

SUGARY DRINK TAX CALCULATOR: DATA AND ASSUMPTIONS

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Taxes on sugary drinks can generate considerable revenue for states, cities, and the nation. The Revenue Calculator for Sugary Drink Taxes estimates potential national or state revenue from a volume-based excise tax on sugary drinks (i.e., beverages with added caloric sweeteners). The calculator is built on several assumptions and data sources described below.

Beverage Sales Data

Proprietary data from the Beverage Marketing Corporation (BMC) was used to measure total sales of non-alcoholic beverages sold across **all retail channels** in the United States, including all types of food stores, fountain drinks in restaurants, vending machines, etc. The data was based on gallonage (**volume of gallons sold**) for the total year of **2019** and projections for **2024** (post-COVID, adjusted for loss of sales in 2020). The following beverage categories were included: carbonated soft drinks (CSDs) or sodas, fruit drinks (excluding 100% fruit juices), sports drinks, ready-to-drink (RTD) tea, energy drinks, and RTD coffee. Note that powders (e.g., fruit drink powder mixes) were not included in this estimation, but syrup served as fountain drinks was included. Beverage sales were assumed to represent beverage consumption.

This estimation focused exclusively on sugary drinks, also referred to as regular varieties of beverages or sugar-sweetened beverages, **excluding diet/zero-calorie/reduced calorie** beverages from the estimation. The BMC provides proprietary data on the share of diet vs. regular varieties for each beverage category. For CSDs, this data is available at the regional level; diet vs regular varieties of other beverages are assessed at the national level. For CSDs, projections of diet beverage sales in 2021-2023 were based on the BMC's projected 2024 regional volume sold for regular and diet varieties of fountain and packaged soft drinks. Other beverages were projected based on the BMC 2016-2019 national data for diet vs. regular varieties. The BMC defines diet beverages depending on their marketing by companies and calories per serving, typically using 40 calories per eight-ounce serving as a threshold. Based on BMC's data, all essence and flavored waters were diet varieties and therefore not included in the estimation.

Projections for beverage sales in 2021-2023 were based on the BMC projected 2024 data for volume sold and 2019 gallonage. A compound annual growth rate was calculated for 2019-2024 and applied to project per capita beverage sales in 2021, 2022 and 2023.

Regional BMC data on volume sold in 2019 and projections for 2024 was used for all beverage categories. Data on total beverage sales for specific states or localities was not available. The BMC defines 7 regional markets for CSDs and fruit beverages, including the Northeast, East Central, West Central, Pacific, South, Southwest, and West (**Table 1** lists states across 7 regional markets). The BMC uses 4 regional markets for sports drinks, RTD tea/coffee and energy drinks, including the Northeast, Midwest, South, and West (**Table 2**).

State-specific data on volume sold was calculated based on the corresponding region's per capita volume sold, adjusted for the state's socio-demographic composition to reflect differences in sugary drink consumption. The 24-hour dietary recall data from the National Health and Nutrition Examination Survey (NHANES) 2013-2014 was used to assess socio-demographic variation in the consumption of each beverage category by age (0-9, 20-44, 45-64 and 65+), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and 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 skewed by education, accounting also for the variation in sugary drink consumption by race/ethnicity and age.

Population Data

National and state population estimates for 2021-2023 were projected using the U.S. Census Bureau [Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2019](#) (Dec 2019 release). The annual rate of population change over 2015-2019 was calculated to project population changes for 2019-2023.

The socio-demographic composition of the resident population by state was assessed using the US Census Bureau 2019: American Community Survey (ACS) 5-Year Estimates and population categories described above. All individuals were assumed to be subject to the same tax rate.

Beverage Prices

Beverage prices in inflation-adjusted dollars were based on several BMC sources, including the BMC Topline report for CSDs (price per gallon sold in the total market), and proprietary reports for national/regional data on wholesale value and total gallonage sold for other beverages. Such data were not available for fruit drinks, which were assumed to equal RTD tea prices. Importantly, to account for lack of state-level data on beverage prices for the total market, national prices were adjusted for the state price correction using the **Cost of Living Index (COLI)*** for soft drinks (2020) for states with significant COLI representation or the 2020 State Cost of Living Index 2020; regional prices were used for RTD tea/coffee and sports drinks.

*<https://www.coli.org/>: Since 1968, the Council for Community and Economic Research (C2ER) has collected and published cost of living index data at the local level. Under the name of the ACCRA Cost of Living Index, the data collection process involves gathering primary price data from communities across the nation using both volunteer and paid data collectors. However, the voluntary nature of the index means that not every area is covered.

CALCULATOR ASSUMPTIONS AND OPTIONS

Fixed model inputs:

Some assumptions are built-in into the calculator and cannot be changed online. Please contact the UConn Rudd Center if interested in discussing estimations under different assumptions.

Price elasticity

The price elasticity of demand for sugary drinks was set to -1.0 based on a recent meta-analysis of the effects of sugary drink taxation (Teng et al 2019). The same price elasticity was assumed for all types of beverages.

Correction for cross-border shopping, tax avoidance, data limitations

The model includes a correction for potential cross-border shopping, tax avoidance and overestimation due to lack of state-specific sales and price data. The extent of these factors is unknown but was assumed to be significant to develop conservative revenue estimates. The correction for most states was assumed at 20% for potential lost revenue. Based on prior evidence on the extent of cross-border shopping in smaller markets with porous

borders and significant retail outside of the tax zone (e.g., Philadelphia, see Roberto et al 2019), states assumed to have a 25% correction were CT, DE, DC, ME, NH, VT and 30% in RI.

Options for Calculator Users to Change:

In estimating tax revenues, the calculator provides options in setting important inputs to the model, including the tax pass through rate and the tax rate. Estimates are available for 2021, 2022 or 2023 and the total US, 50 states and District of Columbia. City-level estimates are available for select locations upon through the American Heart Association and upon request.

Tax pass through rate

The default setting for the tax pass through rate is 70%, which is in line with prior evidence on the tax pass through for local sugary drink taxes in the US. To consider alternative scenarios, the calculator users can estimate tax revenue assuming an incomplete tax pass through rate from 50% to a complete pass through of 100%. The same pass through rate is assumed for all types of beverages.

Tax per ounce rate

The default setting for the tax rate is 1.50 cents/oz, which is the mid-point of implemented local taxes and tax proposals. To consider alternative scenarios, the calculator users can use tax rates from 1.0 to 3.0 cents per ounce. The same rate is assumed for all types of sugary drinks irrespective of their sugar content (i.e., no tiers).

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Table 1: BMC Regional Markets for Carbonated Soft Drinks and Fruit Drinks

<u>NORTHEAST</u>	<u>SOUTH</u>	<u>EAST CENTRAL</u>	<u>WEST CENTRAL</u>	<u>WEST</u>	<u>SOUTHWEST</u>	<u>PACIFIC</u>
Connecticut	Alabama	Illinois	Iowa	Colorado	Arizona	Alaska
Delaware	Arkansas	Indiana	Kansas	Idaho	New Mexico	California
D.C.	Florida	Kentucky	Minnesota	Montana	Oklahoma	Hawaii
Maine	Georgia	Michigan	Missouri	Nevada	Texas	Oregon
Maryland	Louisiana	Ohio	Nebraska	Utah		Washington
Massachusetts	Mississippi	West Virginia	North Dakota	Wyoming		
New Hampshire	North Carolina	Wisconsin	South Dakota			
New Jersey	South Carolina					
New York	Tennessee					
Pennsylvania	Virginia					
Rhode Island						
Vermont						

Source: Beverage Marketing Corporation (BMC).

Table 2: BMC Regional Markets for Sports Drinks, RTD Tea/Coffee, Energy Drinks

<u>NORTHEAST</u>	<u>MIDWEST</u>	<u>SOUTH</u>	<u>WEST</u>
Connecticut	Illinois	Alabama	Alaska
Delaware	Indiana	Arkansas	Arizona
D.C.	Iowa	Florida	California
Maine	Kansas	Georgia	Colorado
Maryland	Michigan	Kentucky	Hawaii
Massachusetts	Minnesota	Louisiana	Idaho
New Hampshire	Missouri	Mississippi	Montana
New Jersey	Nebraska	North Carolina	Nevada
New York	North Dakota	Oklahoma	New Mexico
Pennsylvania	Ohio	South Carolina	Oregon
Rhode Island	South Dakota	Tennessee	Utah
Vermont	Wisconsin	Texas	Washington
		Virginia	Wyoming
		West Virginia	

Source: Beverage Marketing Corporation (BMC).

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Bureau of Labor Statistics; CPI - All urban consumers US city average, seasonally-adjusted estimates. Carbonated beverages and juices and non-carbonated beverages.

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