Sugary Drinks Excise Tax Alaska

Intervention Strategy Description

Implementation of a state excise tax on sugary drinks based on either solely the size of the beverage ("volume tax"; $0.03/ounce) or both beverage size and sugar content ("graduated tax": $0.03/ounce for higher-sugar-content beverages and $0.02/ounce for lower-sugar-content beverages). The tax in either form would be applied at the wholesale level, be administered by the state and be based on proposals considered by federal, state, and local governments and the American Heart Association.[1-4]

Background

Sugary drinks include all beverages with added caloric sweeteners. The modeled excise tax does not apply to 100% juice, milk products, or artificially-sweetened beverages. Although sugary drinks consumption has declined in recent years, adolescents and young adults in the United States consume more sugar than the Dietary Guidelines for Americans recommend, with persistent racial/ethnic disparities.[5-8] Randomized trials and longitudinal studies have linked sugary drinks consumption to excess weight gain, diabetes, and cardiovascular disease. Consumption of sugary drinks increases the risk of chronic diseases through its impact on weight and other mechanisms.[9,10] The *Dietary Guidelines for Americans, 2015-2020*[11] recommend that individuals reduce sugary drink intake in order to manage their body weight. Drawing on the success of tobacco taxation and decades of economic research, public health experts have studied taxes on sugary drinks and documented their likely impact.[12-15] In 2009, the Institute of Medicine (IOM) recommended that local governments implement tax strategies to reduce consumption of "calorie-dense, nutrient-poor foods," emphasizing sugary drinks as an appropriate target for taxation.[16]

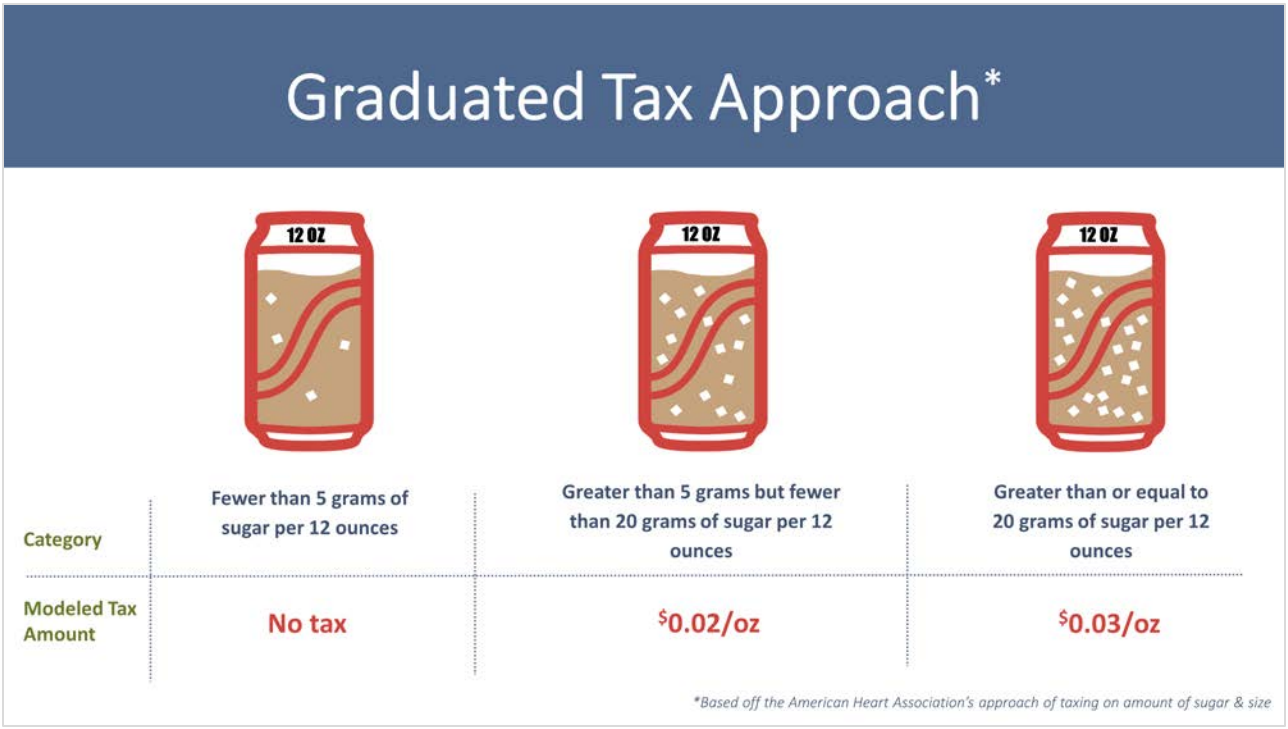
Summary Results 2015-2025

	Volume Tax: $0.03/ounce	Graduated Tax: $0.03/ounce & 0.02/ounce
# of Cases of Obesity Prevented in 10th year	7,220	6,830
Health Care Cost Avoided per $1 Invested	$19.30	$18.40
Cost per Case of Obesity Prevented	Costs avoided	Costs avoided
Health Care Cost Avoided	$43.6 million	$41.6 million

Modeled Tax Structures

In recent years, 7 cities in the U.S. have passed and implemented taxes of varying amounts on sugary drinks based on the size of the beverage (referred to in this brief as a volume tax). The volume tax model in this brief followed this approach.

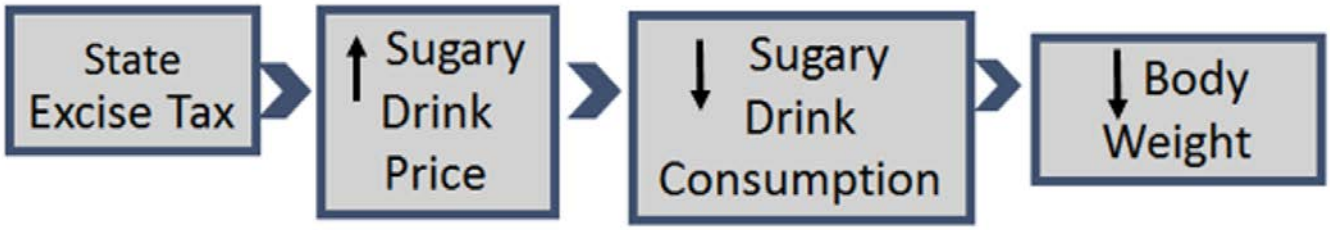
The United Kingdom is applying a different type of tax structure to a sugary drink tax starting in 2018, which will be a tax rate that varies according to both the amount of sugar in the beverage and the size of the beverage, referred to in this brief as a graduated tax. This approach, according to a recent report by the Urban Institute, may encourage industry to reformulate products to reduce sugar.[17] The American Heart Association has developed a proposal for a graduated tax structure; that framework was used for the graduated tax model.[1]



Under both approaches, a tax rate of 0.25 cents/ounce is applied to powdered beverages.

Modeling Framework

An excise tax is linked to changes in body weight through changes in sugary drink price and consumption.



Impact of Tax on Price to Consumers

We assume 100% pass through of the tax over the 10 years. Empirical studies in Mexico and France indicate that approximately the full amount of the excise tax is passed on to consumers.[18] Short-term studies for the local tax in Berkeley indicate less than complete pass through.[3,19,20] The expected percent increase in sugary drink price was estimated based on an average $0.092/ounce; based on national and local price/ounce for several sugary drink categories, including ready-to-drink and powdered mixes;[21-23] and inflated for higher prices in geographically remote locations in Alaska where high transportation costs increase food and beverages prices .[23] The volume tax approach would result in an average 36% price increase; the graduated tax approach would result in a 34% price increase.

Sugary Drink Consumption and Price Elasticity of Demand

We used regionally-adjusted estimates of total sugary drink consumption in 2017 published in the UCONN Rudd Center Revenue Calculator for Sugar-Sweetened Beverage Taxes to adjust national age, sex, and race/ethnicity-specific consumption data from the National Health and Nutrition Examination Survey (NHANES) 2005-2010 to estimate current sugary drink consumption levels in Alaska.[24] We further adjusted sugary drink consumption to

account for Alaska Behavioral Risk Factor Surviellance System (BRFSS)-reported differences by race.[25] A review of studies published from 2007-2012 was used to estimate how a change in the price of sugary drinks would impact consumer purchases.[26] These studies found that, on average, every 10% price increase would lead to a 12% reduction in purchases.[65] Recent research concerning the Berkeley tax indicates a 21% reduction in sugary drink intake among low-income populations.[19]

Direct effect of change in sugary drink consumption on change in weight

We conducted evidence reviews for impact of change in sugary drink intake on weight, measured by Body Mass Index (BMI), taking into account any dietary compensation.[15] Four large longitudinal studies in adults[27-30] of sufficient duration were identified. The relationship was modeled using a uniform distribution based on the range of the estimates of the effect of a one-serving (142 kcal) reduction on BMI (from 0.21 to 0.57). A double-blind randomized controlled trial conducted over 18 months among youth found that kids who consumed an additional daily 8 ounce serving (104 kcal) of sugary drinks gained 1 kg more weight than kids who did not.[31] We assumed the same impact of change in sugary drink consumption on change in body weight for both tax structure approaches.

Reach

Since obesity can be estimated and tracked for adults and youth as young as age 2, for the purposes of the model the reach of the intervention is defined as all youth and adults ages 2 years and older in Alaska.

Costs

We assume that the two different tax structures would involve the same implementation costs. The policy change would involve start-up and ongoing labor costs for state tax department administrators. To implement the intervention, the state government would need to process tax statements and conduct audits. The state government would also incur a one-time cost to set up the new tax within the state system. Businesses would also need to prepare tax statements and participate in audits, which would require labor from private tax accountants. Cost information was drawn from states and localities with planned or implemented excise taxes on sugary drinks.[15] *The cost and benefit estimates do not include expected tax revenue.*

CHOICES Microsimulation Model

The CHOICES microsimulation model for Alaska was used to calculate the costs and effectiveness of a volume or graduated sugary drink tax over 10 years (2015–25). This is a stochastic, discrete-time, individual-level microsimulation model designed to simulate the experience of the state population from 2015 to 2025. Cases of obesity prevented were calculated at the end of the model in 2025. The model uses data from the following sources: U.S. Census, American Community Survey, Alaska Behavioral Risk Factor Surveillance System[32,33], NHANES, National Survey of Children's Health[34], the Medical Expenditure Panel Survey, and multiple national longitudinal studies. We calculated uncertainty intervals using Monte Carlo simulations programmed in Java over 1,000 iterations of the model for a population of 1,000,000 simulated individuals scaled to the state population size.[15]

According to this model analysis, a $0.03/ounce volume excise tax on sugary drinks in Alaska would reach all residents of the state and prevent over 1,000 cases of childhood obesity and over 7,000 cases of adult obesity in the 10th year of the model. The sugary drinks excise volume tax would also prevent 156 premature deaths due to sugary drink consumption while avoiding $43.6 million in health care costs by the final year of the model. We project overall obesity prevalence to decline by 0.93% in the final year of the model with the tax and a decline in childhood obesity prevalence of 0.56% (the difference in the projected Alaska prevalence of obesity without the intervention and the projected Alaska prevalence of obesity in 2025 with the intervention). The sugary drink excise tax is projected to

increase healthy life years and avoid $19.30 in health care costs for every $1 to implement the tax. The graduated tax is projected to result in a slightly lower impact on health and health care costs avoided and is also projected to be a cost saving approach for reducing obesity. Detailed model results are presented in the table below. A sugary drink excise tax, using either tax approach, is one of the most cost effective strategies to reduce childhood obesity the CHOICES team has modeled. [15]

Results

Metric	Volume Tax $0.03/ounce Results	Graduated Tax $0.03/ounce & $0.02/ounce Results
	Mean (95% Uncertainty Intervals)	
Effect		
Cases of obesity prevented in 10th year*	7,220 (5,710; 8,080)	6,830 (5,420; 7,660)
Case of childhood obesity prevented in 10th year*	1,110 (809; 1,370)	1,030 (747; 1,270)
Reduction in obesity prevalence overall in 10th year*	0.93% (0.74%; 1.04%)	0.88% (0.70%; 0.99%)
Reduction in childhood obesity prevalence in 10th year*	0.56% (0.41%; 0.70%)	0.52% (0.38%; 0.64%)
Years with obesity prevented over 10 years	51,000 (40,700; 56,500)	48,400 (38,600; 53,600)
Life years gained over 10 years	519 (388; 635)	496 (368; 612)
Deaths prevented* over 10 years	156 (119; 185)	149 (114; 180)
Decrease in 12-ounce serving of sugary drinks per person in the first year*	134 (74.5; 230)	128 (70.4; 219)
Total decrease in gallons of sugary drinks consumed in the first year*	9,210,000	8,840,000
Cost		
Health care costs avoided over 10 years^	$43.6 million ($35.4 million; $48.0 million)	$41.6 million ($33.8 million; $45.7 million)
Annual intervention cost	$226,000 ($192,000; $260,000)	$226,000 ($192,000; 261,000)
Total 10 year intervention cost	$2.25 million ($1.92 million; $2.60 million)	$2.26 million ($1.92 million; $2.61 million)
Net cost (negative means savings) over 10 years†	-$41.3 million (-$45.9 million; -$33.0 million)	-$39.3 million (-$43.5 million; -$31.6 million)
Health care costs avoided per $1 invested^	$19.30 ($14.60; $23.80)	$18.40 ($14.10; $22.70)
Reach		
First year population reach*	734,000 (733,000; 734,000)	734,000 (733,000; 734,000)
Cost/Effect		
Cost per year with obesity prevented	Costs-avoided	Costs-avoided
Cost per Quality Adjusted Life Year (QALY) gained	Costs-avoided	Costs-avoided
Cost per case of obesity prevented	Costs-avoided	Costs-avoided
QALYs gained	2,090 (1,690; 2,330)	2,000 (1,620; 2,250)

All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted.

† These costs include the difference between the cost to implement the intervention and the healthcare cost savings produced over 10 years.

^does not include dental costs saved

Impact on Diabetes

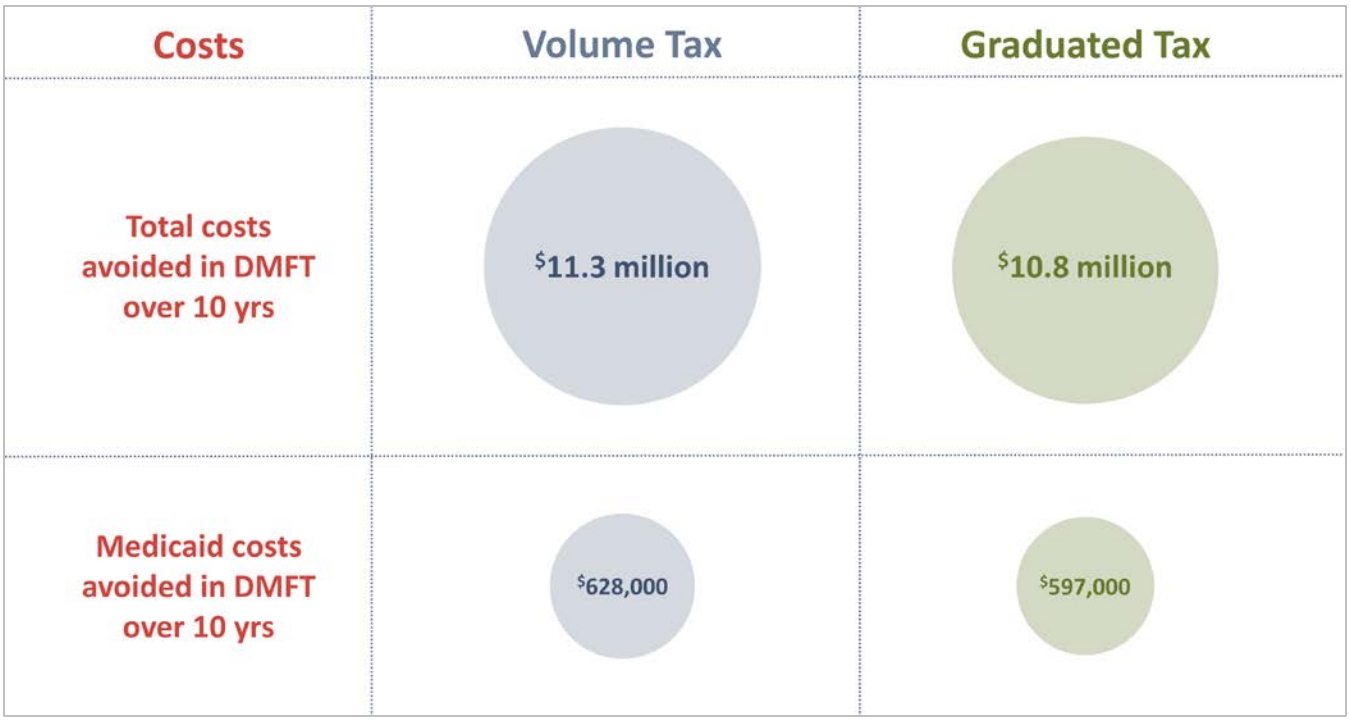
We estimated the impact of the tax-induced reduction in sugary drink intake on type 2 diabetes incidence for adults ages 18-79 years using a published meta-analysis of the relative risk of developing diabetes due to a one-serving change in sugary drink consumption[35]as well as local estimates of diabetes. On average, each 8.5 ounce serving of sugary drinks per day increases the risk of diabetes by 18%. In Alaska, we estimated that a $0.03/ounce volume tax would lead to a 10% reduction in diabetes incidence — an estimated 362 cases of diabetes prevented — over a one-year period once the tax reaches its full effect; the graduated tax would lead to a similar reduction— an estimated 384 cases of diabetes prevented — over this same timeframe.

Impact on Dental Caries

We estimated the impact of a sugary drink excise tax on tooth decay cost using a longitudinal analysis of the relationship between intake of sugars and tooth decay in adults. On average, for every 10 grams higher intake of sugar per day, there is an increase in decayed, missing and filled teeth (DMFT) of approximately 0.10 over 10 years.[36] As described above, we assume that the excise tax will result in a reduction in sugary drink intake. There are many studies showing a similar relationship between higher intake of sugars and tooth decay in children and youth[37] and thus we assume the same relationship as found in adults.

We used the Alaska Medicaid Assistance: State Fiscal Year 2018 Fee Schedule to estimate a Medicaid cost of treating DMFT as: $692.24 for a permanent crown in children and $106.89 for a filling in both children and adults. These codes reflect treatment for one surface and do not reflect higher reimbursement rates for multi-surface treatment, temporary crowns, or potential flat tax schedules. Based on analysis of data on tooth decay, fillings and crowns for the U.S. population from NHANES 1988-1994 (the last year crowns and fillings were separately reported)[39], we estimate that 78.9% of tooth decay in children and 43.5% of tooth decay in adults is treated. Using this same data set, we estimate that 97% of treatment for children is fillings and 82.5% of treatment for adults is fillings.

To estimate Medicaid-specific dental caries cost savings, we used local estimates of the numbers of people enrolled in Medicaid and the proportion receiving Medicaid dental services from 2011; these numbers may be conservative given state-wide Medicaid expansion in Alaska in fiscal year 2016. In Alaska, we estimate that a $0.03/ ounce volume tax would lead to a total savings of $11,300,000 over a period of 10 years in DMFT and of that $628,000 in Medicaid savings. We estimate that a $0.03/ounce and $0.02/ounce graduated tax would lead to a total savings of $10,800,000 over a period of 10 years in DMFT and of that $597,000 in Medicaid savings. The Medicaid reimbursement tax estimates may underestimate the total cost savings of tooth decay treatment projected here as dental providers may charge higher amounts to patients.



Expected Yearly Sugary Drink Tax Revenue[1]

The annual revenue from a state excise tax on sugary drinks is likely to be substantial. Based on data from the Rudd Center and CHOICES model estimates of the consumption of sugary drinks, including powdered beverages, in Alaska, a $0.03/ounce volume excise tax on ready to drink sugary drinks and $0.0025/ounce tax on powdered sugary drinks in Alaska could raise approximately $32.0 million in 2017 and a graduated excise tax ($0.03/ounce and $0.02/ounce) could raise approximately $36.0 million in 2017.

Equity and Implementation Considerations

Concerns have been raised regarding the impact of the tax on households with low incomes. Because of the elasticity of -1.21, our analyses clearly indicate that households will spend less on sugary drinks after the tax goes into effect, providing disposable income for other purchases. We estimate that a $0.03/ounce volume tax will result in $109 million in sugary drink savings for consumers after one year and a $0.03/ounce and $0.02/ounce graduated tax will result in $105 million in sugary drink savings for consumers after one year. In addition, we project that greater health benefits will accrue to low-income consumers who on average consume more sugary drinks than higher-income consumers; the same is true for a number of racial and ethnic groups. Racial/ethnic and income disparities in obesity outcomes should thus decrease following implementation of the modeled tax. In addition, revenue raised from a sugary drinks tax can be reinvested in low-income communities; for instance, in Berkeley, sugary drink tax revenue has been allocated for spending on school and community programs, several with a focus on low-income or minority populations, to promote healthy eating, diabetes prevention and obesity prevention.[40,41]

There is opposition to sugary drink excise taxes from the beverage industry, which spends over $4 billion each year nationwide on marketing.[42] Public support for such taxes generally increases when the public knows the revenue is designated for health promotion activities.[43] The modeled tax is likely to be sustainable if implemented based on the history of tobacco excise taxes.

[1] Actual fee revenue may be lower than these projected estimates due to several factors. For instance, retailers may have inventories of sugary drinks obtained before a tax is implemented. There may also be some distributors/manufacturers that are non- compliant with the fee. Revenue estimations differ from the UCONN Rudd Center Revenue Calculator for Sugar-Sweetened Beverage Taxes due to the use of locally adjusted consumption estimates and the inclusion of powders taxed at a lower tax rate.

Discussion

We project that the modeled sugary drink excise tax based on a volume tax structure of $0.03/ounce would prevent thousands of cases of childhood and adult obesity, prevent new cases of diabetes, increase healthy life years and avoid more in future health care costs than it costs to implement, with a lower impact for a graduated tax structure. Revenue from the tax could be used for education and health promotion efforts. Implementing the tax could also serve as a powerful health education message to reduce added sugar consumption. There is potential for a shift in social norms of sugary drink consumption based on evidence from tobacco control tax and regulatory efforts.[44] There is not one reason for the obesity epidemic and there is not one solution. A sugary drink excise tax is just one of a number of cost-effective strategies that could be implemented; a multi-pronged, multi-sector approach will be necessary to reduce obesity.

Results prepared by the CHOICES project at the Harvard T.H. Chan School of Public Health: Gortmaker SL, Long MW, Ward ZJ, Giles CM, Barrett JL, Flax C, Resch SC, Cradock AL. Funded by The JPB Foundation and Healthy Food America. Results are those of the authors and not the funders. For further information contact cgiles@hsph.harvard.edu. Visit www.ChoicesProject.org.

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