic black | 0.0141 |  | 0.2018 |  |  |
| 12-19 years: Non-Hispanic white vs Other race/ethnicity | 0.6390 |  | 0.3581 |  |  |
| 12-19 years: Non-Hispanic black vs Other race/ethnicity | 0.1105 |  | 0.0629 |  |  |
| 20-59 years: HIispanic vs Non-Hispanic white | 0.8708 |  | 0.8742 |  |  |
| 20-59 years: HIispanic vs Non-Hispanic black | 0.0003 |  | 0.0896 |  |  |
| 20-59 years: HIispanic vs Other race/ethnicity | 0.0015 |  | 0.5659 |  |  |
| 20-59 years: Non-Hispanic white vs Non-Hispanic black | 0.0009 |  | 0.0367 |  |  |
| 20-59 years: Non-Hispanic white vs Other race/ethnicity | 0.0011 |  | 0.5098 |  |  |
| 20-59 years: Non-Hispanic black vs Other race/ethnicity | 0.7466 |  | 0.1261 |  |  |
| ≥60 years: HIispanic vs Non-Hispanic white | 0.9577 |  | 0.2291 |  |  |
| ≥60 years: HIispanic vs Non-Hispanic black | 0.0759 |  | 0.3586 |  |  |
| ≥60 years: HIispanic vs Other race/ethnicity | 0.4417 |  | 0.2121 |  |  |
| ≥60 years: Non-Hispanic white vs Non-Hispanic black | 0.0583 |  | 0.9877 |  |  |
| ≥60 years: Non-Hispanic white vs Other race/ethnicity | 0.3211 |  | 0.0680 |  |  |
| ≥60 years: Non-Hispanic black vs Other race/ethnicity | 0.5501 |  | 0.1129 |  |  |
|  |  |  |  |  |  |

a The final multivariate regression models included: sex, age, race, sex\*age, and sex\*race (DPHP); race, sex, age, age\*race (BDCIPP); race, sex, age, sex\*age, and age\*race (BCEP); race, age, and sex (DNBP); and age and race (BCIPP).

Table S6. Weighted multivariate logistic regression to examine associations of OPFRs concentrations above the 95th percentile by sex, age group and creatinine

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Independent variable** | **BDCIPP** | **DPHP** | **BCEP** | **DNBP** | **BCIPP** |
| **Odds ratio** | **p value** | **Odds ratio** | **p value** | **Odds ratio** | **p value** | **Odds ratio** | **p value** | **Odds ratio** | **p value** |
| Log10 creatinine | 9.04 (3.96-20.6) | <0.001 | 55.3 (14.8-207) | <0.001 | 36.6 (18.0-74.4) | <0.001 | 22.7 (7.72-66.7) | <0.001 | 24.2 (8.23-71.4) | <0.0001 |
|   |  |   |   |   |   |   |   |   |   |   |
| **Age group:** |  |   |   |   |   |   |   |   |   |   |
| 6-11 years | 3.57 (1.98-6.45) | <0.003 | 6.56 (2.50-17.2) | <0.001 | 2.05 (1.07-3.93) | <0.02 | 3.59 (1.98-6.52) | 0.001 | 10.7 (4.42-26.1) | <0.0001 |
| 12-19 years | 0.77 (0.27-2.16) |   | 1.88 (0.54-6.52) |   | 0.90 (0.41-1.96) |   | 0.93 (0.50-1.74) |   | 1.67 (0.49-5.71) |   |
| 20-59 years | 1.58 (1.03-2.43) |   | 1.05 (0.38-2.87) |   | 0.76 (0.43-1.34) |   | 0.46 (0.21-1.01) |   | 1.09 (0.42-2.83) |   |
| ≥60 years | ref |   | ref |   | ref |   | ref |   | ref |   |
|   |  |   |   |   |   |   |   |   |   |   |
| **Sex:** |  |   |   |   |   |   |   |   |   |   |
| Male |  |   | ref |   |   |   |   |   |   |   |
| Female |  |   | 3.61 (2.01-6.48) | 0.0003 |   |   |   |   |   |   |