Supplementary Materials

Supplemental Methods

Definition of Sugar-Sweetened Beverages and Methods of Estimating Sugar-Sweetened Beverage Consumption Among US Adults

We defined sugar-sweetened beverages (SSBs) as any non-alcoholic, carbonated or non-carbonated, packaged (bottled) and reconstituted beverage with any added "caloric" sweetener.[1] This definition includes soft drinks, carbonated drinks, energy drinks, sports drinks, fruit drinks, and other beverages with added sugars (**Supplementary Table 1**). We further defined "caloric" as ≥5 grams of added sugar per 12-ounce serving (≥20 kcal per 12-ounce). This definition aligns with thresholds used to define SSBs in existing SSB taxes throughout the United States (US) (**Supplementary Table 2**).

In NHANES, the amount of beverages consumed is estimated as grams consumed per day, and the amount of added sugar consumed is estimated as teaspoons per day. We converted the beverage size from grams to ounces and converted the added sugar unit from teaspoons to grams. We then estimated the consumption of SSBs in 8-ounce serving among US adults in 32 population subgroups by age (20-44, 45-54, 55-64, 65+ years), sex, and race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and other) using 24-hour dietary recall data collected among participants of the two most recent cycles of the National Health and Nutrition Examination Survey (NHANES) 2013-2016 (**Supplementary Table 3**).[2] The NHANES is designed to be a nationally representative survey based on a multistage and stratified area probability sample of non-institutionalized U.S. households.[3] Trained interviewers collected dietary information on all foods and beverages consumed during the previous 24 hours with the use of a computer-assisted dietary interview system that included a multiple-pass format with standardized probes.[4,5] To correct for measurement error associated with the use of one or two-day diet recalls estimating usual intake, we used the National Cancer Institute (NCI) method to estimate the usual intake distribution by strata.[6]

Methods of Estimating Effect Sizes of Implementing Sugar-Sweetened Beverage Tax on Intake Among US Adults

We identified the best available estimates of implementing SSB tax on intake based on food price intervention studies including studies assessing SSB tax and price elasticity modeling using the national data.[7-12] Because the effect sizes vary by income, we obtained estimates separately for high *versus* low-income individuals whenever possible. The following three studies served as the basis for deriving the best available estimates of implementing SSB tax on intake.

The first study is a meta-analysis of 23 interventional studies and 7 prospective cohorts that evaluated the impact of the food price change on consumption by Afshin et al. The results of this meta-analysis suggested a 6.74% reduction in SSB intake per 10% increase in price.[7] However, this meta-analysis did not present effect size estimates by income level.

The second study is a systematic review and meta-analysis of food price elasticity modeling studies using nationally represented data for different countries by Green et al.[12] This study evaluated food price elasticities by income level of a country (high versus low-income country).

The findings suggested that an increase in food price results in a greater reduction in consumption in low-income than high-income countries for nearly all foods evaluated. Among the 21 high-income countries, an average price elasticity (for sweets, confectionery, and SSB combined) was -0.73, corresponding to a 7.3% reduction in intake per 10% price increase.

The third study is a price elasticity modeling study conducted among the US population and by levels of income by Wada et al.[11] This study used nationally representative data of soda consumption and price to estimate the associations between regular soda price and soda intake as well as total caloric intake from soda by age, race/ethnicity, and income-based socioeconomic status (SES). They reported a price elasticity of -0.66 for the total US population and -1.025 for low-income individuals versus -0.505 for other individuals.

We used the effect size estimates from the study by Wade et al because they provide the effect size estimates by income level based on nationally representative data of US adults. Similar estimates for the total population from Wade et al to the national price elasticity reported by other meta-analyses support the use of effect size estimates from Wade et al for our study.

Using these estimates, we estimated that implementing a national penny-per-ounce SSB tax would result in a 10.8% decrease in SSB consumption among the total US adult population. The effect size was estimated to be higher among low-income individuals (16.8%) and lower among high-income individuals (8.3%) (**Supplementary Table 4**).

Various SSB taxes have also been implemented in multiple US jurisdictions, including penny-per-ounce SSB tax in Berkley and Oakland, California, and Cook County, Illinois; 1.5 cents-per-ounce SSB tax in Philadelphia, Pennsylvania; 1.75 cents-per-ounce SSB tax in Seattle; Washington; and 2 cents-per-ounce SSB tax in Boulder, Colorado.[10,13-17] Previous studies have evaluated the impact of these SSB taxes on reducing SSB consumption or purchases. However, earlier studies did not account for cross-border shopping, which may lead to an overestimation of the policy effect. We assessed the evidence from three studies that explicitly adjusted for cross-border shopping in reported estimates: (1) in Philadelphia, the tax resulted in a 51% decrease in total SSB volume sales. However, sales also increased in border zip codes, offsetting the decrease in Philadelphia by 24.4%. This led to a net reduction of 38% in total SSB volume sales. With a pass-through rate ranging from 43.1% in supermarkets to 104% in pharmacies, this net reduction is equivalent to a 17% reduction in SSB volume sales per 10% price increase;[13] (2) in Cook County, the tax resulted in a 27% reduction in SSB sales. After cross-border adjustment, the reduction was 21%. With a 114% pass-through rate, this net reduction corresponds to an 8% reduction in SSB sales per 10% price increase;[15] (3) in Seattle, tax resulted in a 22% reduction in SSB sales with no clear evidence of cross-border shopping occurring in Seattle's border area. With a 59% pass-through rate, this corresponds to an 11% reduction in SSB sales per 10% price increase.[16] To summarize the empirical evidence, we calculated the weighted average of these three studies using the baseline SSB volume sales as the weight. The weighted average was 11.4%, corresponding to an average of 11.4% reduction in SSB sales per 10% price increase. We model the policy effect using 11.4% as the policy effect estimate in a sensitivity analysis (**Supplementary Table 8**). Because the empirical evidence did not provide separate estimates for the higher vs. low-income population, the sensitivity analysis was conducted among the total US adult population only.

Cancer Incidence and Mortality for 13 Cancers Among US Adults

We obtained cancer incidence for 13 cancers among US adults in 32 population subgroups by age (20-44, 45-54, 55-64, 65+ years), sex, and race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and other) in 2015 from the Surveillance, Epidemiology, and End Results (SEER) database and the Centers for Disease Control and Prevention's National Program of Cancer Registries (NPCR) database.[18] To project cancer incidence in future years, we first calculated the average annual percent change (AAPC) by fitting a regression line to the natural logarithm of the age-adjusted incidence rates in years 2006 through 2015 (y): $\ln(I) = \alpha + \beta y$, where α and β are coefficients to be estimated, y is the calendar year, and I is the incidence rate from 2006 to 2015.[19,20] To project future cancer incidence from 2016 to 2030, we assume that the trend of cancer incidence follows the same AAPC from 2016 to 2030.[19] We held the cancer incidence constant for all subsequent years after 2030 because the validity of using the AAPC method for long-term projection has not been established.[20]

We obtained the five-year relative survival for 13 cancers among US adults in 32 population subgroups in 2014 estimated using the period analysis method from the Surveillance, Epidemiology, and End Results (SEER) database.[18] The relative survival is a net survival measure representing cancer survival in the absence of other causes of death, defined as the ratio of the proportion of observed survivors in a cohort of cancer patients to the proportion of expected survivors in a comparable set of cancer-free individuals.[21] The period analysis method enhances the use of the most up-to-date survival data by deriving the survival rate estimates exclusively from the survival experience of patients within the most recent calendar period.[22,23]

Methods for Estimating Health-Related Quality of Life for 13 Cancers

We searched the Tufts Medical Center Cost-Effectiveness Analysis (CEA) Registry database to identify the health-related quality of life (HRQOL) for the 13 cancer types. The following search string was used for each cancer type: ("health related quality of life" OR "HRQOL" OR "quality of life" OR "QOL" OR "preference weight*" OR “utility weight*” OR “health state utility*” OR “health utility*”) AND (“cancer of interest”) AND ("cancer" OR “neoplasm*”) AND ("review" OR “systematic review”). When an appropriate systematic review was identified, we read the articles included in the systematic review and determined if the paper met the following data needs. We used the following criteria to determine whether the HRQOL reported in a particular study or systematic review shall be considered for our study, including whether the cancer type included in the published study was specific to the cancer type of our interest, whether a US sample was used to estimate HRQOL; whether the EQ-5D was used to assess HRQOL, and whether phase-specific HRQOL was available. HRQOL ranging from 0 (dead) to 1 (perfect health) was extracted by phase of care (initial, continuous, end of life) whenever possible. When the phase-specific HRQOL was not available, we assumed the same HRQOL for each phase (**Supplementary Table 5).**

Methods for Estimating the Cost of Implementing National Sugar-Sweetened Beverage Tax in the US

We estimated the cost of implementing national penny-per-ounce SSB tax in two components: (a) the government tax collection costs and (b) the industry compliance costs. The total cost was assumed to be 2% of the SSB tax revenue, and the cost for each component was divided equally between the government and industry with a 3% annual discounting rate (**Supplementary Table 6**).

We considered the implementation cost as a function of tax revenue, and the government tax collection cost is equal to the industry tax compliance cost based on current literature. The Organization for Economic Co-operation and Development (OECD) reported a cost collection ratio (the ratio of administrative cost to net revenue) ranging from 0.47% to 0.66% in the US although this estimate did not account for industry compliance cost.[24] The Brookings Institute estimated that the government collection cost and the cost taxpayers bear to comply with the tax code represented 3-5 % for value-added taxes and 2-5 % for sales taxes.[25] MUNI Services, a private firm contracted by the city of Berkeley to collect SSB tax revenue, charges 2% of the tax proceeds.[26] Based on the literature, we estimated the total implementation cost as 2% of SSB tax revenue, divided equally between government and industry.[27]

To estimate the SSB tax revenue, we first estimated the mean consumption of SSB consumption in 8-ounce servings post-tax using the effect size estimates described in Supplementary Method 2. We then multiplied the mean consumption by the US adult population and the average SSB price in 2015 ($0.061 per ounce)[28] plus the additional $0.01 added to each ounce of SSB consumption (post-tax price: $0.071 in 2015 US dollars). Finally, we estimated 2% of the total SSB tax revenue as the cost of implementing the national penny-per-ounce SSB tax in the US. Using similar methods, we estimated the cost of implementing the SSB tax among low-income and high-income individuals separately, taking into consideration of different effect size estimates by income (Supplementary Method 2) and different population sizes by income. All costs were estimated as the present value of the tax revenue in 2015 US dollars and discounted 3% annually.

Methods of Estimating Health-Related Costs Among Individuals with and without Cancer

We estimated the annual health-related costs in three components: a) medical expenditure, b) productivity loss form missed workdays or disability, and c) patient time cost associated with receiving care. The health-related costs were estimated by age (under 65 vs. above 65 years old) and phase of care (three phases for individuals with cancer: initial, continuing, and end-year of life; two phases for individuals without cancer: general and end-year of life).

We extracted the raw data for each of the costing components from the published literature .[29-34] Because age-, sex, and phase-specific data were not available for some specific cancer types such as postmenopausal breast cancer, advanced prostate cancer, esophageal adenocarcinoma, and stomach cancer (cardia), we assumed the cost of breast, prostate, esophageal, and stomach cancers apply to these specific types. For some cancers such as multiple myeloma, gallbladder, liver, and thyroid cancers, because the cost data cannot be identified from existing literature, we used the costs for all cancers combined to replace the costs for these cancers. When a specific costing component was not directly available for a specific cancer type, we made our estimation based on the best available evidence. For example, the annual productivity loss for colorectal cancer was reported as a percentage of total health-related costs.[34] We then multiplied the total health-related cost for colorectal cancer by the percentage to obtain the productivity loss cost for colorectal cancer. For individuals without cancer, we assumed that the end-year life costs do not vary by the 32 subgroups.

To estimate the health-related costs in 2015, we assumed that there was an annual 2% increase in health-related expenditures in three phases of cancer care while the expenditure remained constant in the continuing phase of care. Based on this assumption, we applied a 2% increase annually in the three phases for medical expenditure, productivity loss, and patient time cost for cancer survivors, starting from the year in which the extracted data represented and lasting until 2015 to estimate the baseline health-related expenditures for cancer survivors. We used the same approach to estimate and project health-related expenditures for individuals without cancer.

To project future health-related costs, we assumed that the costs will increase by 2% from 2015 to 2025. Because the cost projection beyond 2025 may become less valid, we assumed no further increase in health-related costs after 2025. All health-related costs were inflated to 2015 US dollars using the Personal Health Care (PHC) index.

Supplementary Table 1. Inclusion and Exclusion of Beverages as Sugar-Sweetened Beverages

Sugar-Sweetened Beverages (≥5 grams of added sugar per 12 oz. serving)	
Included (but not limited to)	Excluded
Soft drinks	Fluid replacement
Carbonated drinks	100% fruit, vegetable juice
Energy drinks	baby food
Vitamin water drinks	coffee substitutes[2]
Water with caloric sweetener	Non-caloric artificially sweetened drinks.
Sports drinks	Alcoholic beverages.
Fruit drinks, fruit nectars, fruit squashes, lemonade, Frescas	100% fruit and vegetable juice
Beverage, non-fruit	Milk, milk-based drinks
Coconut beverages	Water without any caloric sweeteners
Presweetened iced tea[1]	Coffee, tea without added caloric sweeteners
Presweetened iced coffee[1]	Dietary supplements, beverages for medical use.
Presweetened coffee[1]	Infant formula
Punch and other non-alcoholic drinks with added sugar (e.g., alcohol-free wines, alcohol-free malt beverages - beer, etc.)	Dry concentrate if not-reconstituted

1. Presweetened coffee and tea were included if sugar was added during the processing of coffee or tea, but not added by consumers.
2. Coffee substitutes did not include added sugar, thus, we excluded.

Supplementary Table 2. Thresholds to Define Sugar-Sweetened Beverages in Existing Sugar-Sweetened Beverage Taxes

Location and Effective date	Tax Rate	Threshold to Define Sugar Sweetened Beverages
Berkeley, CA (Enacted Mar 2015)	1 cent per ounce	≥2 calories from added sugar per 1 oz.
Navajo nation (Enacted June 2016)	2% sales tax on soda	≥5g of added sugar per 12 oz
Philadelphia, PA (Enacted Jan 2017)	1.5 cent per ounce	None (any content)
Boulder, CO (Effective July 2017)	2 cent per ounce	≥5g of added sugar per 12 oz
Oakland, CA (Effective July 2017)	1 cent per ounce	≥25 kcal per 12oz
Cook County, IL (Effective July 2017)	1 cent per ounce	None (any content)
San Francisco, CA (Effective Jan 2018)	1 cent per ounce	≥25 kcal per 12oz
Seattle, WA (Effective Jan 2018)	1.75 cent per ounce	40 kcal per 12 oz
Albany, CA (Effective Apr 2017)	1 cent per ounce	≥2 calories from added sugar per 1 oz.

Supplementary Table 3. Mean Consumption of Sugar-Sweetened Beverages Among US Adults by Age, Sex, Race/Ethnicity, and Income, NHANES 2013-2016

Age groups, years	Sex	Race/Ethnicity	SSB Consumption, 8-oz servings/day, Mean (SE)[1]		
			Total Population (n= 235,162,844)	Higher-Income Adults[2] (n= 156,383,293)	Low-Income Adults[2] (n= 78,779,553)
20-44	Female	Non-Hispanic White	1.17 (0.05)	1.01 (0.04)	1.49 (0.06)
		Non-Hispanic Black	1.65 (0.06)	1.47 (0.05)	1.78 (0.06)
		Hispanic	1.41 (0.04)	1.31 (0.04)	1.48 (0.05)
		Other	0.98 (0.06)	0.90 (0.06)	1.11 (0.06)
	Male	Non-Hispanic White	1.94 (0.07)	1.77 (0.06)	2.35 (0.07)
		Non-Hispanic Black	2.15 (0.09)	2.09 (0.10)	2.22 (0.08)
		Hispanic	2.30 (0.08)	2.23 (0.07)	2.35 (0.08)
		Other	1.58 (0.10)	1.45 (0.10)	1.84 (0.10)
45-54	Female	Non-Hispanic White	1.01 (0.07)	0.84 (0.06)	1.60 (0.08)
		Non-Hispanic Black	1.17 (0.07)	1.18 (0.07)	1.16 (0.07)
		Hispanic	1.04 (0.07)	0.86 (0.06)	1.25 (0.08)
		Other	0.81 (0.11)	0.65 (0.07)	1.17 (0.17)
	Male	Non-Hispanic White	1.49 (0.09)	1.35 (0.08)	2.10 (0.01)
		Non-Hispanic Black	1.59 (0.10)	1.48 (0.09)	1.77 (0.12)
		Hispanic	1.52 (0.09)	1.25 (0.07)	1.78 (0.10)
		Other	1.06 (0.12)	0.85 (0.07)	1.55 (0.18)
55-64	Female	Non-Hispanic White	0.76 (0.06)	0.70 (0.05)	0.94 (0.08)
		Non-Hispanic Black	1.15 (0.08)	1.03 (0.07)	1.31 (0.09)
		Hispanic	0.79 (0.05)	0.70 (0.04)	0.88 (0.05)
		Other	0.69 (0.09)	0.72 (0.08)	0.60 (0.11)
	Male	Non-Hispanic White	1.27 (0.10)	1.18 (0.09)	1.58 (0.13)
		Non-Hispanic Black	1.48 (0.09)	1.43 (0.09)	1.55 (0.09)
		Hispanic	1.34 (0.07)	1.20 (0.06)	1.49 (0.07)
		Other	0.91 (0.10)	0.95 (0.11)	0.80 (0.09)
≥65	Female	Non-Hispanic White	0.48 (0.02)	0.40 (0.02)	0.68 (0.04)
		Non-Hispanic Black	0.67 (0.04)	0.72 (0.05)	0.61 (0.04)
		Hispanic	0.73 (0.05)	0.61 (0.04)	0.79 (0.06)
		Other	0.45 (0.07)	0.42 (0.06)	0.51 (0.09)
	Male	Non-Hispanic White	0.75 (0.03)	0.69 (0.03)	0.98 (0.04)
		Non-Hispanic Black	0.99 (0.07)	0.93 (0.06)	1.09 (0.08)
		Hispanic	0.92 (0.06)	0.78 (0.05)	1.00 (0.06)
		Other	0.85 (0.10)	0.90 (0.09)	0.73 (0.10)

Abbreviations: SSB, sugar-sweetened beverages; SE, standard error; NHANES, National Health and Nutrition Examination Survey

1. SSBs were defined as any non-alcoholic, carbonated or non-carbonated, beverages with added caloric sweetener including sodas, energy drinks, sports drinks, and fruit drinks.

2. Low-income (Federal poverty-to-income ratio (PIR) ≤1.85), Higher-income (Federal poverty-to-income ratio (PIR) PIR >1.85).

Supplementary Table 4. Change in Sugar-Sweetened Beverage Consumption After Implementation of a National Penny-Per-Oz Sugar-Sweetened Beverage Tax Among US Adults by Income

Population	Price Elasticity[1] (1)	Price of SSB per oz[2] (2)	Price of SSB per oz with Tax[3] (3)	Percent Increase in Price with Tax (4)	Percent Decrease in Intakes with Tax (5)
Total US Adults	-0.66	$0.061	$0.071	16.4%	10.8%
Low-Income Individuals	-1.025	$0.061	$0.071	16.4%	16.8%
High-Income Individuals	-0.505	$0.061	$0.071	16.4%	8.3%

1. Price elasticity is defined as the change in intake (oz.) per 1 percent change in price. Prior literature suggests a higher price elasticity among low-income individuals compared to high-income individuals.
2. Price of SSB per oz. is inflated to 2015 US dollars.
3. Price of SSB per oz. with tax is estimated as the price of SSB per oz before tax + $0.01 (penny-per-ounce tax).
4. Percent increase in price due to tax is calculated as (the price with tax – the price before tax) / the price with tax × 100%.
5. Percent decrease in SSB intake after implementing the tax is calculated as (1) × (4)/0.01.

Supplementary Table 5. Health-Related Quality of Life (HRQOL) Estimates for 13 Cancer Types

Health-Related Quality of Life	Phase	HRQOL	Source
Female Breast (post-menopausal)	Initial:	0.78 (0.19)	Yabroff et al.[35]
	Continuous:	0.81 (0.20)	
	End of Life:	0.64 (0.16)	
Colorectal	Initial:	0.760 (0.19)	Färkkilä et al.[36]
	Continuous:	0.835 (0.20)	
	End of Life:	0.643 (0.26)	
Advanced Prostate	Initial:	0.78 (0.20)	Yabroff et al.[35]
	Continuous:	0.76 (0.19)	
	End of Life:	0.59 (0.15)	
Stomach (gastric cardia)	Initial:	0.84 (0.25)	Zhou et al.[37]
	Continuous:	0.86 (0.24)	
	End of Life:	0.65 (0.33)	
Endometrial	Overall	0.80 (0.14)	Naik et al.[38]
Esophageal Adenocarcinoma	Overall	0.69 (0.26)	Wildi et al.[39]
Kidney	Overall	0.78 (0.14)	Pickard et al.[40]
Liver	Overall	0.79 (0.19)	Naik et al.[38]
Gallbladder	Overall	0.79 (0.19)	Naik et al.[38]
Pancreas	Overall	0.65 (0.30)	Müller-Nordhorn et al.[41]
Multiple myeloma	Overall	0.79 (0.19)	Naik et al.[38]
Thyroid	Overall	0.85 (0.13)	Naik et al.[38]
Ovary	Overall	0.77 (0.17)	Pickard et al.[40]

Supplementary Table 6. Relative Risk (RR) Estimates of Etiologic Relationships between Obesity and Cancer

Cancer Type	No. of Studies	No. of Events	Source	Evidence Grading	RR (95% CI) Per 5 kg/m^2 of Body Mass Index	Statistical Heterogeneity
Corpus uteri	26	18,717	CUP, 2013	Convincing ↑risk	1.50 (1.42-1.59)	I^2=86.2% P<0.0001
Esophageal (adenocarcinoma)	9	1,725	CUP, 2016	Convincing ↑risk	1.48 (1.35-1.62)	I^2=36.7% P=0.13
Kidney	23	15,575	CUP, 2015	Convincing ↑risk	1.30 (1.25-1.35)	I^2=38.8% P=0.03
Liver	12	14, 311	CUP, 2015	Convincing ↑risk	1.30 (1.16-1.46)	I^2=78.3% P=0.000
Gallbladder	8	6,004	CUP, 2015	Probable ↑risk	1.25 (1.15-1.37)	I^2=52.3% P=0.04
Stomach (cardia)	7	2,050	CUP, 2016	Probable ↑risk	1.23 (1.07-1.40)	I^2=55.6% P=0.04
Breast (post-menopausal)	56	80,404	CUP, 2017	Convincing ↑risk	1.12 (1.09-1.15)	I^2=75% P<0.001
Pancreas	23	9,504	CUP, 2011	Convincing ↑risk	1.10 (1.07-1.14)	I^2=19% P=0.20
Multiple myeloma	20	1,388	IARC, 2016	Sufficient (IRAC) ↑risk	1.09 (1.03-1.16)	Not reported
Prostate (advanced)	24	11,149	CUP, 2014	Probable ↑risk	1.08 (1.04-1.12)	I^2=18.8% P=0.21
Thyroid	22	3,100	IARC, 2016	Sufficient (IARC) ↑risk	1.06 (1.02-1.10)	Not reported
Ovary	25	15,899	CUP, 2013	Probable ↑risk	1.06 (1.02-1.11)	I^2=55.1% P=0.001
Colorectal	38	71,089	CUP, 2017	Convincing ↑risk	1.05 (1.03-1.07)	I^2=74.2% P=0.000

Abbreviations: CUP: Continuous Update Project; RR: relative risk; IARC: International Agency for Research on Cancer

Supplementary Table 7. Estimated Costs of Implementing a Penny-Per-Ounce National Sugar-Sweetened Beverage Tax in the United States

	Expenditure on SSBs	Expenditure on SSBs with Tax	Total SSB Tax Revenue	2% SSB Tax Revenue
Total US Adult Population				
Per Person Per Day	$0.504	$0.587	$0.083	$0.001
Per Person Per Year	$184.15	$214.34	$30.19	$0.604
High-Income Individuals				
Per Person Per Day	$0.419	$0.489	$0.069	$0.001
Per Person Per Year	$153.36	$178.51	$25.14	$0.503
Low-Income Individuals				
Per Person Per Day	$0.648	$0.753	$0.106	$0.002
Per Person Per Year	$236.52	$275.29	$38.77	$0.775

Abbreviations: SSB, sugar sweetened beverages

Supplementary Table 8. Estimated Health Gains, Costs, and Cost-Effectiveness of a Penny-Per-Ounce National Sugar-Sweetened Beverage Tax on Reducing Cancer Burden Among US Adults Aged 20 years, Using Empirical Evidence of Policy Effect

	Total US Adults (n= 235,162,844)
	Median (95% UI)
Overall health outcomes	
New cancer cases prevented	38,970 (32,105, 47,480)
Cancer deaths averted	23,718 (19,408, 28,838)
Life years saved	107,701 (87,521, 132,007)
QALYs gained	154,208 (125,713, 188,568)
Policy implementation costs, $ millions[1]	
Government administration costs	1,704 (1,502, 1,948)
Industry compliance costs	1,695 (1,476, 1,955)
Cancer-related health costs, $ millions	
Direct medical costs	-2,819 (-3,431, -2,321)
Productivity loss costs	-477 (-608, -356)
Patient time costs	-109 (-138, -85)
Net Costs, $ millions[2]	
Government affordability perspective	-1,112 (-1,738, -548)
Societal perspective[2]	-683 (-1,619, 142)
ICER, $	
Government affordability perspective[1]	cost-saving
Societal perspective[2]	cost-saving

Abbreviations: ICER, incremental cost-effectiveness ratio; QALYs, quality-adjusted life years; UI, uncertainty interval

1. Empirical evidence was derived using xxx. or (11.4% Reduction in SSB Sales for 10% Increase in Price) explain in the footnote the methods briefly, refer to supplementary method for the calculation of weighted average.

2. Policy implementation costs represent the net present value over a lifetime with a 3% discount rate. The tax policy was assumed to have a one-time effect on reducing SSB consumption that lasts for subsequent years with no further reduction.

3. The government affordability perspective reflects the difference between the government costs for implementing the policy and direct healthcare costs saved for cancer care. The societal perspective reflects the difference between the policy implementation costs (including both government administration costs and industry compliance costs) and the health-related costs saved (including direct healthcare costs, productivity loss costs, and patient time costs).

Supplementary Table 9. Estimated Health Gains, Costs, and Cost-Effectiveness of a Penny-Per-Ounce National Sugar-Sweetened Beverage Tax on Reducing Cancer Burden Among US Adults Aged 20 years or Above Over a Lifetime, Assuming No Time Trends in Cancer Incidence

	Total US Adults (n= 235,162,844)	Low- Income Adults[1] (n= 78,779,553)	Higher-Income Adults[1] (n= 156,383,293)
		Median (95% UI)	
Overall health outcomes			
New cancer cases prevented	16,954 (12,570, 21,828)	11,547 (9,585, 13,856)	8,748 (6,037, 12,011)
Cancer deaths averted	9,361 (6,949, 12,120)	6,449 (5,253, 7,716)	4,735 (3,349, 6,450)
Life years saved	29,436 (21,326, 33,784)	20,030 (16,599, 23,729)	16,938 (11,763, 23,247)
QALYs gained	46,498 (33,784, 60,464)	31,346 (25,982, 37,689)	27,099 (18,518, 37,434)
Policy implementation costs, $ millions[2]			
Government administration costs	1,718 (1,514, 1,966)	676 (591, 782)	1,008 (887, 1,142)
Industry compliance costs	1,709 (1,489, 1,972)	672 (581, 780)	1,002 (877, 1,144)
Cancer-related health costs, $ millions			
Direct medical costs	-1,006 (-1,316, -730)	-642 (-760, -536)	-604 (-850, -413)
Productivity loss costs	-408 (-540, -288)	-275 (-329, -227)	-245 (-343, -167)
Patient time costs	-71 (-94, -49)	-48 (-57, -39)	-43 (-60, -28)
Net Costs, $ millions[3]			
Government affordability perspective	714 (356, 1,085)	35 (-108, 172)	397 (149, 629)
Societal perspective[3]	1,953 (1,384, 2,496)	382 (189, 603)	1,120 (737, 1,453)
ICER, $			
Government affordability perspective[2]	15,340 (6,105, 30,511)	1,067 (-3,082, 6,375)	14,659 (4,157, 33,182)
Societal perspective[3]	42,359 (23,757, 71,788)	12,149 (5,324, 21,820)	41,174 (19,547, 76,340)

Abbreviations: ICER, incremental cost-effectiveness ratio; QALYs, quality-adjusted life years; UI, uncertainty interval

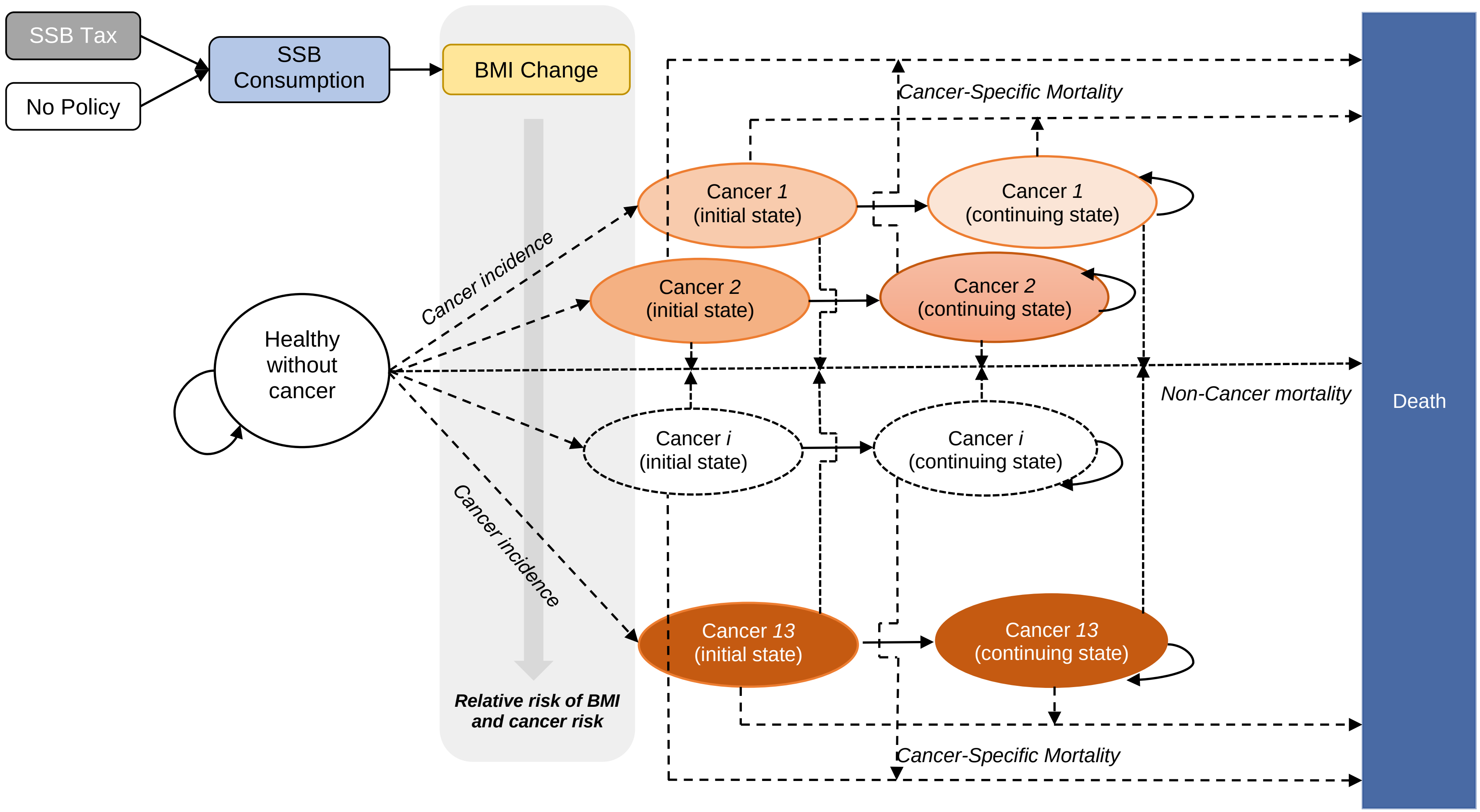
1. Low-income was defined as the federal poverty-to-income ratio (PIR) ≤1.85, and higher-income was defined as PIR >1.85.
2. Policy implementation costs represent the net present value over a lifetime with a 3% discount rate. The tax policy was assumed to have a one-time effect on reducing SSB consumption that lasts for subsequent years with no further reduction.
3. The government affordability perspective reflects the difference between the government costs for implementing the policy and direct healthcare costs saved for cancer care. The societal perspective reflects the difference between the policy implementation costs (including both government administration costs and industry compliance costs) and the health-related costs saved (including direct healthcare costs, productivity loss costs, and patient time costs).

Supplementary Table 10. Estimated Health Gains, Costs, and Cost-Effectiveness of a Penny-Per-Ounce National Sugar-Sweetened Beverage Tax on Reducing Cancer Burden Among US Adults Aged 20 years or Above Over 15 Years

	Total US Adults (n= 235,162,844)	Low- Income Adults[1] (n= 78,779,553)	Higher-Income Adults[1] (n= 156,383,293)
		Median (95% UI)	
Overall health outcomes			
New cancer cases prevented	5,206 (3,699, 6,880)	3,000 (2,456, 3,629)	2,918 (1,803, 4,054)
Cancer deaths averted	1,445 (967, 1,948)	871 (714, 1,054)	852 (488, 1,217)
Life years saved	3,182 (2,106, 4,343)	1,906 (1,552, 2,315)	1,861 (1,033, 2,680)
QALYs gained	9,823 (6,919, 13,468)	5,745 (4,680, 7,109)	5,629 (3,372, 7,988)
Policy implementation costs, $ millions[2]			
Government administration costs	959 (845, 1,068)	369 (324, 423)	573 (511, 640)
Industry compliance costs	963 (852, 1,081)	369 (326, 426)	573 (513, 646)
Cancer-related health costs, $ millions			
Direct medical costs	-443 (-587, -306)	-257 (-309, -213)	-255 (-356, -148)
Productivity loss costs	-131 (-177, -91)	-77 (-94, -63)	-76 (-106, -45)
Patient time costs	-19 (-26, -12)	-11 (-14, -9)	-11 (-16, -7)
Net Costs, $ millions[3]			
Government affordability perspective	520 (321, 693)	111 (41, 185)	317 (197, 446)
Societal perspective[3]	1,331 (1,077, 1,573)	392 (298, 496)	806 (640, 975)
ICER, $			
Government affordability perspective[2]	53,406 (25,613, 95,732)	19,293 (6,382, 37,358)	56,362 (25,674, 127,454)
Societal perspective[3]	136,837 (84,127, 219,067)	68,004 (43,948, 102,180)	143,756 (82,277, 281,671)

Abbreviations: ICER, incremental cost-effectiveness ratio; QALYs, quality-adjusted life years; UI, uncertainty interval

1. Low-income was defined as the federal poverty-to-income ratio (PIR) ≤1.85, and higher-income was defined as PIR >1.85.
2. Policy implementation costs represent the net present value over 15 years with a 3% discount rate. The tax policy was assumed to have a one-time effect on reducing SSB consumption that lasts for subsequent years with no further reduction.
3. The government affordability perspective reflects the difference between the government costs for implementing the policy and direct healthcare costs saved for cancer care. The societal perspective reflects the difference between the policy implementation costs (including both government administration costs and industry compliance costs) and the health-related costs saved (including direct healthcare costs, productivity loss costs, and patient time costs).



Supplementary Figure S1. **Diet and Cancer Outcome Model (DiCOM)**. Abbreviations: SSB, sugar-sweetened beverage; BMI: body mass index. The model consists of four general health states: (a) healthy without cancer (healthy state); (b) initial cancer diagnosis (initial state) for each cancer type *i*; (c) continuing care (continuing state) for each cancer type *i*; and (d) death state. Transitions between states are based on national cancer incidence and cancer-specific mortality rates from SEER (for individuals with cancer) and lifetable-based mortality rates (for individuals without cancer). The model simulates the policy impact on the number of new cases and deaths of 13 obesity-associated cancers, health-related quality of life (HRQOL), and health-related costs among US adults over a lifetime by comparing a policy scenario (national penny-per-ounce SSB tax) to a non-policy scenario (status quo).

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