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A sugar-sweetened beverage excise tax in California: Projected benefits for population obesity and health equity

Matthew M. Lee, MS[1], **Jessica L. Barrett, MPH**[2], **Erica L. Kenney, ScD**[1,2], **Jessie Gouck, MUP**[3], **Lauren Whetstone, PhD**[3], **Stephanie McCulloch, MS**[2], **Angie L. Cradock, ScD**[2], **Michael W. Long, ScD**[4], **Zachary J. Ward, PhD**[5], **Benjamin Rohrer, BA**[5], **David R. Williams, PhD**[2], **Steven L. Gortmaker, PhD**[2]

[1]Harvard T.H. Chan School of Public Health, Department of Nutrition, Boston, MA

[2]Harvard T.H. Chan School of Public Health, Department of Social and Behavioral Sciences, Boston, MA

[3]California Department of Public Health, Sacramento, CA

[4]George Washington University Milken Institute School of Public Health, Department of Prevention and Community Health, Washington, DC

[5]Harvard T.H. Chan School of Public Health, Center for Health Decision Science, Boston, MA

Abstract

Introduction: Amid the successes of local sugar-sweetened beverage (SSB) taxes, interest in state-wide policies has grown. This study evaluated the cost-effectiveness of a hypothetical 2-cent-per-ounce excise tax in California (CA) and implications for population health and health equity.

Methods: Using the CHOICES microsimulation model, tax impacts on health, health equity, and cost-effectiveness over ten years in CA were projected, both overall and stratified by race/ethnicity and income. Expanding upon prior models, differences in the effect of SSB intake on weight by BMI category were incorporated. Costing was performed in 2020, and analyses were conducted in 2021-2022.

Results: The tax is projected to save $4.55b in healthcare costs, prevent 266,000 obesity cases in 2032, and gain 114,000 QALYs. Cost-effectiveness metrics, including the cost/QALY gained,

Corresponding Author: Matthew M. Lee, MS, Harvard T.H. Chan School of Public Health, Department of Nutrition, 677 Huntington Ave, Boston, MA 02115, mlee8@g.harvard.edu, (916) 642-3497.

Credit author statement
Matthew M. Lee: Conceptualization, Methodology, Software, Formal Analysis, Writing – Original Draft, Writing – Review & Editing, Visualization, **Jessica L. Barrett:** Conceptualization, Methodology, Supervision, Writing – Review & Editing, **Erica L. Kenney:** Writing -- Review & Editing, **Jessie Gouck**: Conceptualization, Writing – Review & Editing, **Lauren Whetstone:** Conceptualization, Writing – Review & Editing, **Stephanie McCulloch:** Conceptualization, Writing – Review & Editing, **Angie L. Cradock:** Conceptualization, Writing – Review & Editing, **Michael W. Long:** Writing – Review & Editing, **Zachary J. Ward:** Software, **Benjamin Rohrer:** Software, **David R. Williams:** Writing – Review & Editing, **Steven L. Gortmaker:** Conceptualization, Methodology, Supervision, Writing – Review & Editing.

were cost-saving. Spending on SSBs was projected to decrease by $33/adult and by $26/child in the first year overall. Reductions in obesity prevalence for Black and Hispanic Californians were 1.8 times larger compared to White Californians, and reductions for adults with lowest incomes (<130%FPL) were 1.4 times the reduction among those with highest incomes (>350%FPL). The tax is projected to save $112 in obesity-related healthcare costs per $1 invested.

Conclusions: A state-wide SSB tax in California would be cost saving and lead to reductions in obesity and improved SSB-related health equity, and lead to overall improvements in population health. The policy would generate more than $1.6 billion in state tax revenue annually that can also be used to improve health equity.

INTRODUCTION

Despite the adverse influence of sugar-sweetened beverages (SSBs) on health, consumption remains prevalent in California.[1] In 2021, residents purchased over 3.6 billion liters of SSBs representing approximately $320 million dollars in transactions.[2] Consuming even 1-2 servings of SSBs daily is linked to higher cardiometabolic disease risk.[3] To encourage lower consumption of SSBs at a population level, four California cities, comprising Berkeley, San Francisco, Oakland, and Albany, have enacted excise taxes on the distribution of SSBs, which are passed through to consumers through increases in shelf prices. Strong evidence suggests that reductions in SSB intake lead to declines in obesity-related diseases, and thus far, evaluations of SSB taxes have found they lead to reductions in consumption and sales.[4–6]

Cost-effectiveness analyses of national taxes have projected that they can lead to substantial healthcare improvements and cost savings.[7] However, prior models have not established what an SSB tax's impact would be on health equity despite the fact that consumption is patterned by race and class. For example, targeted marketing of SSBs to lower-income Black and Hispanic communities is clearly documented, including greater advertising spending on Spanish-language television and higher levels of beverage advertising on media consumed by Black adults and youth.[8] In a recent report, Coca-Cola and PepsiCo were responsible for the majority of campaigns directed at youth of color.[8] These forces are likely to further entrench disparities in SSB consumption. Despite calls for population interventions that also improve health equity,[9] few cost-effectiveness studies of SSB taxes report results by these demographic characteristics in ways to help inform public policy.[10] Previous models have also assumed that changes to SSB consumption result in equivalent changes to weight across the entire BMI distribution, despite evidence that adults and children at higher BMI may be more sensitive to reductions in SSBs.[11–13]

In this study, a microsimulation approach was used to estimate the 10-year cost-effectiveness and health equity impacts of a $0.02/oz SSB excise tax in California implemented, accounting for differences in the effect of SSB intake on weight by BMI.

METHODS

The Childhood Obesity Intervention Cost-Effectiveness Study (CHOICES) microsimulation model was used to project the costs, health impacts, and cost-effectiveness of a $0.02/oz excise tax on SSBs in California from 2023-2032, compared to no intervention. A ten-year time horizon was chosen due to its relevancy for policymaking and the likelihood that impacts of a tax would be reasonably sustained over this period. SSBs were defined as any beverage with added caloric sweeteners. Diet beverages, 100% juices, and milk beverages were not considered taxed under the intervention, consistent with current policy.[14] This tax would be applied to all distributors in the state, and a $0.02/oz rate was chosen after discussions with local partners. This study was determined to be Not Human Subjects Research by the Harvard T.H. Chan School of Public Health Institutional Review Board.

Study Population

A state-wide tax would reach all individuals ≥2 years over a 10-year intervention period in California. The CHOICES model simulates a state-representative open population through a non-parametric matching procedure that synthesizes data including the US 2010 Census census-tract data, the National Health and Nutrition Examination Survey (NHANES), and the American Community Survey while ensuring that distributions of demographic variables are consistent with reported state-level data. Height/weight trajectories are drawn based on pooled analyses of large prospective cohort studies. Population growth was stratified by sex, age, race/ethnicity, BMI category, and smoking status using data from US Population Projections, life tables, and NIH-AARP Diet and Health Study.[7,15] Weight trajectories and demographics were calibrated to match state-level data from the California Health Interview Survey (2011-2017) by including the state-level prevalence estimates as calibration targets in the simulation.[16]

Following standard guidelines,[17] costs to state government and industry were determined assuming that the California Department of Tax and Fee Administration (CDTFA) would be responsible for administering and auditing a tax (Table 1). Costing was performed in 2020 by Gouck et al. (2021) previously.[18] State costs, including taxpayer identification, communications, and training, were identified by the CDTFA and California Department of Public Health (CDPH). Industry costs included those related to tax submissions and auditing compliance. For the 1,065 distributors that would be subject to the tax, 0.022 full time equivalent units from an industry accountant would be required per distributor.[19] Health-related costs were estimated based on analyses of the Medical Expenditure Panel Survey (MEPS), with continuous BMI-related costs by age and sex assigned based on analyses from 2011-2016.[20] Prior microsimulations of taxes have assigned health-related costs using categorical definitions of weight, leading to losses of information compared to approaches that reflect the non-linear relationship between BMI and costs by assigning health-related costs for each BMI value.[20]

All costs were converted to 2019 US dollars, the most recent year for which data were available at the time of economic analysis, and future costs were discounted at the standard rate of 3% per year to reflect the decaying value of future costs and benefits as recommended by the Second Panel on Cost-Effectiveness in Health and Medicine.[21] Results are reported from a modified societal perspective, which excludes costs associated with productivity changes associated with obesity or patient costs for transportation or the value of time seeking and receiving care – costs that are difficult to estimate and likely to be small over a 10-year time horizon.[7] Tax revenues and decreases in distributor SSB sales were not included in cost-effectiveness calculations, consistent with standard guidelines.[22]

The impact of a tax followed the logic outlined in Appendix Figure 1, which relates changes in price to changes in individual purchases/consumption and weight. To estimate baseline SSB intake by sex-, age-, and race/ethnicity, state-specific questionnaire data from CHIS (2011-17), 24-hour recall data from NHANES (2011-16), and sales data from the Rudd Center Calculator for SSB Taxes were combined.[23–25] Baseline intake levels for each age and race/ethnicity group were calibrated to their relative levels in CHIS by applying scalars to the NHANES estimates, which provide information on all SSBs consumed in a 24-hour window by sex, age, and race/ethnicity. They were then scaled to match regional sales estimates from the UConn Rudd Center.[25]

Implementation of a tax that increases SSB prices results in decreased consumption.[4] Assuming a tax would be fully passed on to consumers, an increase of $0.02/oz was calculated to translate to a 22.7% increase in the price of SSBs. Using an estimate of the own price elasticity of demand for SSBs of −1.21 identified from a systematic review of US food prices,[26] price changes were translated to consumption changes, which were then converted into weight changes. Based on evidence indicating that the effect of SSB reduction on body weight differs by BMI,[11–13] model effect inputs for the SSB intake-associated BMI/weight change were stratified by individual weight classification. Technical details are available in the Appendix.

Measures

Intervention-attributable impacts over a 10-year period were projected after a California $0.02/oz SSB excise tax implemented in 2023. These included the number of individuals reached by a tax, total implementation costs, and total healthcare costs saved over 10 years, changes in SSB spending, obesity prevalence, and quality adjusted life years (QALYs), deaths averted, years with obesity prevented, and cost-effectiveness measures including implementation costs per QALY gained, cost per year of obesity prevented, and healthcare costs saved per each $1 invested in implementation. Details on QALY weights by age, sex, and weight are found online (https://choicesproject.org/methods/choices-model-technical-documentation/). Following standard guidelines, values of cost-effectiveness are not reported if an intervention is cost-saving with respect to a given metric. Projected changes in the SSB intake were also examined, since this is a proximal mechanism by which SSB taxes might lead to obesity reductions.[3] In addition, changes in per capita SSB spending in the first year were calculated. To assess tax impacts on health disparities, results were stratified by race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian, or other racial/ethnic identity (including American Indian and Alaskan Native, Native Hawaiian and Other Pacific Islander, and those reporting multiple racial/ethnic identities)) and income as a percent of the FPL (<130%, 130-185%, 185-350%, and >350%).

Relative reductions in obesity prevalence and SSB consumption for each group compared to a reference (Non-Hispanic White or above 350% FPL) were estimated.

Statistical analyses

Estimates of the reach, costs, and effects of the intervention described above were used as inputs to the CHOICES microsimulation model. The CHOICES model is a stochastic, discrete time individual-based model that projects obesity-related outcomes under intervention-absent and intervention-present scenarios. 95% uncertainty intervals (UI) for all outcomes were taken as the 2.5th and 97.5th quantiles of estimates across 1000 Monte Carlo simulations. Additional details and updates on the CHOICES microsimulation are available online (https://choicesproject.org/methods/choices-model-technical-documentation/). Probabilistic sensitivity analyses were performed by drawing key input parameters from probability distributions (Table 1) and by stochastically sampling individuals to form the underlying simulated population. The primary model incorporated differential intervention effects by baseline BMI and applied healthcare costs by continuous values of BMI. However, several one-way sensitivity models were conducted varying assumptions about the relationship between SSB intake and weight change, the assignment of healthcare costs, the tax rate, and the extent to which a tax would be passed through to consumers. Results from these are in the Appendix.

RESULTS

A $0.02/oz SSB tax would be expected to reach 43.3 million individuals (95%UI:42.9-43.7), and cost $0.93 per person to implement (95%UI:0.67-1.21) over ten years (Table 2). In the first year, SSB spending, including dollars spent on the tax, would decrease by $32.54 (95%UI:-$8.64 to $140.78) for adults and by $25.67 (95%UI:-$7.78 to $123.92) for children.

From 2023-2032, a $0.02/oz California SSB tax would be cost-saving across all cost-effectiveness metrics. It was projected to lead to $4.55 (95%UI:$1.87-$10.60) billion saved in healthcare costs with reductions in obesity prevalence and cases. Implementing a tax would prevent an estimated 266,000 (95%UI:125,000-541,000) adult and 42,700 (95%UI:17,600-92,300) childhood cases of obesity in 2032. A tax would also result in 114,000 (95%UI:53,600-239,000) QALYs gained, 21,700 (95%UI:8,140-52,900) years of life gained, 6,320 (95%UI:2,350-15,000) deaths averted, and 2.02 (95%UI:0.958-4.16) million years of obesity prevented. A tax would generate $112 (95%UI:44-279) in health-related cost savings for each dollar invested in implementation (Table 2).

Differences in the projected impact of a tax varied by race/ethnicity and income (Table 3). At baseline, SSB consumption was highest for non-Hispanic Black and Hispanic populations. These groups saw the largest reductions in consumption compared to the non-Hispanic White population, translating into greater relative reductions in obesity prevalence. Similarly, these populations were projected to experience the greatest reductions in per capita SSB spending in the first year (Appendix Table 3). Since the effect of SSB reduction on weight is larger for individuals at higher BMI, these consumption differences were also amplified by co-occurring disparities in BMI. The tax-attributable obesity prevalence reductions among non-Hispanic Black and Hispanic populations were projected to be 1.82 times (95%UI:1.53-2.27) and 1.75 (95%UI:1.47-2.25) times the reduction among the non-Hispanic White group. This difference was larger for children: non-Hispanic Black children would experience an obesity prevalence reduction over twice as large (2.22, 95%UI:1.42-3.07), and Hispanic children would experience a reduction 1.88 as large (95%UI:1.48-2.49) compared to non-Hispanic White children. Subgroup analyses revealed an income gradient with those in the lowest income category experiencing the largest relative reductions in projected obesity prevalence and SSB intake.

Regardless of model specification, a state-wide tax was found to be cost-saving over 10 years (Appendix Table 2).

DISCUSSION

In this analysis, a $0.02/oz state-wide tax in California implemented in 2023 was projected to be cost-saving over 10 years, with more than 260,000 cases of obesity among the population 2 years or older, and over 40,000 cases of childhood obesity averted in 2032 alone. This would result in $4.55 billion in related healthcare costs savings. Reductions in obesity prevalence were projected for all racial/ethnic and income groups. The largest benefits were projected among individuals that are non-Hispanic Black, Hispanic, and individuals with lower incomes who would experience larger reductions in obesity prevalence, driven by greater reductions in SSB purchasing and intake relative to other groups.

Results from this study were consistent with published cost-effectiveness analyses of national SSB taxes.[10,14] However, this study includes innovations that suggest prior approaches may have underestimated the potential benefits of a tax. First, obesity-related healthcare costs were assigned using a novel continuous-BMI costing framework to account for more granular changes in health costs as a result of individual BMI changes, thereby allowing for assessment of potential cost-savings across the full BMI distribution in the population. Prior approaches assigned differential health-care costs when individuals moved between weight categories, for example, from obese to overweight or normal weight categories.[20] Second, the model incorporated differential impacts of SSB consumption changes on obesity by baseline BMI based on published evidence suggesting greater reductions in weight among those in the upper tail of the BMI distribution for the same reduction in SSB consumption.[11–13] While the realities of future tax implementation are unknown, testing several scenarios allows a broader understanding of the potential outcomes that might be seen.

While opponents have argued that SSB taxes disproportionately burden consumers from low-income households,[27] results from this study suggests that a state-wide tax is likely to improve health equity.[28] First, taxes result in reductions in SSB-related spending across the entire racial/ethnic and income distribution. In this microsimulation, individual SSB spending was projected to decrease by $33/adult and by $26/child in the first year. Those with lower incomes were projected to experience the greatest declines in SSB purchasing and intake, by as much as 30 liters/year for those between 0 to 130% FPL. Consequently, reductions in SSB spending were projected to be greatest for populations living with lower incomes, and for non-Hispanic Black and Hispanic communities. Implementation of a state-wide tax may therefore result in greater household dollars saved for these groups, freeing up resources that can be used elsewhere. These differences are projected to lead to improvements in health equity based on obesity prevalence. When examining differences by poverty level, those in the lowest income group were projected to experience 1.4 times the obesity prevalence reduction compared to those at the highest income. Larger differences were found by race/ethnicity, with non-Hispanic Black and Hispanic individuals experiencing nearly 2-fold greater reductions in obesity prevalence compared to non-Hispanic White individuals.

Second, taxes can be valuable tools for generating revenue for key public health interventions. According to the Rudd Center, a $0.02/oz tax with 70% pass-through in California would generate $1.6 billion dollars in 2023 alone.[25] During the revenue-allocation process, taxes provide an opportunity to engage communities and improve health equity further. In the US, revenues have been used to address community-driven priorities including access to healthy foods, health services, physical activity opportunities, and early childhood education.[29] Revenues from the Oakland tax, which have totaled more than $25 million,[30] have funded projects by the Alameda County Department of Public Health and Oakland Unified School District (OUSD) to promote nutrition education and health literacy, as well as to reduce food insecurity.[31] Recent research from existing taxes in San Francisco, Seattle, and Philadelphia found a significant net transfer of funds, as much as $16.4 million in Philadelphia, towards programs benefitting communities with lower incomes.[28]

Local taxes on SSBs have been implemented in Berkeley (2015), Albany (2016) Oakland (2017), San Francisco (2018) in California. Evidence suggests that these policies have led to increases in the prices for SSBs along with reductions in sales and consumption.[32] A state-wide policy may confer additional advantages. First, cross-border shopping, where consumers shift their purchases of SSBs to nearby cities without taxes, may reduce the overall effect on purchases. The extent of cross-border shopping varies, though Léger and Powell (2021) estimated that cross-border shopping in Oakland offset reductions SSBs sales by 46% in the first 2-4 months, and by 82% by 9-11 months.[33] A state-wide policy would reduce the negating influence of cross-border shopping. In addition, a state tax may promote a greater sense of fairness among beverage retailers as a broader policy would lower the competitive advantage of retailers in nearby cities.[34] SSB intake is also highest in counties that have not yet implemented taxes, and a state-wide policy represents an opportunity to address consumption in these areas (Appendix Figure 2 and Appendix Table 4).

Limitations

Cost-effectiveness analyses represent projections based on the best-available evidence from tax evaluations and studies of diet and weight change. Importantly, no study has yet to examine the effect of a US-based tax policy on weight outcomes directly, and results presented here leverage studies that examine effects of reduction in SSB intake on weight change. However, the CHOICES project has standard guidelines for evidence synthesis that prioritizes high-quality studies with limited bias, similar systematic review methods. This study also assumed a fixed own-price elasticity of demand for all individuals in the study population. While households with low incomes have been shown to be more price sensitive in response to an SSB tax in other countries, including Mexico, studies in the US have provided less evidence for interaction in the price elasticity of SSBs by income.[35,36] Lastly, results were reported using standard cutoffs for classifying obesity according to the CDC, though some research suggests that use of lower thresholds for non-Hispanic Asian populations may more accurately reflect chronic disease risk across the BMI distribution for this group.[37] Future work examining chronic disease outcomes could evaluate the sensitivity of results if different standards are developed in the US.

CONCLUSIONS

SSB excise taxes are an effective strategy to reduce consumption and purchasing of sweetened beverages. This microsimulation of a $0.02/oz state-wide excise tax on SSBs in California suggests the potential to promote healthy weight and substantial savings in related healthcare costs over ten years, alongside improvements in health equity. While SSB excise taxes are but one strategy, these findings reify their place in the policy toolkit to advance health and equity while generating important revenue that can be re-invested to build healthy communities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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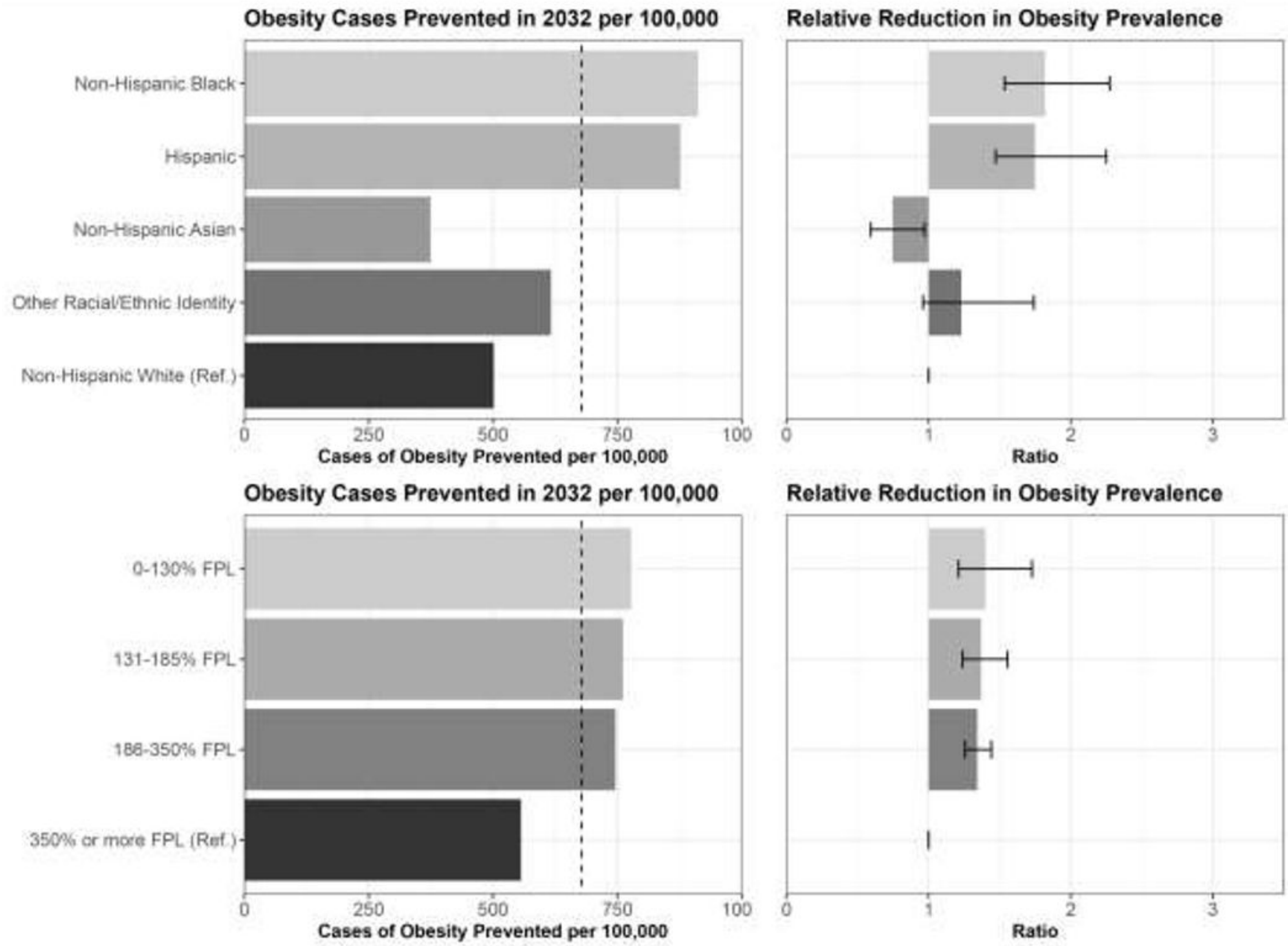

Figure 1: Projected absolute and relative cases of obesity prevented per 100,000 in 2032 following a $0.02/oz statewide sugar sweetened beverage excise tax in California, by race/ethnicity (top) and by income categories as a percent of the federal poverty level (bottom)

Dashed line represents the overall population-average obesity cases prevented per 100,000 individuals in 2032

Table 1:

Microsimulation inputs and sources for a $0.02 per ounce California state-wide sugar-sweetened beverage excise tax

Parameter	Value/Distributional Assumptions	Source/Notes
Costs		
Administrative start-up (year 1) costs for California Department of Tax and Fee Administration	$1.8-2.5 million; Sampled from uniform distribution with lower bound of $1.8m and upper bound of $2.5m	California Department of Public Health (CDPH) and California Department of Tax and Fee Administration (CDTFA); includes lump cost related to taxpayer identification, notification, and registration; regulation development; manual and publication revisions; tax return design; computer programming; return, payment, and refund claim processing; audit and collection tasks; staff training; public inquiry responses
Ongoing annual costs (years 2-10) for California Department of Tax and Fee Administration	$1.4-2 million; Sampled from uniform distribution with lower bound of $1.4m and upper bound of $2m	Same as administrative start-up costs.
Number of SSB distributors	1,065 (fixed)	CDPH/CDTFA
Labor (in full-time equivalents, FTEs) for industry tax submission and compliance	23 FTE total (range from 8.2-37.4), 0.0216 FTE per distributor (range from 0.0077 to 0.0351); Sampled from PERT distribution with min 0.0077, most likely 0.0216, and max 0.0351	Based on previous estimates of accountant labor from microsimulations of other SSB taxes by CHOICES.
Annual salary for industry accountants	$83,910 (fixed) with 43.65% fringe benefits rate	Bureau of Labor Statistics (BLS), fringe rate based on national average for private industry workers in 2019
Effects		
Baseline daily intake of SSBs	Model-based	Assigned based on non-parametric statistical matching in microsimulation population initialization, from NHANES 2011-2016 24-hour dietary recall data, sampled conditional on sex, age, poverty level, race/ethnicity, weight, and height.
SSBs baseline price per ounce (USD)	0.0881 (fixed)	Based on 2020 estimated beverage sales by category in California from the UConn Rudd Center Sugary Tax Calculator and the price for different beverage categories (inflated to 2020 dollars) from Powell et al. (2014)[38]
Own-price elasticity of demand for SSBs	−1.22 (range from −2.63 to −0.70); Sampled from shifted exponential distribution with lambda 1.9044 and shift parameter 0.6892)	Systematic review/pooled analysis of 12 studies reporting elasticities of demand for various SSBs by Powell et al. (2013)[26] Shifted exponential prior distribution chosen based on previous goodness of fit analyses by Long et al. (2015)[14]
Δ in SSB intake to Δ weight (youth 2-19 years, above age- and sex-specific median)	1.53kg over 18 months for 8.4oz daily replacement of artificially sweetened for sugar-sweetened beverages; Sampled from normal distribution with mean 1.53 and SD 0.42	From randomized trial of Dutch primary school children by Katan et al. (2016)[11] Dutch Median BMI for children by age- and sex and additional details available in the Appendix.
Δ in SSB intake to Δ weight (youth 2-19 years, below age- and sex-specific median)	0.62kg over 18 months for 8.4oz daily replacement of artificially sweetened for sugar-sweetened beverages; Sampled from normal distribution with mean 0.62 and SD 0.32	From randomized trial of Dutch primary school children by Katan et al. (2016)[11] Dutch Median BMI for children by age- and sex and additional details available in the Appendix.
Δ in SSB intake to Δ weight (adults 20+ years), overall	0.39 kg/m^2 for each additional 12oz serving (range 0.21 to 0.57); sampled from uniform with lower bound of 0.21 and upper bound of 0.57	Range of estimates taken from four change-in-change prospective cohort studies. Details on estimates extraction available in Long et al. (2015) and in the Appendix technical details document.[14]
Effect scalar by BMI weight category for adults	Underweight/normal weight = 0.494, Overweight = 1.056, Obese/severe obesity = 1.625; Sampled from uniform distributions, see technical details document in the Appendix for distributional parameters.	Calculated from meta-analysis of longitudinal cohort studies by Pan et al. (2013).[12] See technical details document in the Appendix for additional details. These scalars are multiplied by the overall adult Δ in SSB intake to Δ weight effect for the final intervention effect.

Table 2:

Impacts of a California $0.02/oz sugar-sweetened beverage excise tax on population reach, costs, and health

Intervention Impact Measure	Impact Estimate (95% UI)
Reach and Cost Measures	
10-year population reach (n, millions)	43.3 (42.9; 43.7)
10-year implementation costs ($, millions)	40.4 (29.1; 52.2)
10-year implementation costs per person ($)	0.93 (0.67; 1.21)
Healthcare costs saved over 10-years ($, billion)	4.55 (1.87; 10.60)
Net cost difference ($, billion)	−4.50 (−10.60; −1.84)
Healthcare costs saved per $1 invested ($)	112 (44; 279)
Health Impact Measures	
Mean per capita BMI reduction (kg/m^2)	−0.197 (−0.378; −0.097)
Reduction in obesity prevalence in 2032 (%)	0.678 (0.320; 1.370)
Reduction in childhood obesity prevalence in 2032 (%)	0.506 (0.213; 1.090)
Cases of obesity prevented in 2032 (n)	266,000 (125,000; 541,000)
Cases of childhood obesity prevented in 2032 (n)	42,700 (17,600; 92,300)
Quality adjusted life years gained (QALYs)	114,000 (53,600; 239,000)
Years of life gained (YL)	21,700 (8,140; 52,900)
Deaths averted	6,320 (2,350; 15,000)
Years with obesity prevented (years, millions)	2.02 (0.958; 4.16)
Cost Effectiveness Measures	
Cost per QALY gained	Cost-saving
Cost per year with obesity prevented	Cost-saving

UI, Uncertainty Interval; BMI, body mass index; QALY, quality adjusted life year

Table 3:

Projected reductions in obesity and sugar-sweetened beverage consumption following a tax, by race/ethnicity and income

	Absolute Measures [Point Estimate (95% UI)]					Relative Measures [Point Estimate (95% UI)]			
Characteristic	**Per Capita Daily SSB Consumption Change (oz) (Adults)**	**Per Capita Daily SSB Consumption Change (oz) (Children)**	**Cases of Obesity Prevented in 2032 (n) (All Ages)**	**Obesity Prevalence Reduction in 2032 (%) (All Ages)**	**Obesity Prevalence Reduction in 2032 (%) (Children)**	**Per capita Daily SSB Consumption Change Ratio (Adults)**	**Per capita Daily SSB Consumption Change Ratio (Children)**	**Obesity Prevalence Reduction Ratio (All Ages)**	**Obesity Prevalence Reduction Ratio (Children)**
By Race/ Ethnicity									
Non-Hispanic White	−1.77 (−3.80; −1.00)	−1.55 (−3.41; −0.91)	66,300 (30,800; 142,000)	0.501 (0.233; 1.070)	0.329 (0.131; 0.736)	Ref.	Ref.	Ref.	Ref.
Non-Hispanic Black	−3.43 (−7.28; −1.94)	−3.20 (−6.99; −1.87)	19,200 (9,010; 40,100)	0.912 (0.427; 1.870)	0.730 (0.278; 1.580)	1.93 (1.90; 1.96)	2.07 (2.00; 2.14)	1.82 (1.53; 2.27)	2.22 (1.42; 3.07)
Hispanic	−3.14 (−6.72; −1.77)	−2.29 (−5.03; −1.34)	151,000 (70,900; 303,000)	0.876 (0.410; 1.760)	0.619 (0.256; 1.340)	1.77 (1.76; 1.79)	1.48 (1.45; 1.51)	1.75 (1.47; 2.25)	1.88 (1.48; 2.49)
Non-Hispanic Asian	−1.57 (−3.34; −0.89)	−1.53 (−3.33; −0.90)	18,200 (8,530; 36,200)	0.374 (0.175; 0.747)	0.345 (0.141; 0.784)	0.89 (0.87; 0.9)	0.99 (0.94; 1.04)	0.75 (0.59; 0.97)	1.05 (0.75; 1.38)
Other Racial/Ethnic Identity	−2.46 (−5.25; −1.39)	−2.18 (−4.80; −1.28)	10,900 (5,160; 21,100)	0.617 (0.292; 1.180)	0.462 (0.177; 0.997)	1.39 (1.36; 1.41)	1.41 (1.37; 1.46)	1.23 (0.96; 1.74)	1.40 (1.01; 2.06)
By Income as a Percent of Federal Poverty Level (% FPL)									
0-130% FPL	−2.89 (−6.19; −1.63)	−2.28 (−5.03; −1.33)	73,600 (34,800; 146,000)	0.778 (0.366; 1.540)	0.538 (0.241; 1.280)	1.48 (1.46; 1.49)	1.26 (1.24; 1.28)	1.40 (1.21; 1.73)	1.38 (1.20; 1.61)
131-185% FPL	−2.81 (−5.99; −1.59)	−2.19 (−4.81; −1.28)	31,900 (14,700; 64,900)	0.761 (0.352; 1.550)	0.506 (0.210, 1.080)	1.43 (1.42; 1.45)	1.21 (1.18; 1.24)	1.37 (1.24; 1.56)	1.20 (0.98; 1.50)
186-350% FPL	−2.60 (−5.57; −1.47)	−2.04 (−4.48; −1.19)	71,300 (33,600; 148,000)	0.746 (0.348; 1.540)	0.531 (0.218; 1.150)	1.33 (1.32; 1.34)	1.13 (1.11; 1.15)	1.34 (1.26; 1.44)	1.26 (1.06; 1.45)
350%+ FPL	−1.96 (−4.19; −1.11)	−1.81 (−3.98; −1.06)	88,900 (41,700; 186,000)	0.556 (0.260; 1.160)	0.423 (0.181; 0.918)	Ref.	Ref.	Ref.	Ref.

UI, Uncertainty Interval; BMI, body mass index; QALY, quality adjusted life year