



Large State Variation in Sugar-Sweetened Beverage Purchases: What We Learn from the Beverage Industry Data

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ABSTRACT

Negative health consequences of excessive sugar-sweetened beverage (SSB) consumption have prompted recommendations for SSB taxation to improve diet and health. Over 40 countries and 8 local US jurisdictions have implemented SSB taxes to date. There is considerable interest in state SSB taxes in the USA, but state-level data on SSB consumption levels is lacking. This article uses proprietary data from the Beverage Marketing Corporation on beverage sales across all US retail channels to estimate state-level per capita SSB purchases in 2021. There is considerable variation in per capita SSB purchases across states, from an estimated annual 23.5 gallons (89.1 L) in Hawaii to 51.8 gallons (196.1 L) in Missouri. Current average levels of SSB purchases at 13 ounces (0.38 L) daily leave little to no room for added sugars from all other sources. Policymakers in states with extra-high SSB purchases, especially in the Midwest, should consider effective evidence-based policies, including fiscal approaches, to increase awareness about SSB risks, encourage healthier beverage choices, and improve population diet. *Curr Dev Nutr* 2021;5:nzab128.

Keywords: sugar-sweetened beverages, taxation, added sugars, fiscal policy, cross-state differences

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Supplemental Tables 1–3 are available from the “Supplementary data” link in the online posting of the article and from the same link in the online table of contents at <https://academic.oup.com/cdn/>.

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Abbreviations used: BMC, Beverage Marketing Corporation; SSB, sugar-sweetened beverage.

Introduction

Sugar-sweetened beverages (SSBs) are among the leading sources of empty calories in the USA for children and adults (1). Despite a recent decline in SSB intake (2–4), population consumption levels of SSBs and related sugars remain significantly above the recommended limits on added sugar (5). Well-documented negative health consequences of excessive SSB consumption and the discretionary contribution of SSBs to diet have prompted recommendations to tax SSBs to improve dietary and health outcomes and raise revenue (6, 7). Various types of SSB taxes have been implemented in 8 US local jurisdictions and over 40 countries, reaching > 2 billion people around the globe (8, 9). There is considerable interest in using state SSB taxes in the USA, but state-level data on SSB consumption is lacking. This article uses proprietary industry data on beverage sales to estimate state-level per capita SSB purchases in 2021.

Methods

Proprietary data from Beverage Marketing Corporation (BMC) measured the total volume of beverages sold across all US retail channels,

including all types of stores, restaurants, and vending machines. All SSB categories were included in this analysis: e.g., carbonated soft drinks, fruit drinks (excluding 100% juices), sports drinks, energy drinks, and ready-to-drink (RTD) tea and coffee. Powders (e.g., fruit drink powder mixes) were not included, but fountain drinks were part of the BMC data on soft drinks and counted in this analysis (10). Essence and flavored waters were diet varieties and therefore not included in the estimation. Flavored milk was not included.

The BMC data was based on gallons sold for each beverage type in the calendar year of 2019, including total volume sold and volume of diet compared with regular varieties. BMC also provided their projections for expected beverage sales (in gallons) in 2024, which were prepared in 2020–2021 and accounted for the impact of COVID-19 on the beverage industry. The BMC data is collected using the company's exclusive BMCDrinkTell™ database, with additional secondary research based on a variety of sources, interviews with industry executives, and other data components, described in detail elsewhere (11). Using the BMC 2019 volume sold data and 2024 projections, the study calculated a compound annual growth rate for 2019–2024 and applied it to project beverage gallonage sales in 2021.

Since state-level data on beverage sales was not available, BMC provided regional data on total volume sold for each beverage type

based on 7 regional markets for soft drinks and fruit drinks (Northeast, South, East Central, West Central, West, Southwest, and Pacific) and 4 regions for other beverages (Northeast, Midwest, South, and West; see **Supplementary Tables 1–2** for listings of states across regions). Data on the proportion of diet compared with regular varieties was provided at the regional level for soft drinks and at the national level for other beverages. State-level estimates were calculated based on the regional per capita volume sold, adjusted for the state's sociodemographic composition to reflect population differences in SSB consumption.

Adjustment weights for each state were developed by beverage type (**Supplementary Table 3**) and reflected the deviation of the state's sociodemographic composition from the composition of the regional population (hence, the adjustment weights are not very large) and beverage consumption across sociodemographic groups for each beverage type. The 24-h dietary recall data from the NHANES 2013–2014 was used to assess sociodemographic variation in the consumption of each beverage type by age (0–9, 10–19, 20–44, 45–64, and 65 y and above), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic other races) and education (less than high school, high school, some college or associate, and college or more). The adjustment weights were heavily weighted by education (70% weight), followed by race/ethnicity (20%) and age (10%).

State population estimates for 2021 were projected using the US Census Bureau Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: 1 April, 2010 to 1 July, 2019 (12). The annual rate of population growth over 2015–2019 was calculated to project population changes for 2019–2021. The sociodemographic composition of the resident population by state was assessed using the US Census Bureau 2019: American Community Survey (ACS) 5-Year Estimates (13), and population categories described above. The study used secondary data and was exempt from the human subjects' review. Data were analyzed in 2021.

Results

In 2021, per capita SSB purchases across the USA are projected at 37.1 gallons (140.5 L) per year (**Table 1**). There is a large variation in SSB per capita purchases across states, from an estimated annual total of 23.5 gallons (89.1 L) in Hawaii to 51.8 gallons (196.1 L) in Missouri with the median being 37.6 gallons (142.3 L) and the IQR is 7.7 gallons (29.3 L). Nine states, including 7 from the Midwest and 2 from the South, exceed the average SSB purchase levels by more than a SD (7.2 gallons or 27.3 L).

The multifold variation in SSB per capita estimates across states is driven primarily by large differences in soft drink purchases across regions. For example, compared with the Pacific region, per capita purchases of regular soft drinks are 3 times higher in the East Central region and almost 4 times higher in the West Central region, where they are 60% above the national average. Large regional differences in per capita purchases are also observed for other types of beverages, including higher per capita levels for energy drinks in the West, sports drinks in the South, and fruit drinks in the Northeast. However, soft drinks have the biggest impact on per capita estimates due to their leading share in the SSB market.

TABLE 1 Estimated total purchases of sugar-sweetened beverages across the USA, 2021

State	Per capita per year, Liters
Missouri	196.1
Iowa	194.9
South Dakota	194.2
North Dakota	191.3
Nebraska	190.9
Kansas	190.4
Minnesota	185.5
West Virginia	177.1
Kentucky	173.2
Indiana	167.0
Ohio	164.7
Michigan	162.5
Wisconsin	161.6
Illinois	159.4
Mississippi	155.6
Louisiana	155.1
Arkansas	153.7
Alabama	152.2
Tennessee	150.3
South Carolina	149.6
Georgia	148.6
Florida	147.8
North Carolina	146.4
New Mexico	145.3
Pennsylvania	142.2
Delaware	142.1
Arizona	142.1
USA, total	140.5
Virginia	140.4
Rhode Island	139.5
Maine	138.8
New York	138.6
Oklahoma	138.6
Texas	138.5
Maryland	136.3
New Jersey	136.3
Connecticut	135.9
Vermont	135.3
New Hampshire	135.2
Massachusetts	132.3
Nevada	132.1
Idaho	128.7
Wyoming	128.4
District of Columbia	126.7
Utah	125.1
Montana	125.1
Colorado	120.5
Alaska	93.0
California	92.4
Oregon	90.8
Washington	89.7
Hawaii	89.1

Source: Author's calculation based on data from the Beverage Marketing Corporation, National Health and Nutrition Examination survey, US Census.

Discussion

Per capita SSB purchases in the USA amount to an average 13 ounces (0.38 L) per day, where a 12-ounce SSB serving typically provides 35–45 g of added sugars and 130–150 calories. Dietary recommendations

suggest that adults limit added sugars to <10% of daily calories (200 calories or 48 g of sugar for a 2000 calorie diet). This study demonstrates that current *average* levels of sugary drink purchases leave little to no room for added sugars from *all* other sources, including all food. As the average consumer comes perilously close to their “limit,” whereas an important proportion of the population does not consume any SSBs, certain population subgroups contribute disproportionate amounts of this “average.” Future work should focus on understanding patterns in SSB purchases and consumption across population groups, with a particular focus on high users to identify opportunities for targeted policy reach.

This study had to make several simplifying assumptions to address the data gaps. First, state adjustments based on the NHANES data may not reflect all factors contributing to the variation in SSB purchases within regions, such as local prices. Beverage consumption by type across sociodemographic groups was available for NHANES 2013–2014, which is not expected to differ considerably from more recent years (4). Further, this analysis does not describe the level of uncertainty in this data, which policymakers interested in using these estimates would want to add to multiple scenarios and assumptions about their policy projections. It is also challenging to assess the validity of the regional BMC data using alternative sources of public or commercial data on SSB purchases. Such work is important to understand the differences in results based on the SSB sales data from commercial sources and self-reported consumption data in public household surveys.

Prior work on regional and state differences in SSB consumption relied on the National Health Interview Survey (NHIS) 2010–2015, suggesting that the highest prevalence of SSB consumption among adults was in the Northeast and the lowest in the Midwest (14, 15), which is not consistent with the results of this study. High consumption of sweetened coffee or tea in the Northeast was proposed as a possible explanation for the high prevalence of SSBs in the Northeast, although it is unclear why hot coffee would be combined with SSBs. Bottled tea and coffee account for <10% of the overall SSB sales in our data, highlighting the importance of measuring volume sold and consumed across SSB types. In policy development, it is also desirable to consider consumer preferences for specific types of SSBs given that their per capita sales vary considerably across regions and per ounce prices are much higher for some types, such as energy drinks.

In conclusion, the study highlights how reporting levels of SSB purchases at a national level obscures major differences across regions and states. It is outside the scope of this work to examine underlying drivers of the large state differences in SSB per capita purchases, which could include economic and social factors, such as availability, marketing, and prices of SSBs and their healthier alternatives, as well as culture and climate. Policymakers in states with high SSB purchases, especially in the Midwest, should consider effective evidence-based policies, including fiscal approaches, to increase public awareness about SSB risks, encourage healthier beverage choices, and improve population diet and health.

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conducted the study, wrote the manuscript, and read and approved the final manuscript.

Data Availability

The proprietary beverage sales data was provided through a contract by the Beverage Marketing Corporation, www.beveragemarketing.com, phone: (212) 688-7640.

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