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# Daily Water Intake Among U.S. Men and Women, 2009–2012

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## Key findings

### Data from the National Health and Nutrition Examination Survey, 2009–2012

- Among U.S. adults, men consumed an average of 3.46 liters (117 ounces) of water per day, and women consumed 2.75 liters (93 ounces) per day.
- Men aged 60 and over consumed less water (2.92 liters) than men aged 20–39 (3.61 liters) and 40–59 (3.63 liters). Similarly, women aged 60 and over consumed less water (2.51 liters) than women aged 20–39 (2.78 liters) and 40–59 (2.9 liters).
- Non-Hispanic white men and women consumed more water daily than non-Hispanic black and Hispanic men and women.
- Water intake increased with physical activity level for both men and women.
- Among men, 30% of total water consumed was plain water (with the remainder from other foods and liquids) compared with 34% for women.

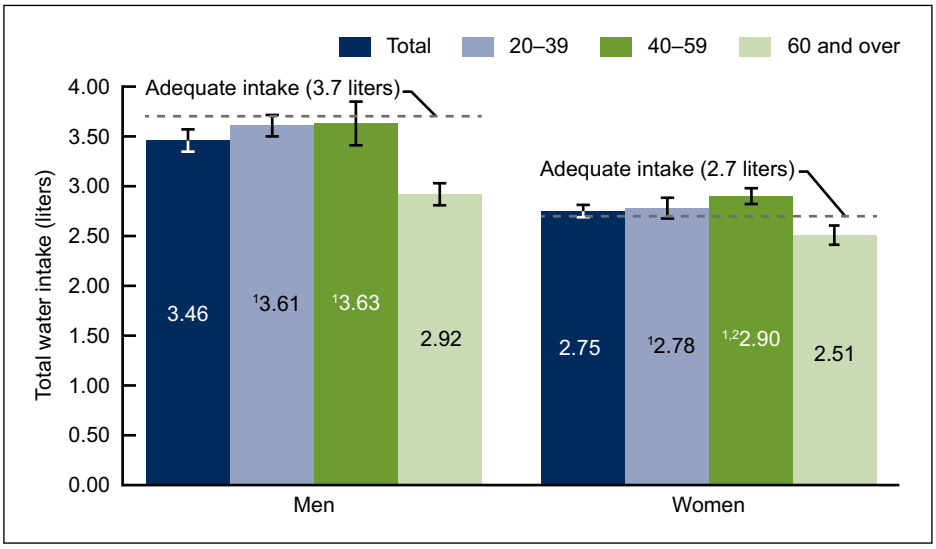
Water is an essential nutrient for life (1). Institute of Medicine (IOM) recommendations from 2004 set adequate levels for total water intake from all foods and liquids at 3.7 liters (125 ounces) for men and 2.7 liters (91 ounces) for women (2). Consuming inadequate amounts of water increases the risk of dehydration, kidney stones, and poorer cognitive performance (3,4). Differences in water intake have been reported by age, race and Hispanic origin, and physical activity (5,6). This report provides updated estimates of mean daily total water intake for U.S. men and women aged 20 and over in 2009–2012.

*Keyword: National Health and Nutrition Examination Survey*

## Did total water intake per day vary by age group for men and women during 2009–2012?

Men consumed an average of 3.46 liters (L) or 117 ounces of water from all foods and liquids per day, while women consumed an average of 2.75 L or 93 ounces (Figure 1).

Figure 1. Mean total water intake per day among adults aged 20 and over, by sex and age group: United States, 2009–2012




I 95% confidence interval.
[1]Significantly different from those aged 60 and over, $p < 0.01$.
[2]Significantly different from those aged 20–39, $p < 0.05$.
NOTE: Access data table for Figure 1 at: http://www.cdc.gov/nchs/data/databriefs/db242_table.pdf#1.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009–2012.

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Total water intake was lowest among both men and women aged 60 and over compared with younger age groups. Men aged 20–39 (3.61 L) and 40–59 (3.63 L) consumed significantly more water per day than men aged 60 and over (2.92 L). Women aged 20–39 consumed 2.78 L of total water per day, while those aged 40–59 consumed significantly more (2.90 L), and those aged 60 and over consumed significantly less (2.51 L).

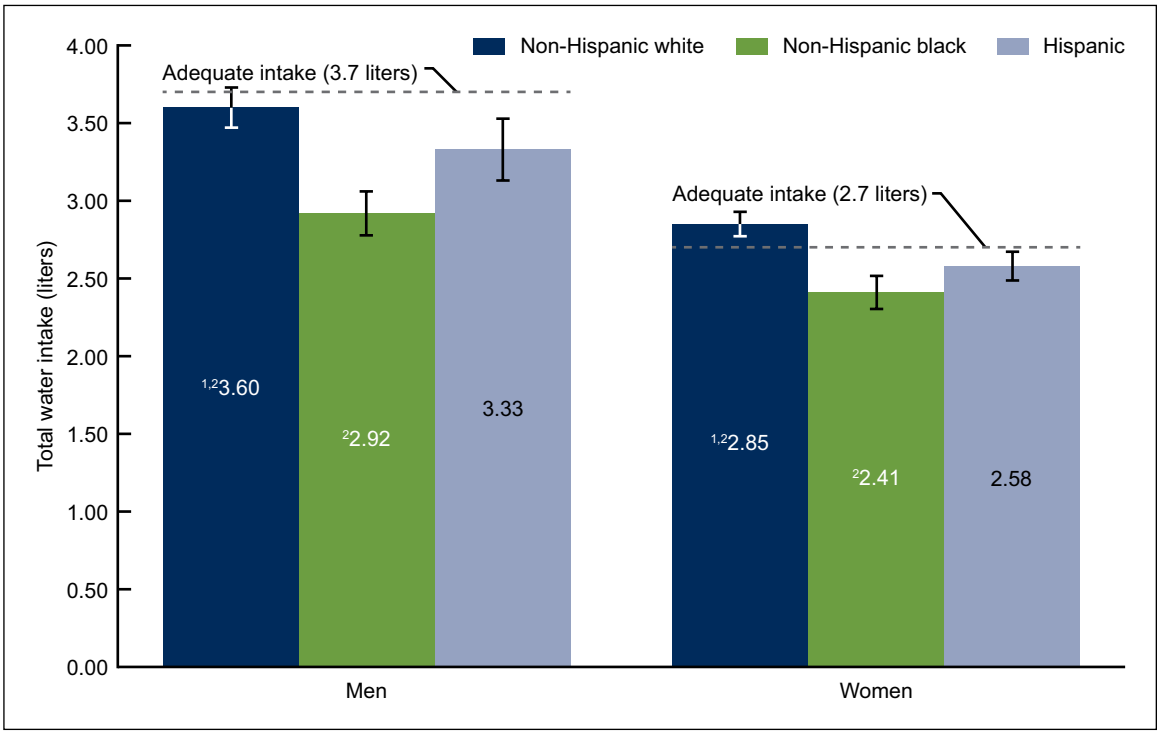
On average, men aged 20–39 and 40–59 consumed water at about the recommended adequate intake level of 3.7 L, while those aged 60 and over consumed 0.78 L less water than the recommended adequate intake. Women aged 20–39 consumed water at about the adequate intake level of 2.7 L, while women aged 40–59 consumed 0.2 L more than the adequate intake, and women aged 60 and over consumed 0.19 L less than the recommended adequate intake.

## Were there differences in mean total water intake per day by race and Hispanic origin among men and women?

Non-Hispanic white men (3.60 L) and women (2.85 L) had the highest water intake, followed by Hispanic men (3.33 L) and women (2.58 L), and non-Hispanic black men (2.92 L) and women (2.41 L) (Figure 2).

Compared with adequate intake levels, non-Hispanic black men and women consumed 0.78 L and 0.29 L less than the IOM recommendations. Hispanic men and women had average water intakes 0.37 L and 0.12 L below their respective adequate intake levels. Non-Hispanic white men did not differ significantly from the adequate intake, while non-Hispanic white women consumed 0.15 L more water than the adequate intake.

Figure 2. Mean total water intake per day among adults aged 20 and over, by sex and race and Hispanic origin: United States, 2009–2012



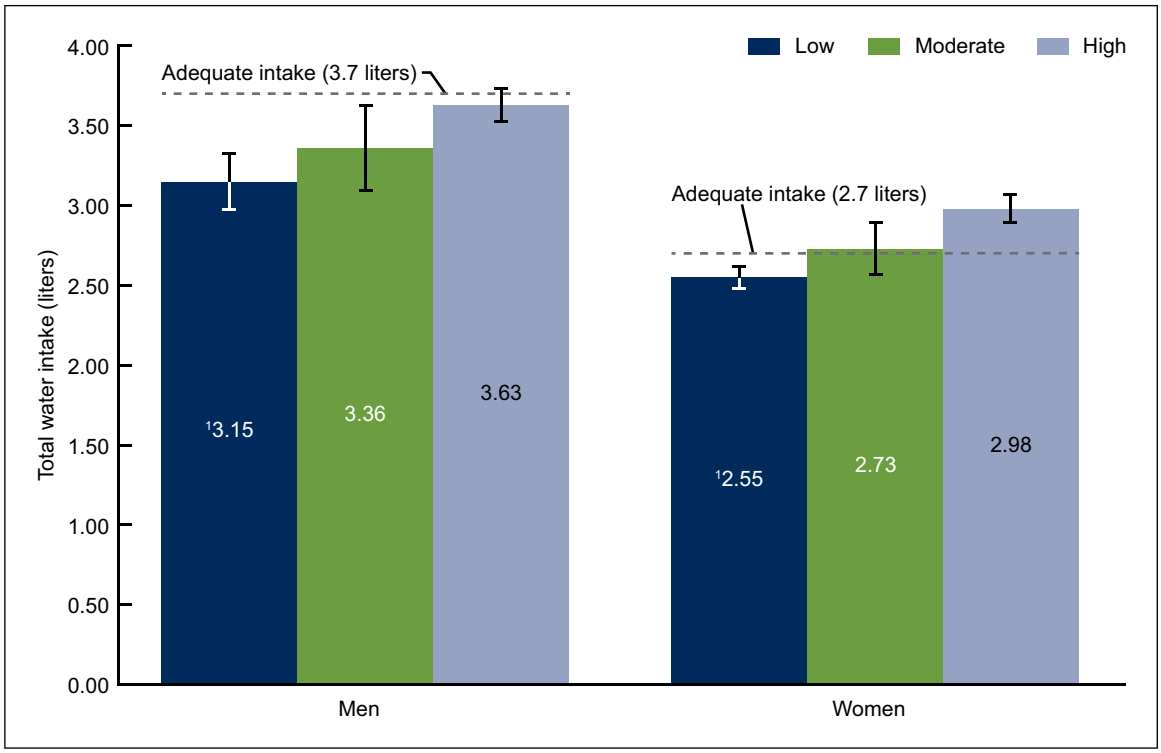

I 95% confidence interval.
[1]Significantly different from non-Hispanic black, $p < 0.05$.
[2]Significantly different from Hispanic, $p < 0.05$.
NOTE: Access data table for Figure 2 at: http://www.cdc.gov/nchs/data/databriefs/db242_table.pdf#2.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009–2012.

## Were there differences in mean total water intake per day by physical activity level among men and women?

As physical activity level increased, mean total water intake per day increased for both men and women. Men with low physical activity had the lowest total water intake per day (3.15 L), followed by moderately active (3.36 L) and highly active (3.63 L) men (Figure 3). Similarly, women with low physical activity had the lowest total water intake per day (2.55 L), followed by moderately active (2.73 L) and highly active (2.98 L) women.

Men with low and moderate physical activity levels consumed an average total water intake lower than the recommended adequate intake, while highly active men did not differ from the recommendation. Highly active women consumed more total water than the recommended intake for women, while women with low activity consumed slightly less than the recommendation, and moderately active women did not differ from the recommendation.

Figure 3. Mean total water intake per day among adults aged 20 and over, by sex and physical activity level: United States, 2009–2012

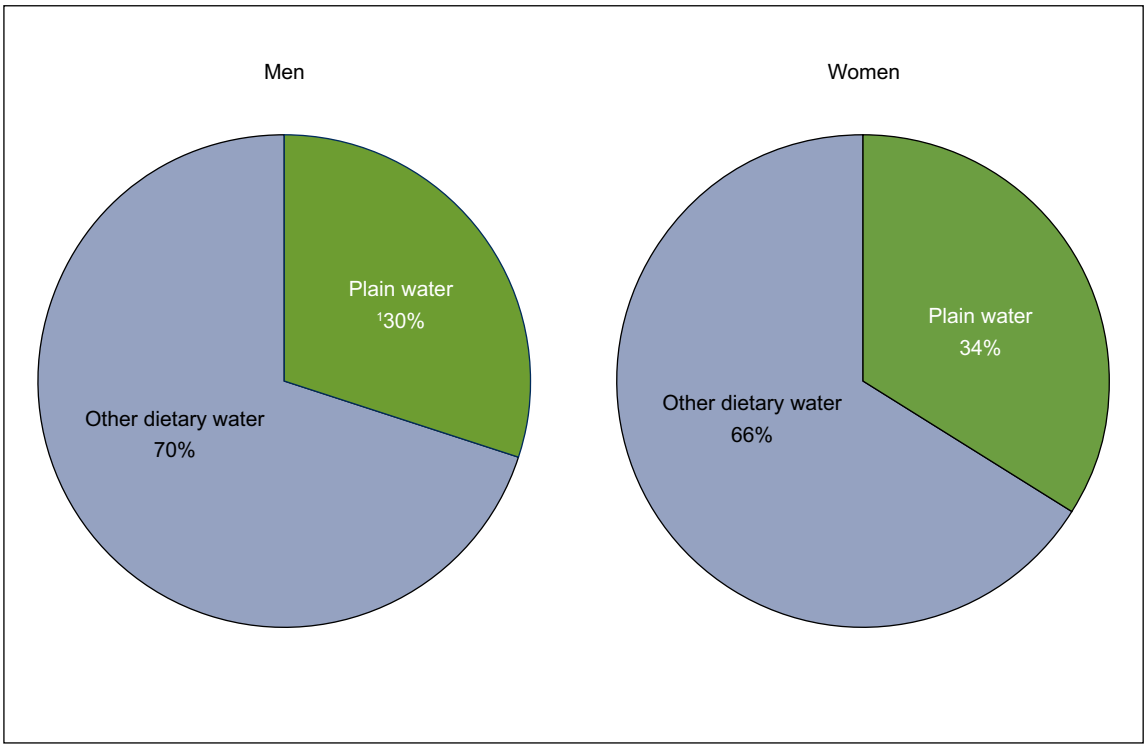



I 95% confidence interval.
[1]Linear trend by physical activity status, $p < 0.01$.
NOTE: Access data table for Figure 3 at: http://www.cdc.gov/nchs/data/databriefs/db242_table.pdf#3.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009–2012.

## Were there differences between men and women in how much plain water contributed to total water intake?

Men and women differed in how much plain water contributed to their total daily water intake. Plain water contributed 30% of total water intake men consumed per day (Figure 4). The remaining 70% of their water consumption came from other dietary foods and liquids. For women, plain water made up 34% of total water intake, with the remaining 66% coming from other dietary foods and liquids.

Figure 4. Plain water as percentage of total water intake among adults aged 20 and over, by sex: United States, 2009–2012




[1]Significantly different from women, $p < 0.01$.
NOTE: Access data table for Figure 4 at: http://www.cdc.gov/nchs/data/databriefs/db242_table.pdf#4.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2009–2012.

## Summary

Overall in 2009–2012, the daily average total water intake from all foods and liquids among U.S. adults aged 20 and over was 3.46 L for men, with 30% coming from plain water, and 2.75 L for women, with 34% coming from plain water. Total water intake was lower among men and women aged 60 and over than among younger adults. Non-Hispanic black men and women had the lowest average total water intake, similar to results from previous studies (5). For U.S. adults aged 20 and over, total water intake increased with physical activity level.

Men's average total water intake per day was approximately 0.25 L less than the recommended adequate intake, whereas women's intake was approximately the same as the adequate intake. On average, men and women aged 60 and over, non-Hispanic black men and women, Hispanic men and women, men and women with low physical activity, and men with moderate physical activity consumed less than the adequate daily intake. Previous studies have shown that adults aged 60 and over are among the most vulnerable to dehydration (4,7). This report found that men aged 60 and over consumed 2.92 L, roughly 0.8 L less than the adequate intake, and women aged 60 and over consumed 2.51 L, approximately 0.2 L less.

## Definitions

Physical activity level: Summary of reported time spent in the previous week in moderate and vigorous activities from biking or walking, work, and leisure activities. Low physical activity is defined as less than 150 minutes of moderate or vigorous physical activity per week (8). Moderate physical activity is defined as between 150 minutes and 300 minutes of moderate or vigorous physical activity per week. High physical activity is defined as 300 minutes or more of moderate or vigorous physical activity per week.

Total water intake: Determined by the 24-hour dietary recall interview in which respondents list all foods and liquids consumed in the previous 24-hour period from midnight to midnight. Plain water intake and moisture content calculated from foods and beverages is then summed in grams, the equivalent of milliliters.

## Data source and methods

Data from the National Health and Nutrition Examination Surveys (NHANES) for survey years 2009–2010 and 2011–2012 were used for these analyses. NHANES is a cross-sectional survey designed to monitor the health and nutritional status of the civilian noninstitutionalized U.S. population (9). It is conducted by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics. The survey combines in-home interviews conducted in the participants' homes and standardized physical examinations conducted in mobile examination centers (MEC). For this report, data were collected through an in-person 24-hour dietary recall interview in the MEC. Dietary recalls cover intake during the day (24 hours, midnight to midnight) prior to the standardized physical examination in the MEC (10).

The NHANES sample is selected through a complex, multistage probability design. In 2009–2010 and 2011–2012, non-Hispanic black and Hispanic persons, among other groups, were oversampled to obtain reliable estimates for these population subgroups. Race and Hispanic

origin categories reflect individuals reporting only one race; those reporting "other" races and more than one race are included in the total but are not reported separately.

Data were analyzed using the day 1 dietary sample weights to account for the days of the week, differential probabilities of selection, nonresponse, and noncoverage. The standard errors of total water intake were estimated using Taylor series linearization, a method that incorporates the sample design. Ninety-five percent confidence intervals were used to assess whether each subpopulation's water intake on a given day included the adequate intake. Pregnant and breastfeeding women were excluded from the analysis.

Differences between groups were evaluated using a univariate $t$ statistic at the $p < 0.05$ significance level. Test for trends by physical activity level was evaluated using linear regression, and the significance was set at $p < 0.05$. All differences reported are statistically significant unless otherwise indicated. Statistical analyses were conducted using Stata version 13.1 (College Station, T.X.).

## About the authors

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