Prevalence of Self-Reported Intake of Sugar-Sweetened Beverages Among US Adults in 50 States and the District of Columbia, 2010 and 2015

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Objective
Sugar-sweetened beverages (SSBs) are a leading source of added sugars in the US diet and are associated with obesity, type 2 diabetes, heart disease, kidney disease, nonalcoholic fatty liver disease, and tooth decay (1–4). SSBs, which are sweetened with various forms of added sugars, include regular soda, sweetened fruit drinks, sports/energy drinks, and sweetened coffee/tea drinks (5). Previous studies reported geographic differences in SSB intake (6–8). However, no study has reported SSB intake for every state.

We assessed the prevalence of SSB intake among US adults by sociodemographic characteristics for all 50 states and the District of Columbia by using National Health Interview Survey (NHIS) data.

Methods
NHIS is a nationally representative, cross-sectional household survey conducted by the National Center for Health Statistics (NCHS) that uses in-person interviews. The Cancer Control Supplement (CCS), which contains dietary intake information, was administered both in 2010 and in 2015 and was approved by the NCHS Research Ethics Review Board. We used nationally weighted data from combined 2010 and 2015 NHIS CCS to examine the prevalence of consuming SSBs 1 or more times daily among 56,260 US adults aged 18 or older. Data were combined to increase the sample size and reduce the variability associated with state estimates. This study required the use of restricted NHIS files for state estimates and categorizing metropolitan status available through the NCHS Research Data Center. SSB intake was based on survey respondents’ answers to 4 questions asking about intake frequency over the past month of regular soda, sweetened fruit drinks, sports/energy drinks, and sweetened coffee/tea drinks (9,10). Sweetened fruit drinks and sweetened coffee/tea drinks included drinks that were presweetened in addition to drinks that were sweetened at home by adding sugar. Adults responded with intake frequency per day, week, or month for each beverage type. Weekly and monthly intake frequency for each type of beverage was converted to daily intake frequency by dividing by 7 or 30, re-
spectively. To calculate frequency of total daily SSB intake, we summed responses from intake of regular soda, sweetened fruit drinks, sports/energy drinks, and sweetened coffee/tea drinks. SSB categories and frequency cutoff of once per day were used, consistent with previous studies (6,7). Differences in respondent characteristics were assessed by $\chi^2$ tests ($P < .05$). Prevalence estimates were calculated for SSB categories and by state for all 50 states and the District of Columbia. Analyses were conducted with SAS-callable SUDAAN, version 9.0 (RTI) to account for a complex survey design and sampling weights.

Results

Overall, 63.0% of US adults reported consuming SSBs 1 or more times daily in combined 2010 and 2015 NHIS CCS data (Table 1). US adults reported consuming the following 1 or more times daily, by beverage type: sweetened coffee/tea drinks, 39.5%; regular soda, 19.5%; fruit drinks, 5.7%; and sports/energy drinks, 5.5%. Among sociodemographic categories with significant differences overall, the prevalence of SSB intake was highest among adults aged 18 to 24 (65.0%) and 25 to 39 (65.4%), men (66.1%), Hispanic respondents (70.1%), people with less than a high school education (69.8%), people with an annual household income less than $35,000 (66.0%), people residing in nonmetropolitan areas (65.0%), and people residing in the Northeast census region (67.0%). The prevalence of SSB intake did not significantly differ by marital status.

By state, SSB intake of 1 or more times daily ranged from 44.5% in Alaska to 76.4% in Hawaii. These 6 states had a prevalence of daily SSB intake of 70.0% or more: Hawaii (76.4%), Arkansas (74.2%), Wyoming (73.2%), South Dakota (72.5%), Connecticut (72.2%), and South Carolina (70.2%). Only 1 state, Alaska (44.5%), had a daily intake prevalence below 50.0% (Table 2). Most states had a daily intake prevalence between 50.0% and 70.0% (Figure).

Discussion

Daily SSB intake is common among US adults and is particularly high in some states and among some populations. The prevalence in our study was higher than in the 2017 Behavioral Risk Factor Surveillance System (BRFSS) survey (8). This discrepancy may be explained by differences in the types of SSBs assessed, modes of survey administration, methods of collecting dietary intake data, and representativeness. Previous NHIS, NHANES (National Health and Nutrition Examination Survey), and BRFSS data also showed that SSB consumption is higher among young adults, men, adults in nonmetropolitan counties, and people with low levels of education (6–8,11).

The prevalence of SSB consumption in previous studies was high in the Northeast (7) and in southern states (6), consistent with our study’s findings. The high northeastern prevalence may be due to high consumption of sweetened coffee or tea drinks (7). Data from the 2017 BRFSS survey (8) for 12 states, and data from the 2013 BRFSS survey (6) for 23 states also revealed state-specific differences in SSB intake. Reasons for state differences may reflect demographic differences. States and communities may also differ in SSB marketing (12), pricing, and access to alternatives.

Our study has several limitations, including self-reported information, assessment of intake frequency without volume or amount of SSBs, age of the data, and combination of data. Declines in SSB intake have occurred over time (13). Combining data may mask changes in prevalence in the study period. Regardless, ours is the
first study to our knowledge to examine SSB intake frequency for all 50 states and the District of Columbia by using a nationally representative sample of US adults. Our findings highlight that prevalence of daily SSB intake remains high among US adults, with sociodemographic and geographic differences. Efforts to decrease SSB intake could consider the higher intake prevalence in sociodemographic and geographic subpopulations to aid design and targeting of equitable interventions.

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### Table 1. Prevalence of Sugar-Sweetened Beverage Intake Once Daily or More Among US Adults Aged 18 or Older (N = 56,260), National Health Interview Survey Cancer Control Supplement, 2010 and 2015

| Characteristic                  | No. Respondents | ≥1 Time/d, Weighted % (95% CI)<sup>b</sup> |
|---------------------------------|-----------------|------------------------------------------|
| Overall                         | 56,260          | 63.0 (62.4–63.6)                         |
| Age, y<sup>a</sup>              |                 |                                          |
| 18–24                           | 5,358           | 65.0 (63.3–66.7)                         |
| 25–39                           | 15,027          | 65.4 (64.4–66.3)                         |
| 40–59                           | 19,143          | 62.8 (61.8–63.7)                         |
| ≥60                             | 16,732          | 59.7 (58.6–60.8)                         |
| Sex<sup>b</sup>                 |                 |                                          |
| Male                            | 25,148          | 66.1 (65.3–67.0)                         |
| Female                          | 31,112          | 60.0 (59.3–60.8)                         |
| Race/ethnicity<sup>b</sup>      |                 |                                          |
| White, non-Hispanic             | 33,488          | 61.4 (60.7–62.2)                         |
| Black, non-Hispanic             | 8,238           | 64.3 (63.0–65.7)                         |
| Hispanic                        | 9,984           | 70.1 (68.7–71.4)                         |
| Other, non-Hispanic             | 4,550           | 60.5 (58.5–62.5)                         |
| Marital status                  |                 |                                          |
| Married/domestic partnership    | 28,079          | 62.7 (61.9–63.4)                         |
| Not married                     | 28,181          | 63.5 (62.7–64.3)                         |
| Education<sup>b</sup>           |                 |                                          |
| <High school                    | 8,712           | 69.8 (68.5–71.0)                         |
| High school/GED                 | 14,358          | 67.3 (66.2–68.3)                         |
| Some college                    | 17,200          | 62.8 (61.8–63.8)                         |
| College graduate                | 15,990          | 56.4 (55.4–57.4)                         |
| Annual household income, $<sup>c</sup> |             |                                          |
| <35,000                         | 23,665          | 66.0 (65.2–66.9)                         |
| 35,000–74,999                   | 17,061          | 64.3 (63.3–65.3)                         |

<sup>a</sup> Data are for 50 states and the District of Columbia. The type of SSBs consumed was based on survey respondents’ answers to 4 questions: 1) “During the past month, how often did you drink regular soda or pop that contains sugar? Do not include diet soda.”; 2) “During the past month, how often did you drink sweetened fruit drinks, such as Kool-Aid, cranberry, and lemonade? Include fruit drinks you made at home and added sugar to.”; 3) “During the past month, how often did you drink sports and energy drinks such as Gatorade, Red Bull, and vitamin water?”; and 4) “During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do not include artificially sweetened coffee or diet tea.”

<sup>b</sup> Significant difference in the prevalence of SSB intake once daily or more across levels of the characteristic at the P < .05 level based on χ² test.

<sup>c</sup> Based on National Center for Health Statistics Urban–Rural Classification Scheme for Counties (https://www.cdc.gov/nchs/data_access/urban_rural.htm). Metropolitan includes large central metro, large fringe metro, medium metro, and small metro categories. Nonmetropolitan includes micropolitan and noncore categories.

<sup>d</sup> US Census Bureau–defined regions: Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont); Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin); Southern (Alabama, Arkansas; Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia); and Western (Alaska, Arizona, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming).

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Table 1. Prevalence of Sugar-Sweetened Beverage Intake Once Daily or More Among US Adults Aged 18 or Older (N = 56,260), National Health Interview Survey Cancer Control Supplement, 2010 and 2015

| Characteristic                      | No. Respondents |  ≥1 Time/d, Weighted % (95% CI)b |
|-------------------------------------|-----------------|----------------------------------|
| 75,000–99,999                      | 5,744           | 61.8 (60.1–63.4)                 |
| ≥100,000                            | 9,790           | 57.7 (56.4–59.0)                 |
| Metropolitan/nonmetropolitan statusb,c|                 |                                  |
| Metropolitan                        | 46,623          | 62.7 (62.0–63.3)                 |
| Nonmetropolitan                     | 9,637           | 65.0 (63.2–66.7)                 |
| Census regionb,d                    |                 |                                  |
| Northeast                           | 9,084           | 67.0 (65.5–68.4)                 |
| Midwest                             | 12,100          | 58.3 (57.0–59.7)                 |
| South                               | 20,072          | 65.2 (64.2–66.1)                 |
| West                                | 15,004          | 61.1 (59.9–62.2)                 |

a Data are for 50 states and the District of Columbia. The type of SSBs consumed was based on survey respondents’ answers to 4 questions: 1) “During the past month, how often did you drink regular soda or pop that contains sugar? Do not include diet soda.”; 2) “During the past month, how often did you drink sweetened fruit drinks, such as Kool-Aid, cranberry, and lemonade? Include fruit drinks you made at home and added sugar to.”; 3) “During the past month, how often did you drink sports and energy drinks such as Gatorade, Red Bull, and vitamin water?”; and 4) “During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do not include artificially sweetened coffee or diet tea.”

b Significant difference in the prevalence of SSB intake once daily or more across levels of the characteristic at the P < .05 level based on χ2 test.

c Based on National Center for Health Statistics Urban–Rural Classification Scheme for Counties (https://www.cdc.gov/nchs/data_access/urban_rural.htm). Metropolitan includes large central metro, large fringe metro, medium metro, and small metro categories. Nonmetropolitan includes micropolitan and noncore categories.

d US Census Bureau–defined regions: Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont); Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin); Southern (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia); and Western (Alaska, Arizona, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming).
Table 2. Prevalence by State of Sugar-Sweetened Beverage Intake Once Daily or More Among US Adults Aged 18 or Older, National Health Interview Survey Cancer Control Supplement, 2010 and 2015

| State                | No. Respondents | Weighted % (95% CI)\(^a\) |
|----------------------|-----------------|----------------------------|
| Nation overall       | 56,260          | 63.0 (62.4–63.6)            |
| Alabama              | 813             | 65.0 (60.2–69.6)            |
| Alaska               | 469             | 44.5 (40.3–48.8)            |
| Arizona              | 898             | 64.5 (59.6–69.1)            |
| Arkansas             | 602             | 74.2 (70.2–77.8)            |
| California           | 6,628           | 62.7 (61.0–64.3)            |
| Colorado             | 882             | 59.4 (55.0–63.6)            |
| Connecticut          | 652             | 72.2 (67.8–76.3)            |
| Delaware             | 463             | 68.0 (60.5–74.6)            |
| District of Columbia | 563             | 64.8 (57.5–71.4)            |
| Florida              | 3,184           | 67.2 (65.2–69.2)            |
| Georgia              | 1,548           | 68.1 (65.1–70.9)            |
| Hawaii               | 516             | 76.4 (73.9–78.7)            |
| Idaho                | 531             | 58.8 (55.0–62.5)            |
| Illinois             | 1,946           | 62.7 (59.5–65.8)            |
| Indiana              | 1,034           | 65.7 (61.0–70.2)            |
| Iowa                 | 752             | 50.5 (44.3–56.7)            |
| Kansas               | 815             | 54.9 (51.5–58.3)            |
| Kentucky             | 893             | 67.2 (62.0–72.0)            |
| Louisiana            | 787             | 68.7 (65.2–71.9)            |
| Maine                | 638             | 65.5 (63.6–67.3)            |
| Maryland             | 830             | 65.4 (61.3–69.3)            |
| Massachusetts        | 858             | 66.8 (62.7–70.7)            |
| Michigan             | 1,437           | 59.0 (55.1–62.8)            |
| Minnesota            | 985             | 50.4 (46.2–54.7)            |
| Mississippi          | 674             | 64.5 (61.8–67.0)            |
| Missouri             | 871             | 59.1 (55.4–62.7)            |
| Montana              | 467             | 64.9 (63.4–66.3)            |
| Nebraska             | 614             | 58.0 (54.6–61.3)            |
| Nevada               | 760             | 63.8 (58.4–68.8)            |
| New Hampshire        | 526             | 69.7 (66.9–72.3)            |
| New Jersey           | 1,220           | 69.5 (65.6–73.2)            |
| New Mexico           | 728             | 68.5 (65.8–71.1)            |

\(^a\) The type of SSBs consumed was based on survey respondents’ answers to 4 questions: 1) “During the past month, how often did you drink regular soda or pop that contains sugar? Do not include diet soda.”; 2) “During the past month, how often did you drink sweetened fruit drinks, such as Kool-Aid, cranberry, and lemonade? Include fruit drinks you made at home and added sugar to.”; 3) “During the past month, how often did you drink sports and energy drinks such as Gatorade, Red Bull, and vitamin water?”; and 4) “During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do not include artificially sweetened coffee or diet tea.”
Table 2. Prevalence by State of Sugar-Sweetened Beverage Intake Once Daily or More Among US Adults Aged 18 or Older, National Health Interview Survey Cancer Control Supplement, 2010 and 2015

| State            | No. Respondents | Weighted % (95% CI)³ |
|------------------|-----------------|----------------------|
| New York         | 2,701           | 65.6 (63.1–68.1)     |
| North Carolina   | 1,511           | 62.7 (59.0–66.2)     |
| North Dakota     | 506             | 59.2 (53.8–64.5)     |
| Ohio             | 1,716           | 57.2 (54.1–60.3)     |
| Oklahoma         | 669             | 66.0 (59.1–72.3)     |
| Oregon           | 708             | 51.5 (48.6–54.4)     |
| Pennsylvania     | 1,727           | 65.9 (62.6–69.0)     |
| Rhode Island     | 390             | 65.7 (58.1–72.6)     |
| South Carolina   | 739             | 70.2 (64.6–75.4)     |
| South Dakota     | 515             | 72.5 (69.0–75.7)     |
| Tennessee        | 909             | 66.4 (61.2–71.2)     |
| Texas            | 4,227           | 62.5 (60.3–64.6)     |
| Utah             | 734             | 53.6 (49.1–58.1)     |
| Vermont          | 372             | 67.3 (64.6–69.8)     |
| Virginia         | 1,097           | 59.6 (56.1–63.0)     |
| Washington       | 1,185           | 55.0 (51.9–58.0)     |
| West Virginia    | 563             | 59.4 (55.8–62.9)     |
| Wisconsin        | 909             | 50.4 (46.6–54.2)     |
| Wyoming          | 498             | 73.2 (67.7–78.0)     |

³ The type of SSBs consumed was based on survey respondents’ answers to 4 questions: 1) “During the past month, how often did you drink regular soda or pop that contains sugar? Do not include diet soda.”; 2) “During the past month, how often did you drink sweetened fruit drinks, such as Kool-Aid, cranberry, and lemonade? Include fruit drinks you made at home and added sugar to.”; 3) “During the past month, how often did you drink sports and energy drinks such as Gatorade, Red Bull, and vitamin water?”; and 4) “During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do not include artificially sweetened coffee or diet tea.”