NEW YORK CITY: Sugary & Diet Drink Taxes

CHOICES

Executive Summary

High rates of obesity are one of the greatest public health threats facing the United States. Sugary drink consumption can lead to type 2 diabetes, heart disease, cavities, weight gain, and obesity. Overweight and obesity are linked to many chronic conditions such as high blood pressure and some cancers.

The current public health landscape demonstrates that nutrition remains critical, even during an infectious disease outbreak like COVID-19. Health conditions such as obesity, diabetes, and heart disease are related to nutrition and can increase the risk of severe illness from COVID-19. Rates of these chronic diseases are still too high in New York City (NYC), disproportionately burdening communities of color.

Federal, state, and local governments have long considered implementing excise taxes on sugary drinks to reduce consumption, reduce obesity, and provide an additional source of government revenue.[1-4] As of 2019, seven U.S. jurisdictions are enforcing beverage tax policies.

We modeled implementation of a city excise tax using two scenarios. Scenario one included a tax on sugary drinks only and scenario two included a tax on both sugary and diet drinks. Each scenario examined three potential tax rates: $0.01/ounce, $0.015/ounce, and $0.02/ounce.

All six tax models resulted in lower levels of sugary drink consumption, thousands of people for whom obesity would be prevented (note: referred to as "cases" throughout this report), improved health equity, and hundreds of millions of dollars in health care cost savings. The estimated effects of the interventions on health care costs were based on national analyses that indicated excess health care costs associated with obesity among children and adults.[5] Health care cost savings per dollar invested ranged from $12.80 to $32.90 across the six models. Projections demonstrate that annual revenue generated from a sugary drink tax is likely substantial.

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Background

There are persistent racial and ethnic inequities across both sugary drink consumption levels and rates of obesity and chronic disease in the U.S.[6-9]

A history of racist and discriminatory policies and practices has created deep inequity that continues to shape where New Yorkers live and go to school, what jobs they have, and what their neighborhoods look like, including their access to affordable healthy food. This inequitable distribution of resources and opportunities for health influences New Yorkers' dietary intake, including sugary drink consumption, contributing to unfair differences in diet-related disease outcomes among the NYC population.[10] An estimated 57% of adults and 28% of youth in New York City have overweight or obesity.[11-12]

Consumption of sugary drinks increases the risk of chronic diseases through changes in weight, often measured using body mass index (BMI), insulin regulation, and other metabolic processes.[13-15] Randomized intervention trials and longitudinal studies have linked increases in sugary drink consumption to excess weight gain, type 2 diabetes, cardiovascular disease, and other health risks.[13-14] In light of this evidence, the federal Dietary Guidelines for Americans[16] began recommending in 2015 that individuals limit added sugars intake in order to manage daily caloric intake and reduce risk of chronic disease. A tax on sugary drinks can lead to greater equity in health by reducing sugary drink consumption, obesity and diabetes rates for a greater percentage of populations with low incomes and Black and Latino populations - the same populations disproportionately burdened by unjust policies and practices, both past and present, that continue to disadvantage their health.[17]

Beverage Categories

The beverage types subject to taxation may vary for multiple reasons, including the intent of a policy. In this model, we categorized beverages as follows:

- **Sugary drink**: a drink that has added sugars, including soda, sweetened iced tea, sports drinks, energy drinks, fruit punch, and other fruit-flavored drinks
- **Diet drink:** a drink that has low- or no-calorie sweeteners, and includes all diet sodas and artificially-sweetened carbonated soda water
- **Other drinks**: 100% juice, milk

Taxation emerged as one recommended strategy to reduce consumption of sugary drinks 12 years ago.[18] Today, this strategy has been studied by public health experts, who have drawn on the success of tobacco taxation and decades of economic research to model the estimated financial and health impact of a sugary drink excise tax.[19-22] This report aims to model the impact of sugary drink excise taxes, both for scenarios that include and do not include diet drinks, on projected health and disease outcomes over the next decade.

MODELING FRAMEWORK: How excise taxes can lead to better health

A city excise tax is linked to change in BMI through change in sugary drink price and consumption

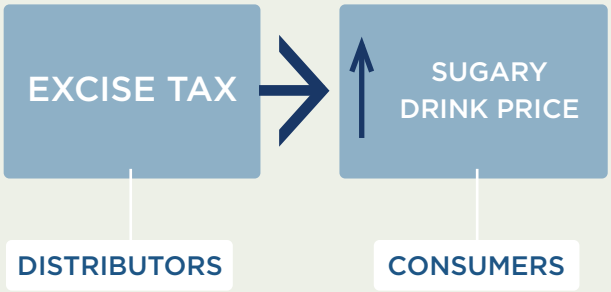
Key Terms

- **Excise tax**: a tax on retailers or distributors; any amount passed on to consumers is reflected in the posted retail price. In contrast, a sales tax is applied after purchase of the item.
- **Pass-through rate**: how much of the excise tax is passed on to consumers as an increase in shelf price; a percent ranging from 0% (none of the tax) to 100% (all of the tax)
- **Price elasticity of demand**: how much consumer purchasing behavior changes following a change in price of an item

How does an excise tax work?

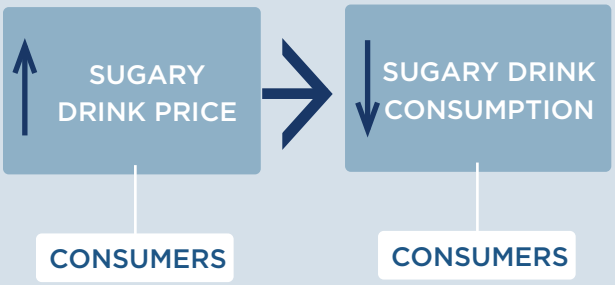
***Why an excise tax vs. a sales tax?** Since an excise tax is mostly or entirely included in the price consumers see, it is more likely to affect consumer purchase behavior than a sales tax, which is added at the register.

How does an excise tax on distributors affect the price paid by consumers?



Since most or all of the cost of a sugary drink excise tax is incorporated directly into the drink's posted retail price, an excise tax would likely influence consumer purchasing decisions and consumption. An existing body of empirical evidence demonstrates that beverage taxes can reduce consumer purchasing and consumption of taxed products, with increased consumption and purchasing of non-taxed products.[23-28] We assume 100% pass-through of the tax over 10 years and assume the tax rate would be adjusted annually for inflation. Our pass-through rate estimate is supported by empirical studies of excise taxes in Mexico and France that demonstrate near-complete pass-through rates to consumers.[29] Short-term studies for the local tax in Berkeley, CA indicate imperfect, or less than 100%, pass-through.[3,23,30] More recent analyses from Philadelphia, PA indicate that over all the sales studied, pass-through was close to complete (from about 6 to 7.5 cents per ounce). The pass-through seen in pharmacies was higher than in supermarkets and mass merchandise settings.[31] The expected change in sugary drink price was estimated using an average of $0.06/ounce based on the national prices of sugary drinks not subject to taxes, in a review of beverage demand elasticity.[32] The price per ounce in this study was based on a weighted average of sugary drink consumption across stores, restaurants, and other sources according to NHANES 2009-2010. The price per ounce of sugary drinks purchased in stores was calculated using weighted averages of two-liter bottles, 12-can cases, and single-serve containers based on 2010 Nielsen Homescan data.[32] For example, a $0.01/ounce tax would raise the price of a 12-ounce can of soda from $0.72/can pre-tax to $0.84/can post-tax.

How does increasing the price of sugary drinks change individual sugary drink consumption?

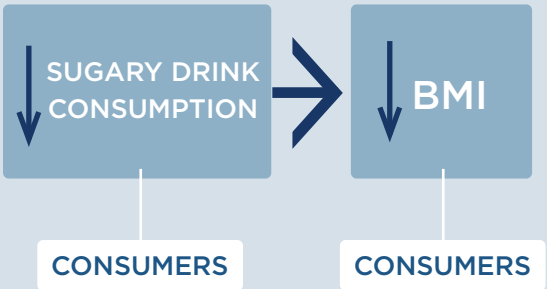


Note: Effects of a tax on sugary drink consumption and related health outcomes were projected for five race/ethnicity groups based on available sugary drink consumption data. Further disaggregation of sugary drink consumption and associated health outcomes by race and ethnicity should be considered for future research to illuminate more nuanced and specific differences between groups.

Race/ethnicity groups: Non-Latino White, non-Latino Black, Latino (Hispanic or Latino of any race), non-Latino Asian/Pacific Islander, and non-Latino Other race.

We used local sugary drink consumption data from NHANES 2011-2014 adjusted to local age and race/ethnicity specific data from the New York City Department of Health and Mental Hygiene 2016 Community Health Survey (CHS), 2015 Youth Risk Behavior Survey (YRBS), and 2015 Child Health, Emotional Wellness and Development Survey (CHEWDS) to estimate current sugary drink consumption levels in New York City. Powell et al. reviewed studies published from 2007-2012 and estimated a mean own-price elasticity of demand for sugary drinks.[33] The own-price elasticity reflects how much consumers will change their purchases in response to price changes. The mean own-price elasticity of demand for sugary drinks (not including diet) is -1.21, indicating a high responsiveness to the change in price. For example, an elasticity of -1.21 estimates that a 16% price increase would lead to a 19% reduction in purchases. The mean own-price elasticity for both sugary drinks and diet drinks combined is -0.86, indicating a lower response to the change in price.[33] Recent research on the Berkeley, CA tax found a 21% reduction in sugary drink intake among low-income populations consistent with this estimate.[23]

What are the individual health effects of decreasing sugary drink consumption?

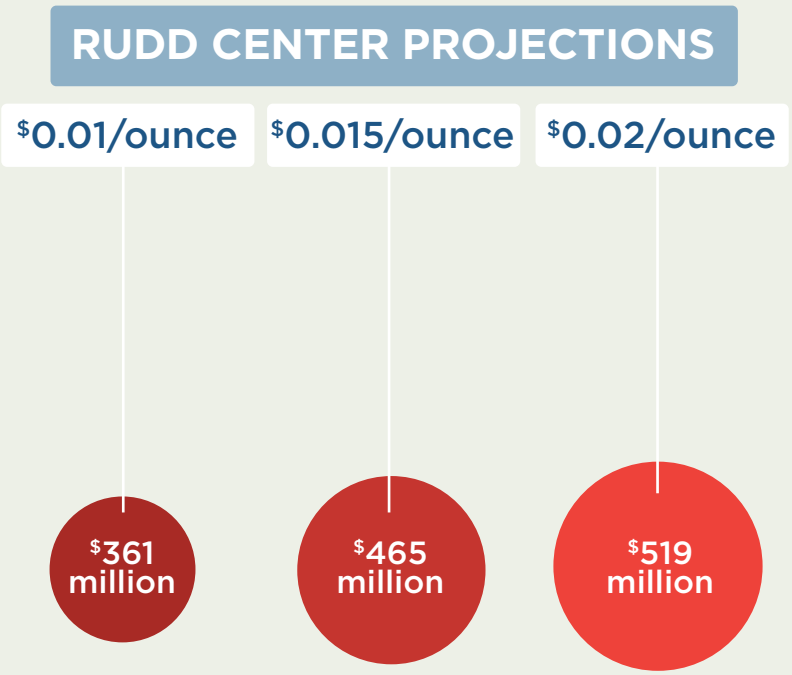


Research has shown that decreasing sugary drink consumption could have positive effects on health in adults and youth. We conducted evidence reviews for the impact of a change in sugary drink intake on BMI, accounting for dietary compensation.[22] Four large, multi-year longitudinal studies in adults[34-37] were identified. The relationship was modeled using a uniform distribution based on the range of estimated effects on BMI due to reducing sugary drink intake; each one-serving reduction was associated with a BMI decrease of 0.21kg/m^2 to 0.57kg/m^2 in adults over a three-year period. Among children, a double-blind randomized controlled trial conducted over 18 months found that an additional 8-ounce serving of sugary drinks led to a 1 kg greater weight gain.[38] We found no randomized controlled trials documenting effects of a reduction in diet drinks on weight. Diet drinks are non-caloric, so we assume that reduction in diet drink intake has no effect on BMI.

Expected Yearly Revenue from a Tax on Sugary Drinks

The CHOICES microsimulation model does not include annual revenue generation from a city excise tax on sugary drinks. Revenue is likely substantial. The Rudd Center Revenue Calculator for Sugary Drink Taxes estimates potential annual revenues from excise taxes on sugary drinks only and is "intended to provide a rough estimate" for municipalities to consider.[39] According to the Rudd Center,[39] a $0.02/ounce excise tax in New York City could raise as much as $519 million in 2017.

Actual tax revenue may be lower than these projected estimates due to several factors. The Rudd Center Revenue estimates are based on regional sales data adjusted for state- or city-specific demographics;[40] sales data for specific states and/or cities within those regions may vary from the regional average. Retailers may have inventories of sugary drinks obtained before the tax was implemented. Residents living close to city, county, and/or state borders may also purchase sugary drinks in neighboring communities without such a tax. Finally, there may be some distributors/manufacturers that are non-compliant with the tax. The Rudd Center notes that their revenue projections "should be adjusted downward by 10%-30%."[39]



Additional Revenue Estimates			
Tax Amount	$0.01/ ounce	$0.015/ ounce	$0.02/ ounce
Assuming 90% of Rudd Center projections	$325 million	$419 million	$467 million
Assuming 70% of Rudd Center projections	$253 million	$326 million	$363 million

Reach

Each of the six modeled beverage taxes applies to all children, youth, and adults in New York City. However, the models only look at the effects on those 2 years of age and older.* Population reach was equal across the six models.

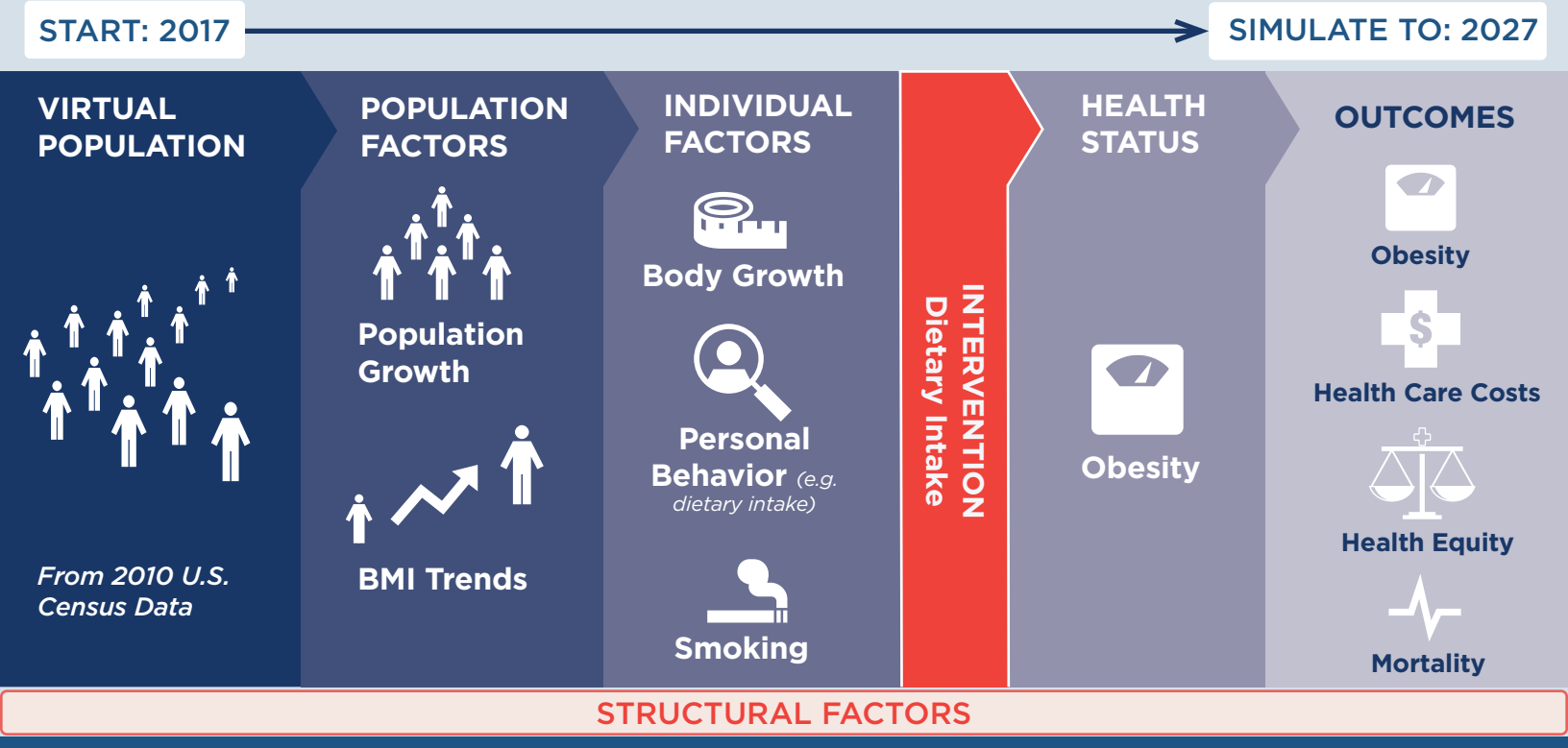
*BMI z-scores were used in our analyses, which are not defined for children under 2 years of age.

Implementation Costs

We assume that the policy change would incur start up and ongoing labor costs for municipal tax department administrators. To implement the intervention, the municipal government would need to process tax statements and conduct audits. 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 localities with planned or implemented excise taxes on sugary drinks.[22] The costs to administer at the municipal level may be higher than costs at the state level due to fewer existing staff. The cost and benefit estimates do not reflect expected tax revenue, which may be large.

CHOICES Microsimulation Model

The CHOICES microsimulation model for New York City was used to calculate the costs and effectiveness of a sugary drink tax over 10 years (2017-27). Cases of obesity prevented were calculated at the end of the model period in 2027. The model was based on prior CHOICES work,[22,41-43] and created a virtual population of New York City residents using data from: U.S. Census, American Community Survey, Behavioral Risk Factor Surveillance System, NHANES, National Survey of Children's Health, the Medical Expenditure Panel Survey, multiple national longitudinal studies, and data provided by the New York City Department of Health and Mental Hygiene. Using peer-reviewed methodology, we forecasted what would happen to this virtual population with and without a sugary drink tax to model changes in disease and mortality rates and health care costs due to the tax. The model takes into account both structural and individual level determinants, and analyses focus on interventions that can cost-effectively change future health outcomes.



Results: City Excise Tax on Sugary Drinks

Overall, the model shows that an excise tax on sugary drinks would be cost-saving. Compared to the simulated natural history without a tax, all three tax levels are projected to result in lower levels of sugary drink consumption, fewer cases of obesity, fewer deaths, improved health equity,[44] and health care cost savings greater than $200 million dollars over the 10-year period (Appendix C). The model indicates greater health effects at higher sugary drink tax rates. The $0.02/ounce tax would result in the greatest decrease in sugary drink consumption and the greatest increase in cases of obesity prevented, as well as the highest level of health care cost savings and health care cost savings per dollar invested.

The estimated reduction in obesity attributable to the tax would lead to lower projected health care costs, offsetting tax implementation costs and resulting in net cost savings. The difference between total health care costs with no intervention and lower health care costs with an intervention represents health care costs saved; these savings can be compared to the cost of implementing the tax (not shown below) to arrive at the metric of health care costs saved per dollar invested. The Rudd Center Revenue Calculator for Sugary Drink Taxes projects that annual revenue generated from a sugary drink tax is likely substantial.[39] For more detail on specific model results, see Appendix C.

In all three tax models, the projected benefits would be disproportionately higher in key groups including non-Latino Black, Latino, and populations with lower income.

$0.01/OUNCE TAX ON SUGARY DRINKS

49,900 CASES OF OBESITY PREVENTED in 2027.

$16.70 HEALTH CARE COSTS SAVED PER $1 INVESTED

$215 MILLION SAVED IN NET COSTS

$0.015/OUNCE TAX ON SUGARY DRINKS

72,900 CASES OF OBESITY PREVENTED in 2027.

$24.90 HEALTH CARE COSTS SAVED PER $1 INVESTED

$327 MILLION SAVED IN NET COSTS

$0.02/OUNCE TAX ON SUGARY DRINKS

94,800 CASES OF OBESITY PREVENTED in 2027.

$32.90 HEALTH CARE COSTS SAVED PER $1 INVESTED

$437 MILLION SAVED IN NET COSTS

Results: City Excise Tax on Sugary and Diet Drinks

Overall, an excise tax on sugary drinks would result in greater health impacts compared to a tax on both sugary and diet drinks. People are expected to have a lower response to changes in sugary drink prices when both sugary and diet drinks are taxed. Even so, the model indicates that a sugary and diet drink tax would still be cost-saving at all three tax levels analyzed. Compared to the simulated natural history without a tax, all three tax levels would result in lower levels of sugary drink consumption, fewer cases of obesity, fewer deaths, improved health equity, and health care cost savings greater than $160 million dollars over the 10-year period (Appendix D). Higher sugary drink excise tax rates are projected to result in decreased sugary and diet drink consumption, decreased rates of obesity and diabetes, and increased health care cost savings. A $0.02/ounce tax is projected to lead to the greatest decrease in sugary drink consumption and the greatest increase in cases of obesity prevented, as well as the highest level of health care cost savings and health care cost savings per dollar invested.

The estimated reduction in obesity attributable to the tax would lead to lower health care costs that offset tax implementation costs. This results in net cost savings attributable to the tax. Further, projections of sugary drink revenue generation demonstrate they are expected to be substantial (see page 5). The difference between total health care costs with no intervention and lower health care costs with an intervention represents health care costs saved; these savings can be compared to the cost of implementing the tax to arrive at the metric of health care costs saved per dollar invested.

In all three models, the projected benefits would be disproportionately higher in key groups including non-Latino Black, Latino, and populations with lower income.

$0.01/OUNCE TAX ON SUGARY & DIET DRINKS

38,900 CASES OF OBESITY PREVENTED in 2027.

$12.80 HEALTH CARE COSTS SAVED PER $1 INVESTED

$162 MILLION SAVED IN NET COSTS

$0.015/OUNCE TAX ON SUGARY & DIET DRINKS

57,100 CASES OF OBESITY PREVENTED in 2027.

$19.10 HEALTH CARE COSTS SAVED PER $1 INVESTED

$248 MILLION SAVED IN NET COSTS

$0.02/OUNCE TAX ON SUGARY & DIET DRINKS

74,700 CASES OF OBESITY PREVENTED in 2027.

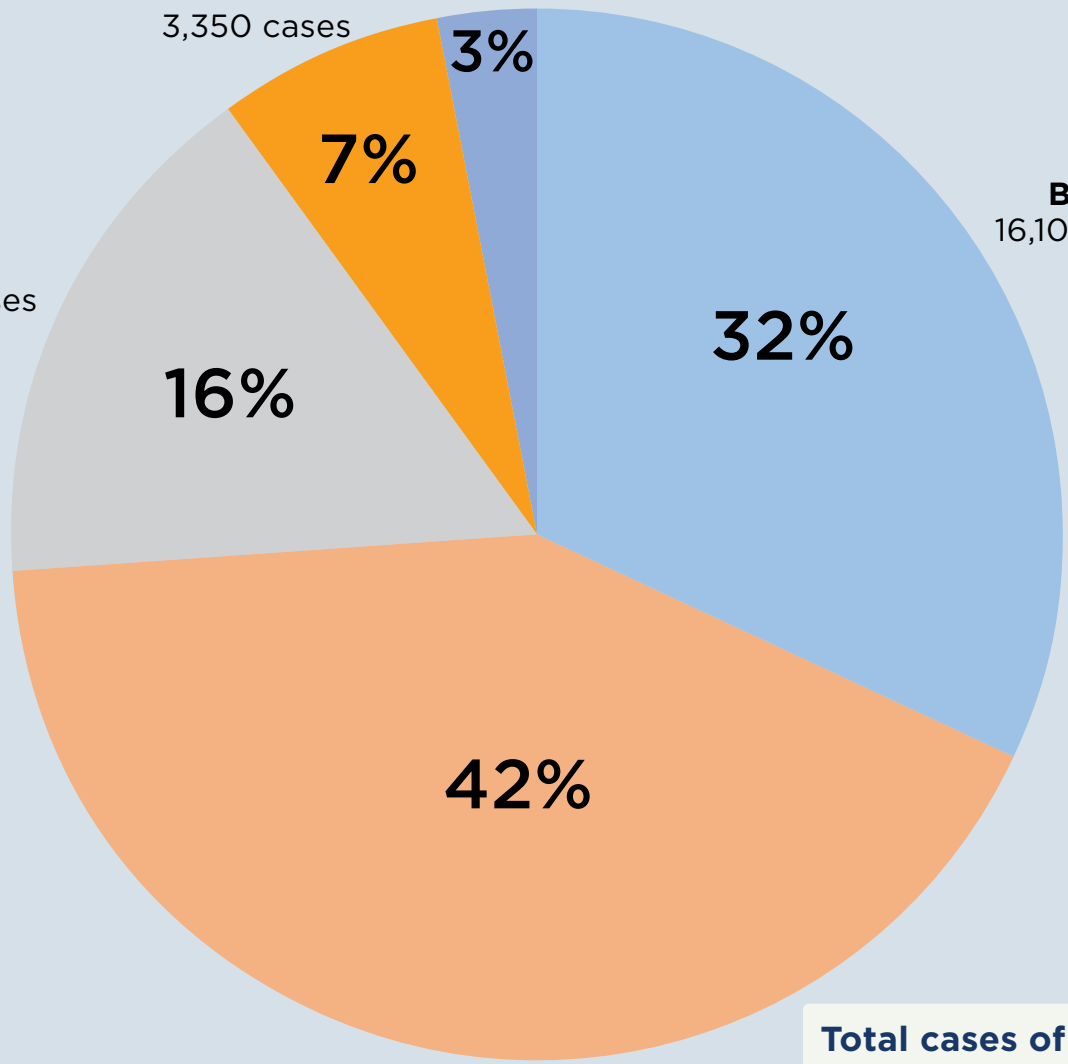
$25.40 HEALTH CARE COSTS SAVED PER $1 INVESTED

$334 MILLION SAVED IN NET COSTS

Impact on Obesity Among Black and Latino NYC Residents

Many factors including disproportionate, targeted marketing and a history of divestment in communities of color contribute to differences in sugary drink consumption (see Appendix A). Black and Latino NYC residents would experience the largest declines in sugary drink consumption after a tax is implemented. Decreased consumption as a result of an excise tax on sugary drinks would lead to many health benefits. An excise tax is projected to have a greater health impact on Black and Latino populations in NYC, resulting in disproportionately more cases of obesity prevented at all tax amounts among these populations whether structured as a tax on sugary drinks only or both sugary and diet drinks, leading to improved health equity. The results below are for a $0.01/ounce excise tax on sugary drinks only. All other tax models project similar results (not pictured).

Three of every four obesity cases prevented by a $0.01/ounce sugary drink tax would be among Black and Latino NYC residents



Note: "Race and ethnicity are social constructs. This means they are ideas made up by people and are not rooted in biology. **Race** is a system of categorizing people based on physical features and **ethnicity** is based on geography, language, traditions or history. There are no biological differences between racial or ethnic groups."[45]

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. The Other category includes respondents who identified as American Indian/Alaska Native, Multi-racial, or another race/ethnicity not represented in the categories shown.

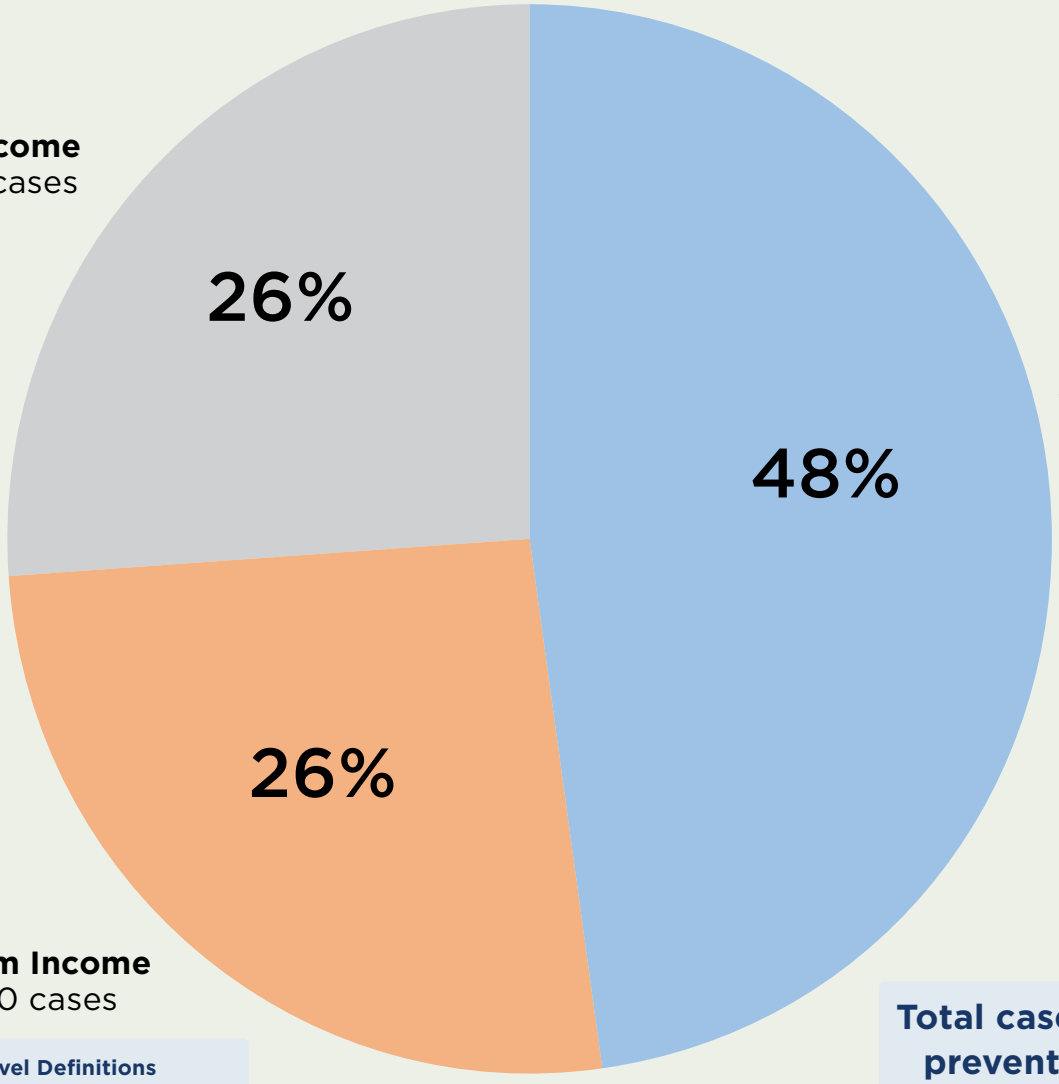
Total cases of obesity prevented: 49,900*

*Numbers may not sum to total due to rounding

Impact on Obesity by Income Level

NYC residents from households with lower income (<200% of the federal poverty level) would experience the largest declines in sugary drink consumption compared to residents with different income levels after a tax is implemented. Decreased consumption as a result of an excise tax on sugary drinks would lead to many health benefits. An excise tax is projected to have a greater health impact on populations with lower incomes in NYC, resulting in disproportionately more cases of obesity prevented at all tax amounts among these populations whether structured as a tax on sugary drinks only or both sugary and diet drinks, leading to improved health equity. The results below are for a $0.01/ounce excise tax on sugary drinks only. All other tax models project similar results (not pictured).

Nearly 75% of cases of obesity prevented by a $0.01/ounce sugary drink tax would be among NYC households with low & medium income



Total cases of obesity prevented: 49,900

Income Level Definitions

Federal Poverty Level (FPL)
Low Income: <200% of FPL
Medium Income: 200-≤400% of FPL
High Income: >400% of FPL

Impact on Type 2 Diabetes

We estimated the impact of the tax-induced reduction in sugary drink intake on 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,[46] 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%.[46]

In New York City, we estimated that the proposed sugary drink excise tax would lead to a 4-7% reduction in diabetes incidence in the sugary drink-only tax model, and a 3-6% reduction in diabetes incidence in the sugary and diet drink tax model. Impact on diabetes incidence was calculated over a one-year period once the tax reaches its full effect. Impact on diabetes was calculated based on summary results from the model, not directly via microsimulation.

Tax Amount	Percent Reduction in Diabetes Incidence	Cases of Diabetes Prevented
Tax on sugary drinks only		
$0.01/ounce	4%	1,850
$0.015/ounce	5%	2,760
$0.02/ounce	7%	3,640
Tax on sugary and diet drinks		
$0.01/ounce	3%	1,480
$0.015/ounce	4%	2,200
$0.02/ounce	6%	2,930

Impact of Sugary Drink Tax on Overall Adult Medicaid Spending

We estimated the impact of a sugary drink excise tax on adult Medicaid expenditures based on the projected reduction in obesity prevalence for each modeled tax scenario. A previous analysis found that 10.2% of adult Medicaid expenditures are due to obesity.[47] Based on data from the Pew Charitable Trusts and the John D. and Catherine T. MacArthur Foundation,[48] we assumed that 79% of Medicaid payments are for adults. In NYC, obesity was estimated to account for $3.85 billion of the $37.7 billion total adult Medicaid expenditure in 2014. The state and city combined share of total Medicaid spending in New York State is 45%[49] and the city share in NYC is 17%.[50] Based on the projected reduction in adult obesity prevalence due to each modeled tax scenario, adult obesity-related Medicaid expenditures in NYC is estimated to be reduced by the following:

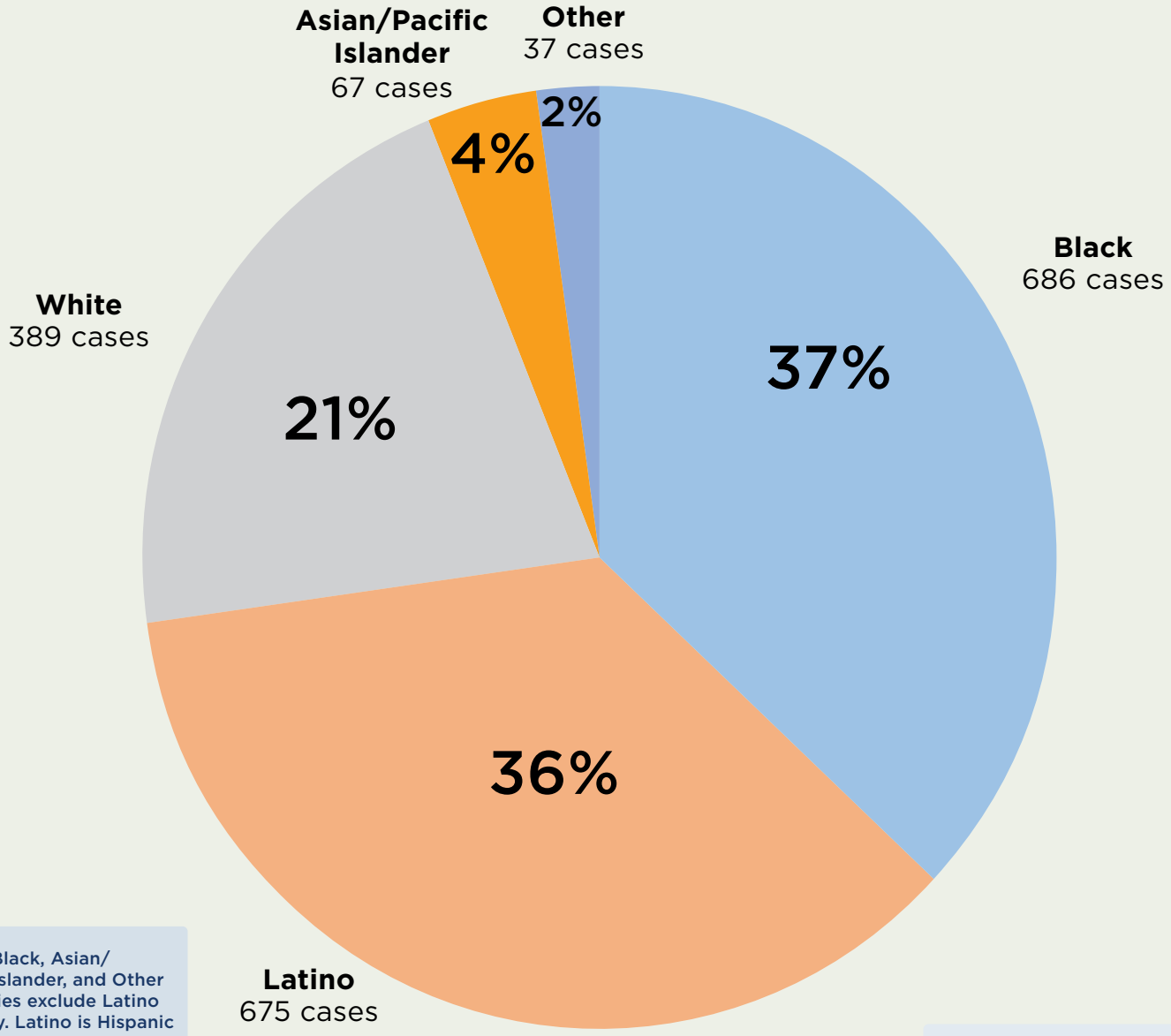
Reductions in Annual Adult Obesity-Related Medicaid Expenditures

Tax Amount	Total Medicaid (including city, state, and federal)	State and City Medicaid	New York City Medicaid
Tax on sugary drinks only			
$0.01/ounce	$15.2 million	$6.88 million	$2.58 million
$0.015/ounce	$22.5 million	$10.2 million	$3.80 million
$0.02/ounce	$29.8 million	$13.5 million	$5.06 million
Tax on sugary and diet drinks			
$0.01/ounce	$11.5 million	$5.23 million	$1.96 million
$0.015/ounce	$17.3 million	$7.84 million	$2.94 million
$0.02/ounce	$23.1 million	$10.5 million	$3.92 million

Impact on Diabetes Among Black and Latino NYC Residents

A tax is projected to have a greater health impact on Black and Latino populations in NYC, resulting in disproportionately more cases of diabetes prevented, at all tax amounts. The results below are for a $0.01/ounce excise tax on sugary drinks only. All other tax models project similar results (not pictured).

Three of every four diabetes cases prevented by a $0.01/ounce sugary drink tax would be among Black and Latino NYC residents



White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. The Other category includes respondents who identified as American Indian/Alaska Native, Multi-racial, or another race/ethnicity not represented in the categories shown.

Total cases of diabetes prevented: 1,853*

*Numbers may not sum to total due to rounding

Impact on Tooth Decay

We estimated the impact of an excise tax on sugary drinks only and on sugary and diet drinks 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.[51] As described above, we assume that the excise tax would 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[52] and thus we assume the same relationship as found in adults.

We used 2018 New York State Medicaid dental policy and procedure code data to estimate a Medicaid cost of treating DMFT as $500 for a permanent crown and $50 for a filling.[53] These codes reflect treatment for one surface and do not reflect higher reimbursement rates for multi-surface treatment, temporary crowns, or potential flat fee 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),[54] 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 all dental treatment for children are fillings and 82.5% of treatment for adults is fillings.

To estimate Medicaid-specific dental caries cost savings, we used local estimates of the number of people enrolled in Medicaid and the proportion receiving Medicaid dental services. In NYC, we estimated that the $0.02/ounce tax on sugary drinks only over a period of 10 years would lead to a total savings in DMFT of $48.5 million and $207,000 in Medicaid savings. The $0.015/ounce tax on sugary drinks only would lead to a total over a period of 10 years in DMFT savings of $36.4 million and $155,000 in Medicaid savings. The $0.01/ounce tax on sugary drinks only would lead to a total over a period of 10 years in DMFT savings of $24.2 million and $103,000 in Medicaid savings. The tax on sugary and diet drinks would potentially result in slightly less DMFT and Medicaid savings at each tax rate. The Medicaid reimbursement fee estimates may underestimate the total cost savings of tooth decay treatment projected here as dental providers may charge higher amounts to patients.

Tax Amount	Medicaid Costs Avoided Over 10 Years	Total Tooth Decay Treatment Costs Avoided Over 10 Years
Tax on sugary drinks only		
$0.01/ounce	$103,000	$24.2 million
$0.015/ounce	$155,000	$36.4 million
$0.02/ounce	$207,000	$48.5 million
Tax on sugary & diet drinks		
$0.01/ounce	$80,500	$18.9 million
$0.015/ounce	$121,000	$28.4 million
$0.02/ounce	$162,000	$37.9 million

Impact on Spending

Concerns have been raised regarding the impact of the tax on populations with lower household income. The 2016 New York City Community Health Survey (CHS) estimates an average of 23% of NYC residents drink one or more sugary drinks per day; this varies throughout neighborhoods from a low of 7% to a high of 36% in various parts of the City.[55] Economic studies indicate that with a sugary drink tax, consumers will buy less of these products.[56] Using sales data from the Rudd Center Sugary Beverage Calculator,[39] we project that individuals and households in NYC would spend less money on sugary drinks after the tax.

On average, consumers with lower household incomes, who contend with a number of systemic factors that disadvantage health, consume more sugary drinks than households with higher income. We therefore project that greater health benefits from this policy would accrue to these consumers; the same is true for a number of racial and ethnic groups. Under the proposed tax, Black New Yorkers would see almost twice as high of a reduction in obesity prevalence compared to White New Yorkers. Similarly, the reduction in obesity prevalence among Latino individuals would be almost four times as high as the reduction among White individuals. On that basis, the proposed tax should decrease inequities in obesity outcomes. These projected changes in sugary drink consumption and health outcomes have led health economists to conclude that populations with lower income can benefit substantially from sugary drink taxes.[57]

Reductions in Sugary Drink Spending

	$0.01/ounce		$0.015/ounce		$0.02/ounce	
	Excise tax on sugary drinks	Excise tax on sugary & diet drinks	Excise tax on sugary drinks	Excise tax on sugary & diet drinks	Excise tax on sugary drinks	Excise tax on sugary & diet drinks
Individuals would spend less on sugary drinks in the first year	$26.00	$0.90	$48.90	$8.40	$78.40	$20.60
Households would spend less on sugary drinks in the first year	$69.90	$2.40	$131.00	$22.60	$210.20	$55.30
NYC population would spend less on sugary drinks in the first year	$129 million	$4.5 million	$243 million	$41.7 million	$389 million	$102 million

Implementation Considerations

Revenue raised from a sugary drink tax could, in some instances, be reinvested in communities with lower incomes if the legislature earmarks the tax revenue for this type of use. Cities with sugary drink taxes in the United States have allocated revenues to be invested in communities with lower incomes: "this includes increasing access to healthy food and water, educating about nutrition and healthy beverage choices, providing health services, and expanding opportunities for physical activity. Others address social determinants of health such as early childhood education or maintenance of libraries, parks, and recreation centers."[58] Berkeley's sugary drink tax, for example, "generated more than $9 million in funding allocated for public health and equity from 2015 to 2021, facilitated by the Sugar-Sweetened Beverage Panel of Experts (SSBPPE) Commission, which represented community and expert voices and provided accountability over revenue allocations."[59] Public support for such taxes generally increases with earmarking for preventive health activities.[60]

There is strong opposition to taxation from the food and beverage industry, which spends billions of dollars promoting their products.[61] Several beverage excise taxes up to $0.02/ounce are currently applied across many states. Sugary drink taxes are likely to have longevity if implemented based on the successful history of tobacco excise taxes. There is potential for a shift in social norms of sugary drink consumption based on evidence from tobacco control tax and regulatory efforts.[62] As in Berkeley, reductions in sugary drink consumption can be advanced by harnessing community agency in decision-making further demonstrating the unique power of communities to help drive changes in social norms.

Conclusion

We project that a tax policy would prevent thousands of cases of childhood and adult obesity, prevent new cases of diabetes, increase healthy life years, improve health equity, and save more in future health care costs than it costs to implement. Revenue from the tax could be used for education and health promotion efforts. Implementing the tax could also serve as a powerful social signal to reduce sugar consumption.

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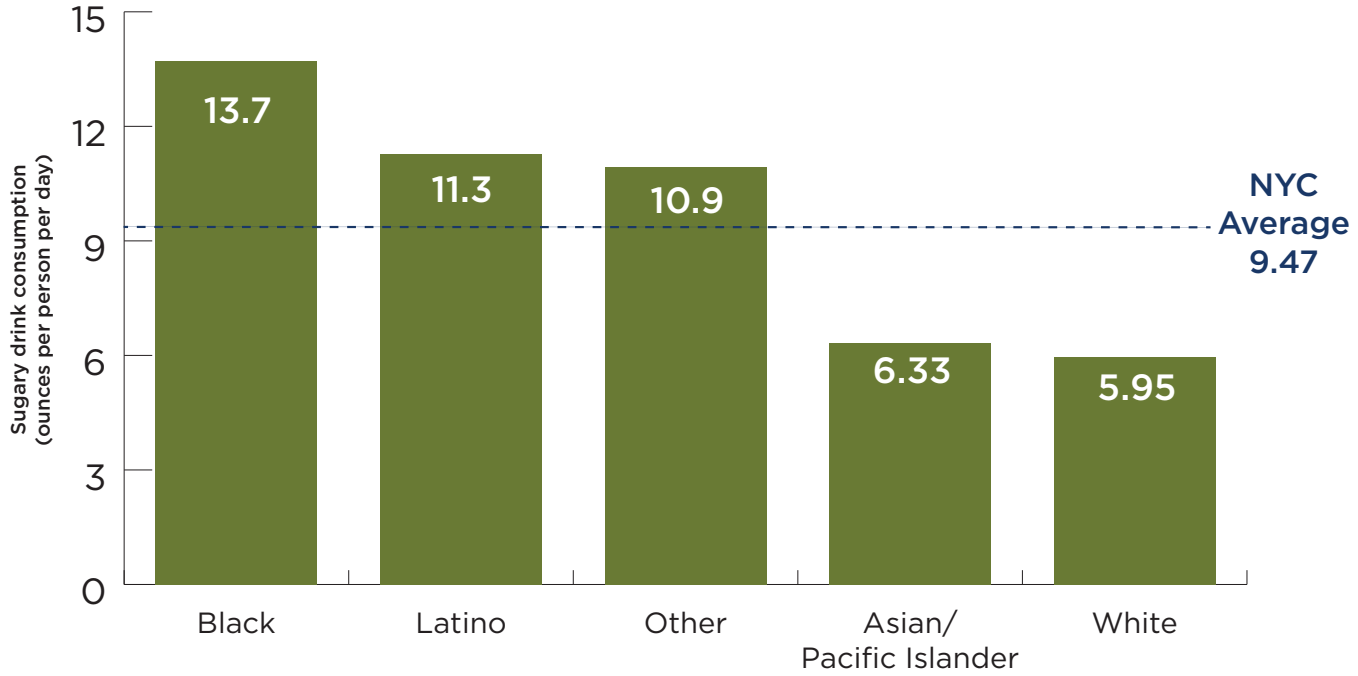
Appendices

Appendix A

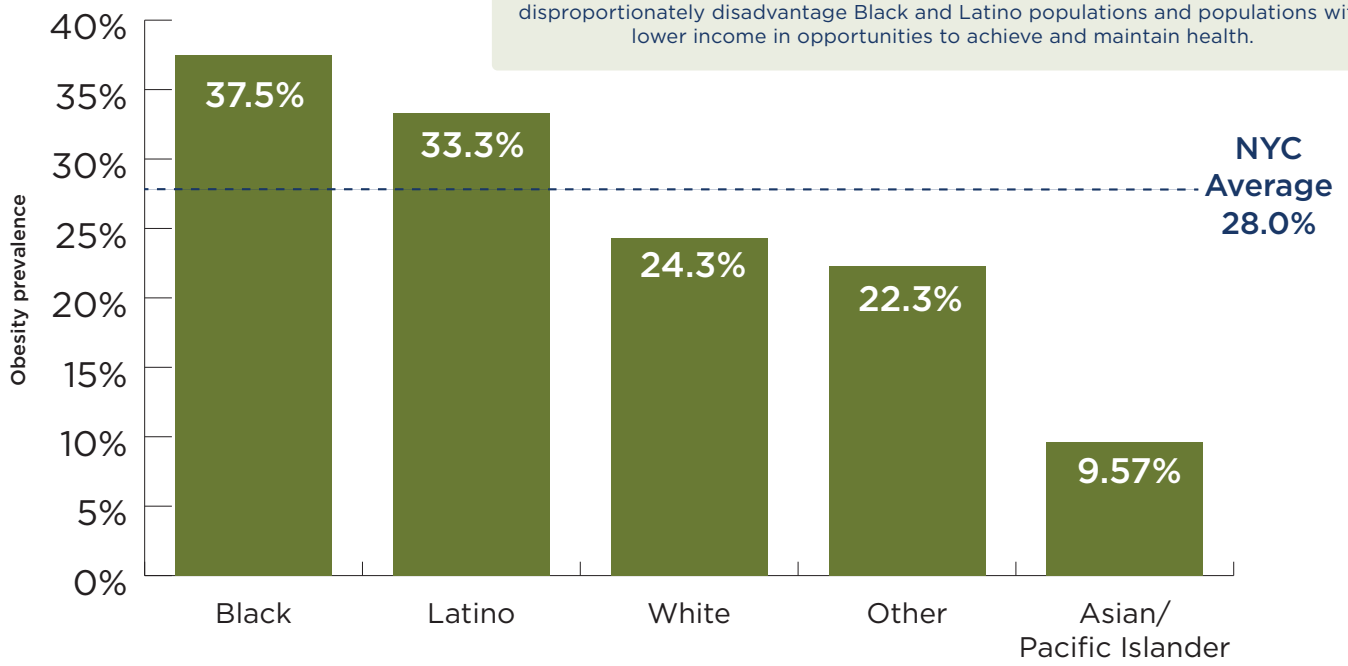
Pre-Tax Sugary Drink Consumption and Obesity Prevalence by Race/Ethnicity



DATA SOURCE: New York City Child Health, Emotional Wellbeing and Development Survey (CHEWDS) 2015, New York City Youth Risk Behavior Survey (YRBS) 2015, New York City Community Health Survey (CHS) 2016, NHANES 2011-2014; BRFSS 2011; NSCH 2003, 2007; MODEL ANALYSIS: CHOICES Project, 2018

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.



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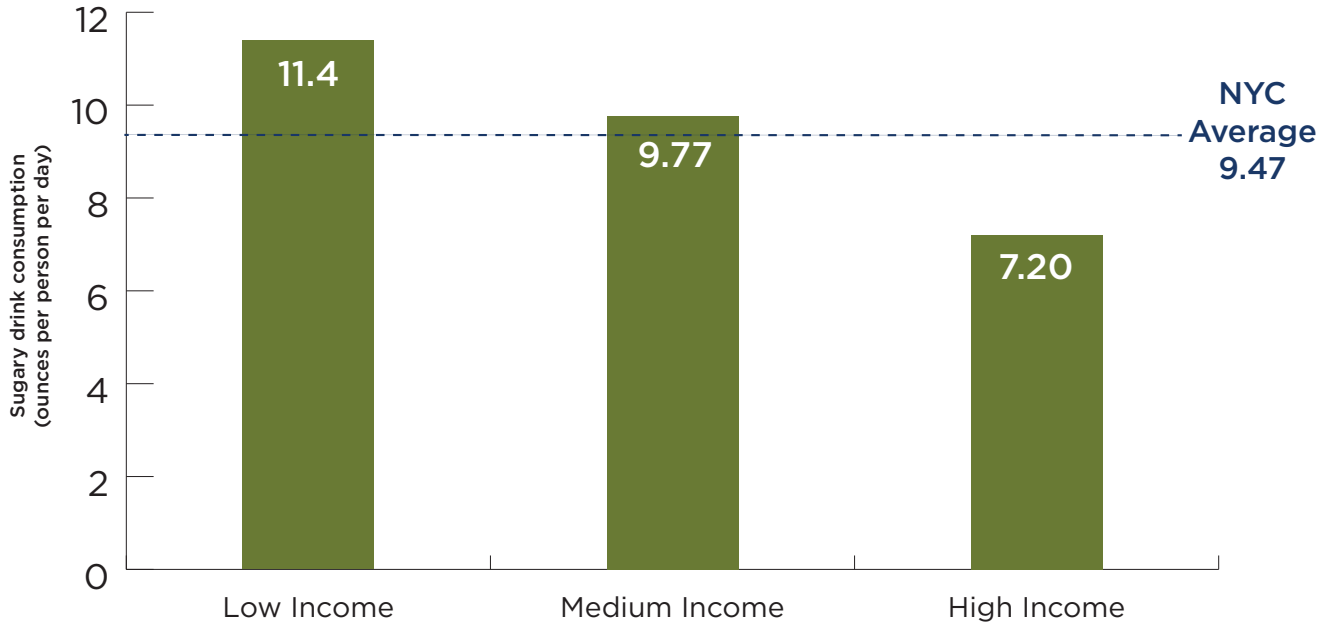
Appendix B

Pre-Tax Sugary Drink Consumption and Obesity Prevalence by Income Level



DATA SOURCE: New York City Child Health, Emotional Wellbeing and Development Survey (CHEWDS) 2015, New York City Youth Risk Behavior Survey (YRBS) 2015, New York City Community Health Survey (CHS) 2016, NHANES 2011-2014; BRFSS 2011; NSCH 2003, 2007; MODEL ANALYSIS: CHOICES Project, 2018

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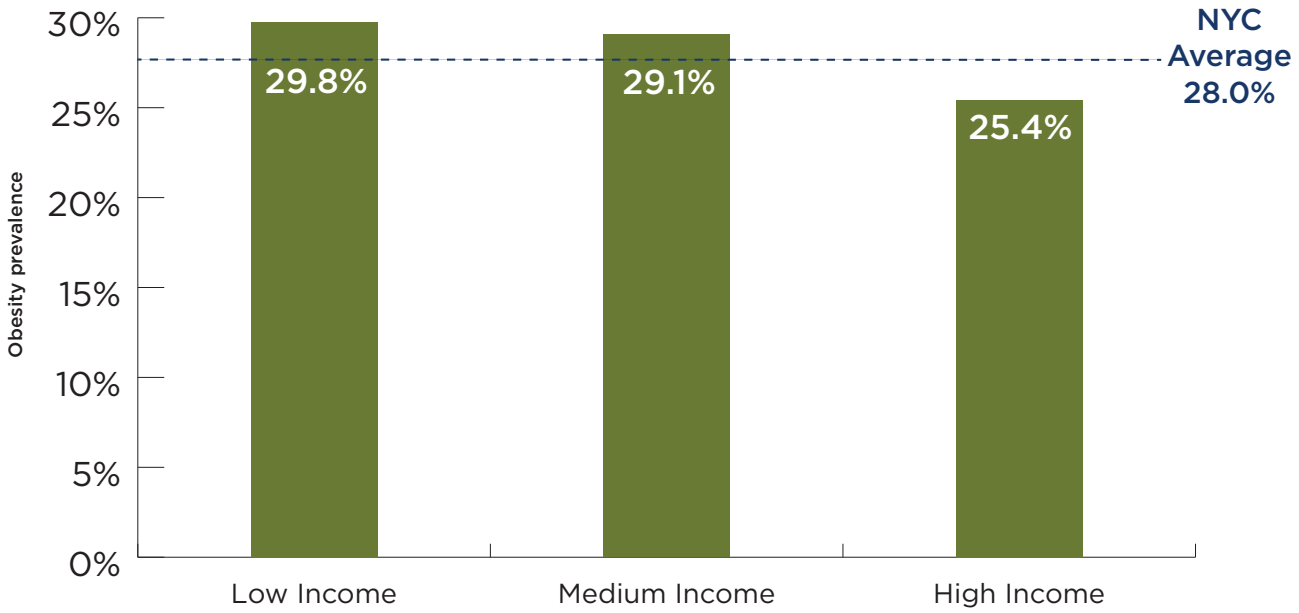


DATA SOURCE: New York City Child Health, Emotional Wellbeing and Development Survey (CHEWDS) 2015, New York City Youth Risk Behavior Survey (YRBS) 2015, New York City Community Health Survey (CHS) 2016, NHANES 2011-2014; BRFSS 2011; NSCH 2003, 2007; MODEL ANALYSIS: CHOICES Project, 2018

Appendix C
City Excise Tax on Sugary Drinks: Results

Metric	$0.01/ounce tax	$0.015/ounce tax	$0.02/ounce tax
Cost/Effect			
Cost Per Year with Obesity Prevented	Cost-saving	Cost-saving	Cost-saving
Cost Per Quality Adjusted Life Year (QALY) Gained	Cost-saving	Cost-saving	Cost-saving
Cost Per Case of Obesity Prevented	Cost-saving	Cost-saving	Cost-saving
Mean QALYs Gained Over 10 Years	10,600 (2,970; 29,800)	15,800 (4,440; 44,000)	20,700 (5,960; 54,000)
Reach			
First Year Population Reach*	8.36 million (8.34 mill; 8.37 mill)	8.36 million (8.34 mill; 8.37 mill)	8.36 million (8.34 mill; 8.37 mill)
Effect			
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	57.9 (32.8; 124)	87.0 (49.4; 187)	116 (65.9; 250)
Cases of Obesity Prevented in 2027*	49,900 (15,000; 135,000)	72,900 (22,300; 192,000)	94,800 (29,700; 245,000)
Cases of Childhood Obesity Prevented in 2027*	17,200 (5,470; 41,700)	24,000 (8,210; 55,200)	30,100 (10,800; 66,900)
Years with Obesity Prevented Over 10 Years	342,000 (103,000; 915,000)	498,000 (153,000; 1,300,000)	646,000 (201,000; 1,660,000)
Mean Years of Life Gained Over 10 Years	2,510 (596; 7,010)	3,760 (939; 10,700)	4,990 (1,320; 13,900)
Deaths Averted*	749 (180; 2,050)	1,120 (294; 3,100)	1,480 (392; 4,050)
Cost			
Annual Intervention Cost	$1.37 million ($1.37 mill; $1.37 mill)	$1.37 million ($1.37 mill; $1.37 mill)	$1.37 million ($1.37 mill; $1.37 mill)
Health Care Costs Saved	$229 million ($65.4 mill; $634 mill)	$340 million ($97.7 mill; $929 mill)	$450 million ($130 mill; $1.23 bill)
Net Cost (negative means savings)	-$215 million (-$620 mill; -$51.7 mill)	-$327 million (-$916 mill; -$84.0 mill)	-$437 million (-$1.21 bill; -$117 mill)
Health Care Cost Savings per $1 Invested	$16.70 ($4.77; $46.30)	$24.90 ($7.13; $67.90)	$32.90 ($9.51; $89.50)

Data shown above represent mean values and are accompanied by uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted

Appendix C.1
$0.01/ounce Excise Tax on Sugary Drinks: Results By Race/Ethnicity

Outcome	Selected Results by Race/Ethnicity				
	White	Black	Latino	Asian/Pacific Islander	Other
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	36.3 (20.6; 78.5)	83.8 (47.6; 181)	68.9 (39.1; 148)	38.7 (21.9; 83.7)	66.8 (37.8; 144)
Relative Reduction in Obesity Prevalence in 2027*	1.00** (1.00; 1.00)	2.92 (2.52; 3.36)	2.66 (2.35; 3.10)	1.03 (0.745; 1.35)	1.98 (1.58; 2.62)
Absolute Reduction in Obesity Prevalence in 2027*	0.300% (0.0892%; 0.828%)	0.859% (0.254%; 2.26%)	0.788% (0.228%; 2.11%)	0.303% (0.0846%; 0.768%)	0.575% (0.183%; 1.48%)
Health Care Costs Saved over 10 Years	52.2 mill (15.3 mill; 145 mill)	70.0 mill (19.8 mill; 195 mill)	89.6 mill (25.4 mill; 244 mill)	11.3 mill (3.25 mill; 31.2 mill)	5.75 mill (1.66 mill; 16.3 mill)
Mean QALYs Gained Over 10 Years	2,330 (643; 6,380)	3,590 (978; 10,200)	3,950 (1,120; 11,000)	468 (121; 1,350)	276 (65; 795)
Mean Years of Life Gained Over 10 Years	649 (107; 1,830)	951 (206; 2,760)	749 (154; 2,100)	84.6 (0.00; 322)	75.6 (0.00; 284)
Years with Obesity Prevented Over 10 Years	55,600 (16,100; 155,000)	111,000 (33,400; 288,000)	143,000 (41,100; 382,000)	21,200 (6,100; 55,900)	10,700 (3,330; 27,400)
Cases of Obesity Prevented in 2027*	8,070 (2,400; 22,200)	16,100 (4,800; 42,700)	20,700 (6,030; 55,400)	3,350 (943; 8,530)	1,630 (510; 4,230)
Cases of Childhood Obesity Prevented in 2027*	1,700 (524; 4,400)	5,730 (1,840; 13,700)	7,210 (2,210; 18,000)	1,740 (496; 4,590)	798 (260; 1,920)

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted
**Reference category

Appendix C.2
$0.01/ounce Excise Tax on Sugary Drinks: Results By Income Level

Outcome	Selected Results by Income Level		
	Low Income	Medium Income	High Income
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	**69.6** (39.5; 150)	**59.7** (33.9; 128)	**44.0** (25.0; 94.8)
Relative Reduction in Obesity Prevalence in 2027*	**1.79** (1.64; 2.00)	**1.42** (1.27; 1.53)	**1.00**** (1.00; 1.00)
Absolute Reduction in Obesity Prevalence in 2027*	**0.738%** (0.218%; 1.98%)	**0.585%** (0.174%; 1.59%)	**0.412%** (0.122%; 1.12%)
Health Care Costs Saved over 10 Years	**93.8 mill** (26.9 mill; 259 mill)	**61.6 mill** (18.0 mill; 172 mill)	**73.4 mill** (21.0 mill; 203 mill)
Mean QALYs Gained Over 10 Years	**4,380** (1,260; 12,500)	**2,940** (817; 8,230)	**3,290** (905; 9,290)
Mean Years of Life Gained Over 10 Years	**929** (200; 2,690)	**701** (122; 1,990)	**880** (151; 2,510)
Years with Obesity Prevented Over 10 Years	**166,000** (49,700; 439,000)	**88,900** (26,600; 235,000)	**87,300** (25,800; 236,000)
Cases of Obesity Prevented in 2027*	**24,100** (7,150; 64,800)	**13,100** (3,910; 35,500)	**12,700** (3,760; 34,500)
Cases of Childhood Obesity Prevented in 2027*	**9,780** (3,080; 23,800)	**3,950** (1,230; 9,570)	**3,460** (1,100; 8,760)

Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

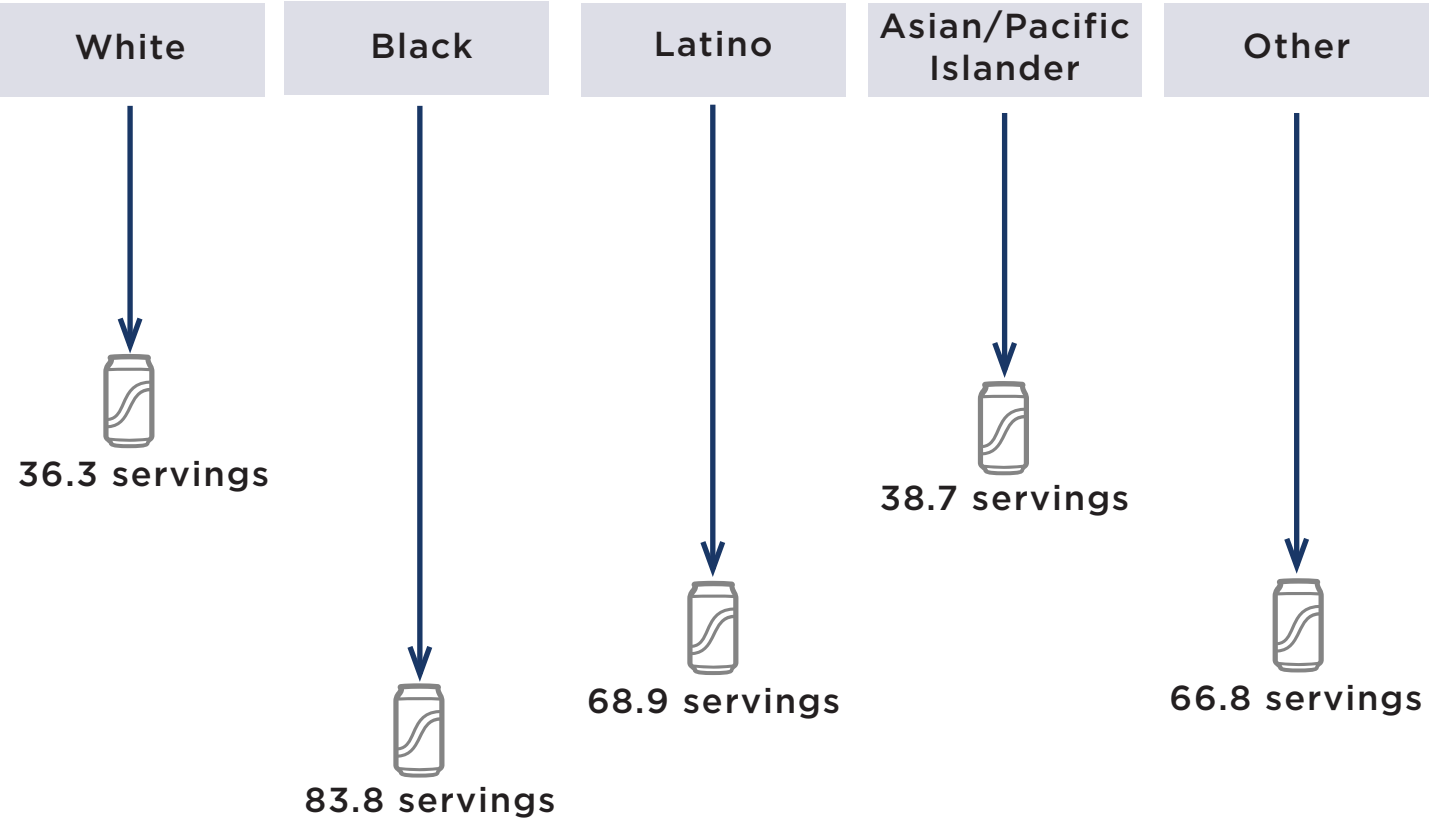
All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted
**Reference category

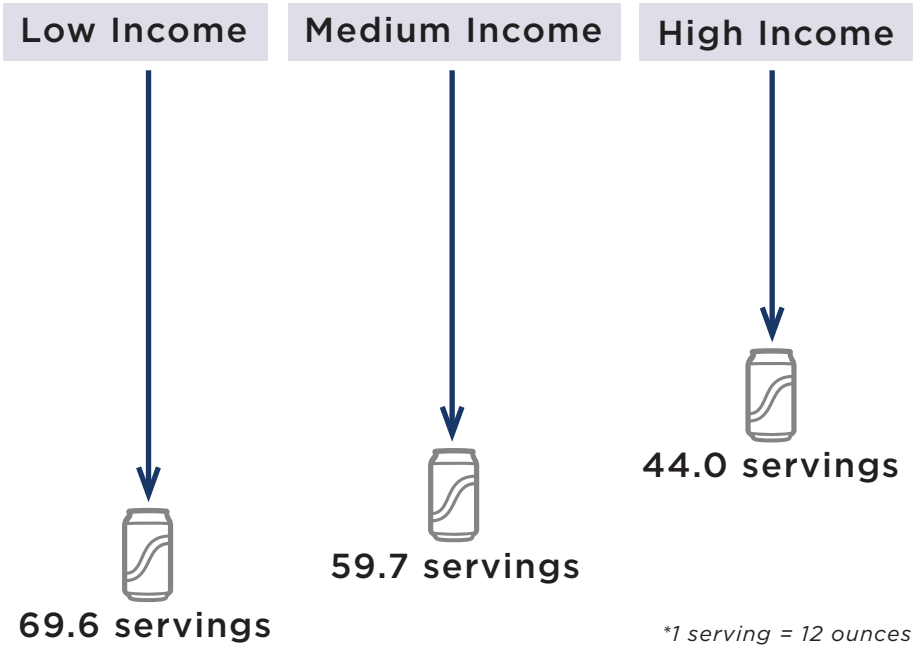
Appendix C.3

$0.01/ounce Excise Tax on Sugary Drinks: Decreases in Sugary Drink Consumption per Person by Race/Ethnicity and Income Level

A $0.01/ounce excise tax on sugary drinks is expected to result in declines in consumption of servings of sugary drinks during the first year of tax implementation. The Black NYC population would see the largest declines, consume 83.8 fewer sugary drink servings per person, and experience greater health benefits compared to other race/ethnicities.



The NYC population with lower income would see the largest declines, consume 69.6 fewer sugary drink servings, and experience greater health benefits compared to other income levels.



*1 serving = 12 ounces

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.

Appendix C.4
$0.015/ounce Excise Tax on Sugary Drinks: Results by Race/Ethnicity

Outcome	Selected Results by Race/Ethnicity				
	White	Black	Latino	Asian/Pacific Islander	Other
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	54.6 (30.9; 118)	126 (71.5; 271)	104 (58.7; 222)	58.2 (32.9; 126)	100 (56.8; 216)
Relative Reduction in Obesity Prevalence in 2027*	1.00** (1.00; 1.00)	2.86 (2.47; 3.32)	2.64 (2.33; 3.10)	1.01 (0.746; 1.30)	1.92 (1.51; 2.52)
Absolute Reduction in Obesity Prevalence in 2027*	0.445% (0.133%; 1.21%)	1.24% (0.378%; 3.27%)	1.16% (0.336%; 3.01%)	0.437% (0.127%; 1.09%)	0.822% (0.267%; 2.03%)
Health Care Costs Saved over 10 Years	77.8 mill (22.7 mill; 215 mill)	104 mill (29.7 mill; 286 mill)	133 mill (38.3 mill; 362 mill)	16.8 mill (4.90 mill; 45.6 mill)	8.56 mill (2.50 mill; 23.6 mill)
Mean QALYs Gained Over 10 Years	3,480 (964; 9,510)	5,320 (1,480; 14,500)	5,890 (1,680; 16,500)	692 (181; 1,870)	404 (101; 1,080)
Mean Years of Life Gained Over 10 Years	976 (205; 2,690)	1,430 (315; 4,050)	1,120 (271; 3,080)	131 (0.00; 421)	110 (0.00; 379)
Years with Obesity Prevented Over 10 Years	82,200 (24,100; 225,000)	161,000 (49,500; 405,000)	209,000 (61,300; 545,000)	30,500 (9,040; 77,500)	15,300 (4,960; 38,300)
Cases of Obesity Prevented in 2027*	11,900 (3,550; 32,400)	23,300 (7,140; 61,100)	30,400 (8,850; 79,100)	4,840 (1,400; 12,100)	2,320 (750; 5,780)
Cases of Childhood Obesity Prevented in 2027*	2,460 (773; 6,100)	7,860 (2,680; 17,600)	10,200 (3,320; 24,000)	2,430 (745; 6,050)	1,100 (381; 2,530)

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted
**Reference category

Appendix C.5
$0.015/ounce Excise Tax on Sugary Drinks: Results by Income Level

Outcome	Selected Results by Income Level		
	Low Income	Medium Income	High Income
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	105 (59.3; 225)	89.7 (50.9; 193)	66.1 (37.5; 142)
Relative Reduction in Obesity Prevalence in 2027*	1.80 (1.64; 1.97)	1.42 (1.30; 1.53)	1.00** (1.00; 1.00)
Absolute Reduction in Obesity Prevalence in 2027*	1.07% (0.326%; 2.81%)	0.856% (0.259%; 2.26%)	0.604% (0.184%; 1.63%)
Health Care Costs Saved over 10 Years	139 mill (39.9 mill; 384 mill)	91.9 mill (26.7 mill; 254 mill)	109 mill (31.5 mill; 298 mill)
Mean QALYs Gained Over 10 Years	6,510 (1,850; 18,000)	4,380 (1,230; 12,000)	4,910 (1,370; 13,600)
Mean Years of Life Gained Over 10 Years	1,400 (322; 4,010)	1,040 (213; 2,940)	1,320 (274; 3,730)
Years with Obesity Prevented Over 10 Years	240,000 (73,400; 621,000)	130,000 (39,500; 340,000)	128,000 (38,600; 337,000)
Cases of Obesity Prevented in 2027*	35,100 (10,700; 92,000)	19,200 (5,800; 50,700)	18,600 (5,670; 49,800)
Cases of Childhood Obesity Prevented in 2027*	13,700 (4,550; 31,400)	5,530 (1,810; 12,700)	4,840 (1,640; 11,500)

Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

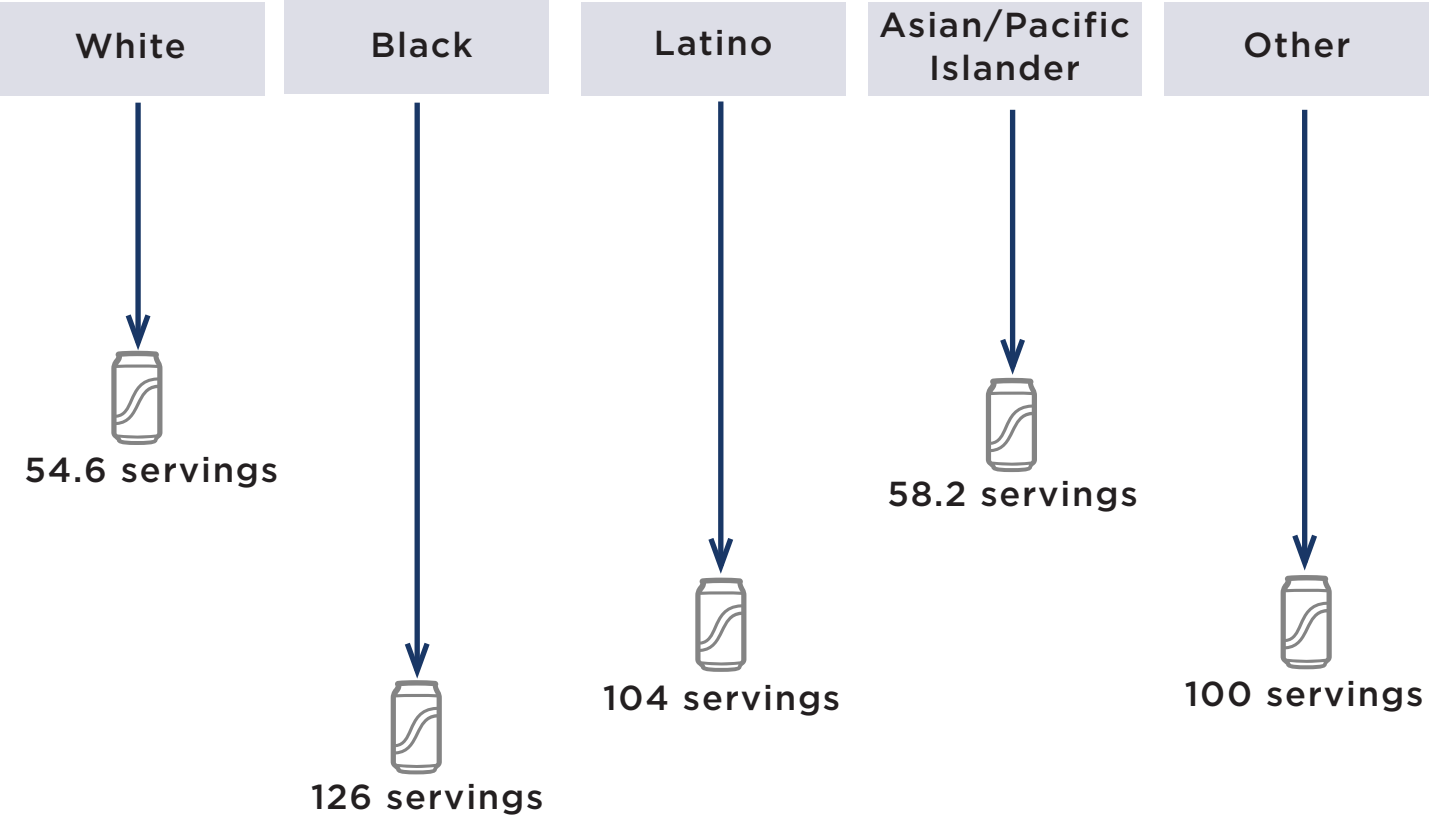
All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted
**Reference category

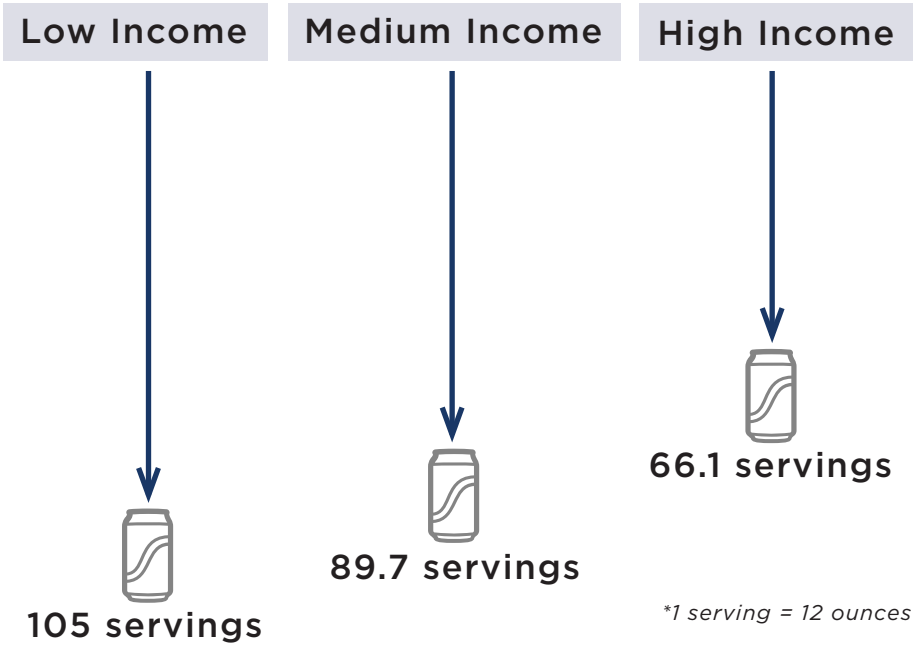
Appendix C.6

$0.015/ounce Excise Tax on Sugary Drinks: Decreases in Sugary Drink Consumption per Person by Race/Ethnicity and Income Level

A $0.015/ounce excise tax on sugary drinks is expected to result in declines in consumption of servings of sugary drinks during the first year of tax implementation. The Black NYC population would see the largest declines, consume 126 fewer sugary drink servings per person, and experience greater health benefits compared to other race/ethnicities.



The NYC population with lower income would see the largest declines, consume 105 fewer sugary drink servings, and experience greater health benefits compared to other income levels.



*1 serving = 12 ounces

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.

Appendix C.7
$0.02/ounce Excise Tax on Sugary Drinks: Results By Race/Ethnicity

Outcome	Selected Results by Race/Ethnicity				
	White	Black	Latino	Asian/Pacific Islander	Other
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	72.9 (41.3; 157)	168 (95.4; 362)	138 (78.4; 296)	77.6 (44.0; 168)	134 (75.8; 288)
Relative Reduction in Obesity Prevalence in 2027*	1.00** (1.00; 1.00)	2.81 (2.43; 3.28)	2.62 (2.31; 3.09)	0.994 (0.739; 1.30)	1.87 (1.47; 2.48)
Absolute Reduction in Obesity Prevalence in 2027*	0.585% (0.177%; 1.57%)	1.60% (0.499%; 4.13%)	1.51% (0.445%; 3.88%)	0.562% (0.170%; 1.40%)	1.05% (0.346%; 2.54%)
Health Care Costs Saved over 10 Years	103 mill (30.1 mill; 283 mill)	137 mill (39.5 mill; 379 mill)	177 mill (50.9 mill; 476 mill)	22.1 mill (6.34 mill; 59.3 mill)	11.3 mill (3.21 mill; 31.2 mill)
Mean QALYs Gained Over 10 Years	4,620 (1,320; 12,600)	6,900 (1,980; 17,300)	7,770 (2,220; 21,300)	884 (236; 2,160)	516 (138; 1,270)
Mean Years of Life Gained Over 10 Years	1,300 (293; 3,580)	1,910 (446; 5,470)	1,470 (343; 4,010)	176 (3.07; 534)	148 (0.00; 471)
Years with Obesity Prevented Over 10 Years	108,000 (32,300; 291,000)	207,000 (65,600; 514,000)	272,000 (81,400; 694,000)	39,200 (11,900; 97,400)	19,600 (6,480; 47,700)
Cases of Obesity Prevented in 2027*	15,700 (4,720; 42,200)	30,100 (9,380; 76,800)	39,800 (11,700; 102,000)	6,230 (1,870; 15,500)	2,960 (979; 7,160)
Cases of Childhood Obesity Prevented in 2027*	3,180 (1,020; 7,760)	9,700 (3,460; 20,800)	12,800 (4,370; 29,000)	3,040 (958; 7,200)	1,360 (500; 3,000)

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted
**Reference category

Appendix C.8
$0.02/ounce Excise Tax on Sugary Drinks: Results By Income Level

Outcome	Selected Results by Income Level		
	Low Income	Medium Income	High Income
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	140 (79.1; 300)	120 (68.0; 257)	88.2 (50.1; 190)
Relative Reduction in Obesity Prevalence in 2027*	1.79 (1.64; 1.97)	1.42 (1.31; 1.54)	1.00** (1.00; 1.00)
Absolute Reduction in Obesity Prevalence in 2027*	1.39% (0.432%; 3.57%)	1.12% (0.341%; 2.90%)	0.788% (0.245%; 2.09%)
Health Care Costs Saved over 10 Years	184 mill (53.2 mill; 504 mill)	122 mill (35.6 mill; 335 mill)	144 mill (41.7 mill; 390 mill)
Mean QALYs Gained Over 10 Years	8,460 (2,460; 21,200)	5,760 (1,640; 15,400)	6,460 (1,820; 17,600)
Mean Years of Life Gained Over 10 Years	1,850 (443; 5,100)	1,390 (314; 3,760)	1,760 (366; 4,850)
Years with Obesity Prevented Over 10 Years	310,000 (96,800; 786,000)	169,000 (52,100; 438,000)	166,000 (51,200; 434,000)
Cases of Obesity Prevented in 2027*	45,600 (14,100; 117,000)	25,000 (7,640; 65,000)	24,200 (7,550; 64,100)
Cases of Childhood Obesity Prevented in 2027*	17,100 (5,980; 37,900)	6,950 (2,370; 15,500)	6,060 (2,110; 13,900)

Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

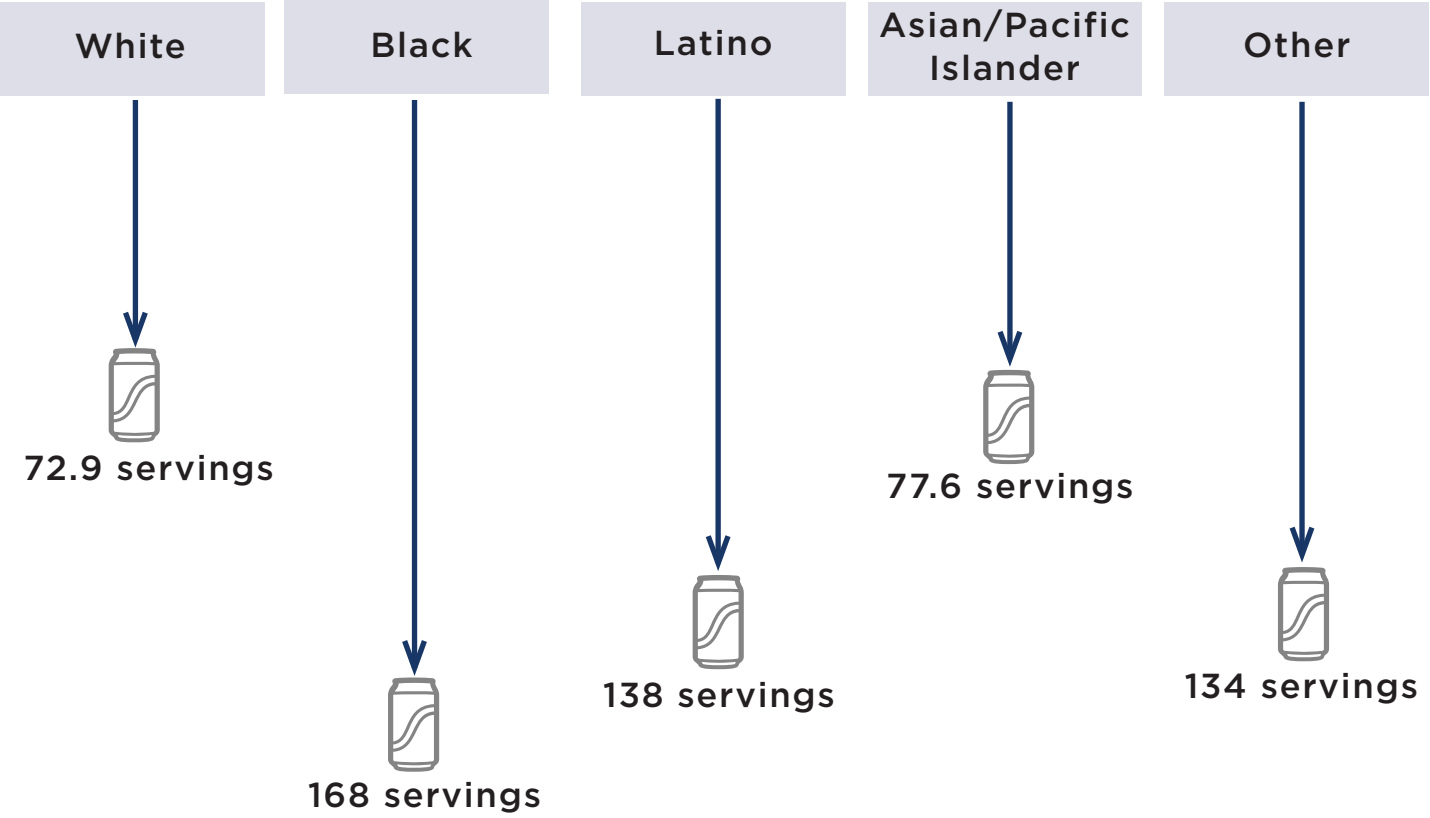
All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted
**Reference category

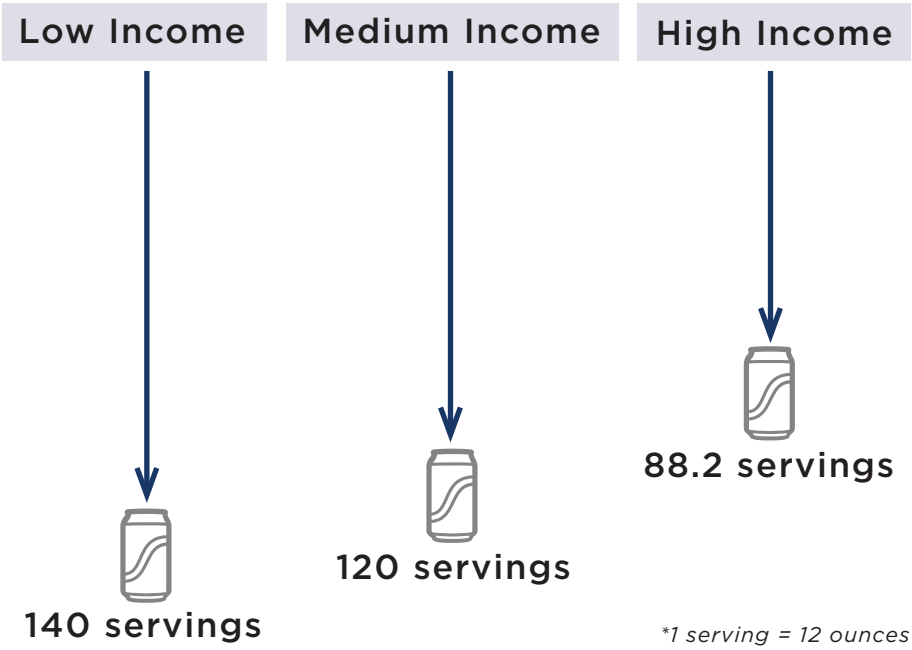
Appendix C.9

$0.02/ounce Excise Tax on Sugary Drinks: Decreases in Sugary Drink Consumption per Person by Race/Ethnicity and Income Level

A $0.02/ounce excise tax on sugary drinks is expected to result in declines in consumption of servings of sugary drinks during the first year of tax implementation. The Black NYC population would see the largest declines, consume 168 fewer sugary drink servings per person, and experience greater health benefits compared to other race/ethnicities.



The NYC population with lower income would see the largest declines, consume 140 fewer sugary drink servings, and experience greater health benefits compared to other income levels.



*1 serving = 12 ounces

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.

Appendix D

City Excise Tax on Sugary and Diet Drinks: Results

Metric	$0.01/ounce tax	$0.015/ounce tax	$0.02/ounce tax
Cost/Effect			
Cost Per Year with Obesity Prevented	Cost-saving	Cost-saving	Cost-saving
Cost Per Quality Adjusted Life Year (QALY) Gained	Cost-saving	Cost-saving	Cost-saving
Cost Per Case of Obesity Prevented	Cost-saving	Cost-saving	Cost-saving
Mean QALYs Gained Over 10 Years	8,130 (2,120; 17,200)	12,200 (3,140; 25,400)	16,200 (4,220; 33,600)
Reach			
First Year Population Reach*	8.36 million (8.34 mill; 8.37 mill)	8.36 million (8.34 mill; 8.37 mill)	8.36 million (8.34 mill; 8.37 mill)
Effect			
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	45.2 (23.4; 70.8)	67.9 (35.1; 106)	90.7 (46.9; 142)
Cases of Obesity Prevented in 2027*	38,900 (10,700; 80,300)	57,100 (16,000; 116,000)	74,700 (21,300; 150,000)
Cases of Childhood Obesity Prevented in 2027*	13,800 (3,930; 27,200)	19,600 (5,890; 37,800)	24,900 (7,830; 46,500)
Years with Obesity Prevented Over 10 Years	267,000 (73,100; 544,000)	391,000 (109,000; 788,000)	511,000 (145,000; 1,020,000)
Mean Years of Life Gained Over 10 Years	1,920 (447; 4,190)	2,890 (679; 6,200)	3,840 (905; 8,080)
Deaths Averted*	576 (131; 1,230)	862 (204; 1,800)	1,140 (278; 2,370)
Cost			
Annual Intervention Cost	$1.37 million ($1.37 mill; $1.37 mill)	$1.37 million ($1.37 mill; $1.37 mill)	$1.37 million ($1.37 mill; $1.37 mill)
Health Care Costs Saved	$176 million ($46.6 mill; $366 mill)	$262 million ($70.3 mill; $543 mill)	$347 million ($92.9 mill; $718 mill)
Net Cost (negative means savings)	-$162 million (-$352 mill; -$32.9 mill)	-$248 million (-$530 mill; -$56.6 mill)	-$334 million (-$704 mill; -$79.2 mill)
Health Care Cost Savings per $1 Invested	$12.80 ($3.40; $26.70)	$19.10 ($5.13; $39.70)	$25.40 ($6.78; $52.40)

Data shown above represent mean values and are accompanied by uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted

Appendix D.1

$0.01/ounce Excise Tax on Sugary and Diet Drinks: Results By Race/Ethnicity

Outcome	Selected Results by Race/Ethnicity				
	White	Black	Latino	Asian/Pacific Islander	Other
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	28.4 (14.7; 44.6)	65.4 (34.0; 103)	53.8 (27.8; 84.1)	30.2 (15.7; 47.3)	52.2 (26.8; 81.7)
Relative Reduction in Obesity Prevalence in 2027*	1.00** (1.00; 1.00)	2.95 (2.56; 3.36)	2.67 (2.35; 3.10)	1.04 (0.745; 1.35)	2.01 (1.61; 2.62)
Absolute Reduction in Obesity Prevalence in 2027*	0.231% (0.0640%; 0.481%)	0.674% (0.186%; 1.38%)	0.611% (0.165%; 1.24%)	0.238% (0.0621%; 0.495%)	0.455% (0.131%; 0.941%)
Health Care Costs Saved over 10 Years	39.9 mill (10.8 mill; 82.5 mill)	53.8 mill (14.1 mill; 112 mill)	68.7 mill (18.5 mill; 141 mill)	8.74 mill (2.31 mill; 18.4 mill)	4.43 mill (1.19 mill; 9.35 mill)
Mean QALYs Gained Over 10 Years	1,790 (464; 3,750)	2,750 (699; 5,900)	3,030 (807; 6,310)	358 (88.1; 767)	211 (44.2; 478)
Mean Years of Life Gained Over 10 Years	497 (72.8; 1,160)	723 (137; 1,690)	582 (112; 1,300)	62.5 (0.00; 211)	56.8 (0.00; 196)
Years with Obesity Prevented Over 10 Years	42,900 (11,400; 89,600)	87,500 (23,900; 177,000)	111,000 (30,200; 232,000)	16,700 (4,340; 34,800)	8,510 (2,400; 16,900)
Cases of Obesity Prevented in 2027*	6,210 (1,720; 12,900)	12,700 (3,500; 25,800)	16,100 (4,370; 32,700)	2,640 (686; 5,450)	1,290 (367; 2,670)
Cases of Childhood Obesity Prevented in 2027*	1,330 (377; 2,760)	4,670 (1,340; 9,340)	5,760 (1,600; 11,700)	1,400 (354; 2,920)	649 (193; 1,320)

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted
**Reference category

Appendix D.2

$0.01/ounce Excise Tax on Sugary and Diet Drinks: Results By Income Level

Outcome	Selected Results by Income Level		
	Low Income	Medium Income	High Income
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	**54.3** (28.1; 85.4)	**46.6** (24.2; 72.8)	**34.3** (17.8; 53.8)
Relative Reduction in Obesity Prevalence in 2027*	**1.81** (1.64; 2.01)	**1.42** (1.27; 1.53)	**1.00**** (1.00; 1.00)
Absolute Reduction in Obesity Prevalence in 2027*	**0.576%** (0.156%; 1.18%)	**0.455%** (0.127%; 0.934%)	**0.320%** (0.0871%; 0.664%)
Health Care Costs Saved over 10 Years	**72.1 mill** (19.1 mill; 148 mill)	**47.2 mill** (12.7 mill; 98.6 mill)	**56.3 mill** (15.2 mill; 115 mill)
Mean QALYs Gained Over 10 Years	**3,360** (895; 7,000)	**2,260** (581; 4,750)	**2,520** (636; 5,350)
Mean Years of Life Gained Over 10 Years	**713** (139; 1,620)	**539** (102; 1,240)	**669** (106; 1,500)
Years with Obesity Prevented Over 10 Years	**130,000** (36,100; 267,000)	**69,200** (19,100; 141,000)	**67,900** (18,300; 138,000)
Cases of Obesity Prevented in 2027*	**18,800** (5,100; 38,400)	**10,200** (2,850; 20,900)	**9,860** (2,690; 20,400)
Cases of Childhood Obesity Prevented in 2027*	**7,870** (2,170; 15,700)	**3,170** (890; 6,350)	**2,780** (803; 5,570)

Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

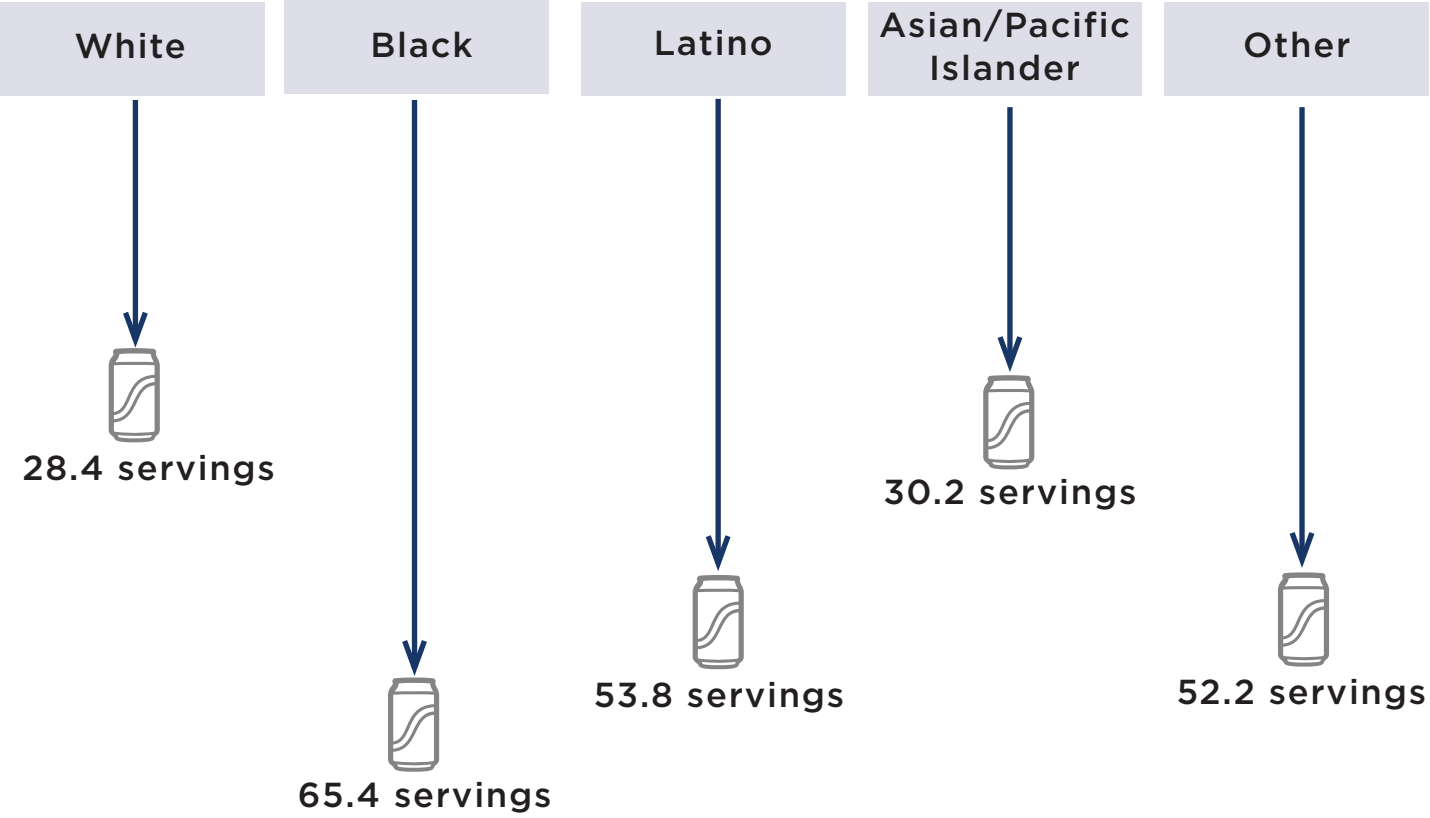
All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted
**Reference category

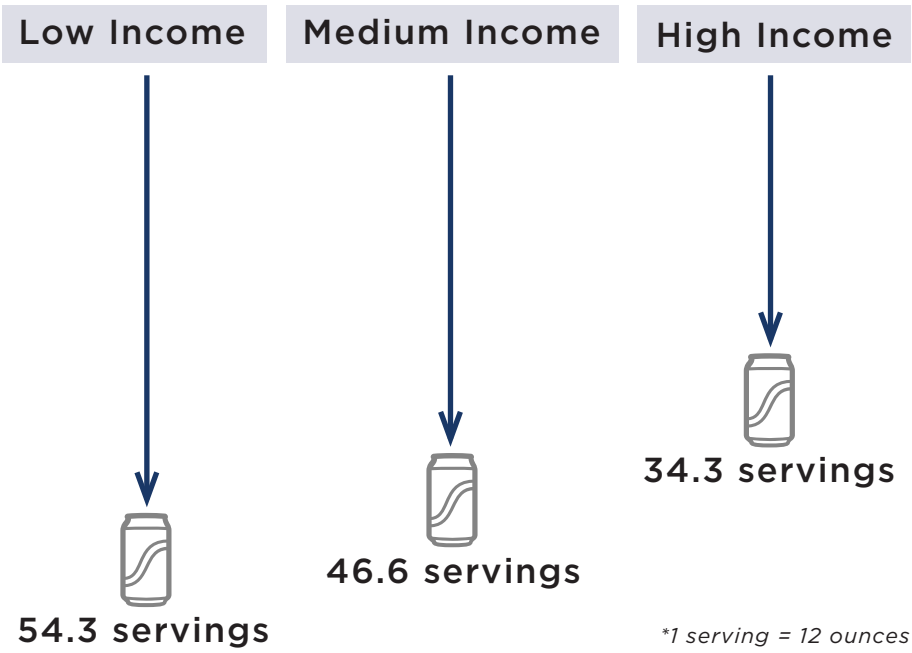
Appendix D.3

$0.01/ounce Excise Tax on Sugary and Diet Drinks: Decreases in Sugary Drink Consumption per Person by Race/Ethnicity and Income Level

A $0.01/ounce excise tax on sugary and diet drinks is expected to result in declines in consumption of servings of sugary drinks during the first year of tax implementation. The Black NYC population would see the largest declines, consume 65.4 fewer sugary drink servings per person, and experience greater health benefits compared to other race/ethnicities.



The NYC population with lower income would see the largest declines, consuming 54.3 fewer sugary drink servings, and experiencing greater health benefits compared to other income levels.



*1 serving = 12 ounces

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.

Appendix D.4

$0.015/ounce Excise Tax on Sugary and Diet Drinks: Results By Race/Ethnicity

Outcome	Selected Results by Race/Ethnicity				
	White	Black	Latino	Asian/Pacific Islander	Other
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	42.6 (22.0; 67.0)	98.3 (51.1; 154)	80.8 (41.7; 126)	45.4 (23.5; 71.2)	78.4 (40.3; 123)
Relative Reduction in Obesity Prevalence in 2027*	1.00** (1.00; 1.00)	2.90 (2.51; 3.34)	2.65 (2.34; 3.11)	1.03 (0.749; 1.32)	1.95 (1.57; 2.56)
Absolute Reduction in Obesity Prevalence in 2027*	0.344% (0.0956%; 0.712%)	0.982% (0.277%; 1.96%)	0.903% (0.246%; 1.83%)	0.346% (0.0917%; 0.718%)	0.657% (0.195%; 1.33%)
Health Care Costs Saved over 10 Years	59.7 mill (16.4 mill; 124 mill)	80.1 mill (21.0 mill; 166 mill)	103 mill (27.5 mill; 210 mill)	13.0 mill (3.50 mill; 27.3 mill)	6.58 mill (1.74 mill; 13.8 mill)
Mean QALYs Gained Over 10 Years	2,680 (702; 5,540)	4,120 (1,070; 8,720)	4,530 (1,160; 9,390)	538 (132; 1,140)	316 (72.6; 695)
Mean Years of Life Gained Over 10 Years	751 (140; 1,690)	1,090 (224; 2,390)	860 (192; 1,840)	98.7 (0.00; 292)	86.5 (0.00; 260)
Years with Obesity Prevented Over 10 Years	63,700 (17,200; 132,000)	127,000 (35,700; 253,000)	164,000 (45,200; 335,000)	24,300 (6,530; 49,600)	12,300 (3,560; 24,100)
Cases of Obesity Prevented in 2027*	9,240 (2,570; 19,100)	18,400 (5,230; 36,900)	23,800 (6,520; 48,100)	3,840 (1,010; 7,970)	1,860 (548; 3,750)
Cases of Childhood Obesity Prevented in 2027*	1,950 (557; 3,980)	6,520 (1,990; 12,500)	8,250 (2,360; 16,400)	1,990 (540; 4,100)	909 (279; 1,800)

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted
**Reference category

Appendix D.5
$0.015/ounce Excise Tax on Sugary and Diet Drinks: Results By Income Level

Outcome	Selected Results by Income Level		
	Low Income	Medium Income	High Income
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	**81.7** (42.2; 128)	**70.0** (36.3; 109)	**51.6** (26.7; 80.9)
Relative Reduction in Obesity Prevalence in 2027*	**1.80** (1.64; 1.98)	**1.42** (1.29; 1.53)	**1.00**** (1.00; 1.00)
Absolute Reduction in Obesity Prevalence in 2027*	**0.845%** (0.233%; 1.70%)	**0.670%** (0.188%; 1.35%)	**0.472%** (0.131%; 0.968%)
Health Care Costs Saved over 10 Years	**107 mill** (28.3 mill; 222 mill)	**70.5 mill** (19.3 mill; 147 mill)	**84.0 mill** (22.5 mill; 173 mill)
Mean QALYs Gained Over 10 Years	**5,030** (1,310; 10,600)	**3,380** (871; 7,140)	**3,770** (963; 7,930)
Mean Years of Life Gained Over 10 Years	**1,070** (224; 2,320)	**807** (156; 1,790)	**1,010** (196; 2,260)
Years with Obesity Prevented Over 10 Years	**190,000** (53,800; 383,000)	**102,000** (28,800; 205,000)	**100,000** (27,700; 202,000)
Cases of Obesity Prevented in 2027*	**27,600** (7,650; 55,700)	**15,000** (4,200; 30,200)	**14,500** (4,040; 29,800)
Cases of Childhood Obesity Prevented in 2027*	**11,200** (3,280; 21,700)	**4,510** (1,310; 8,780)	**3,940** (1,190; 7,750)

Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

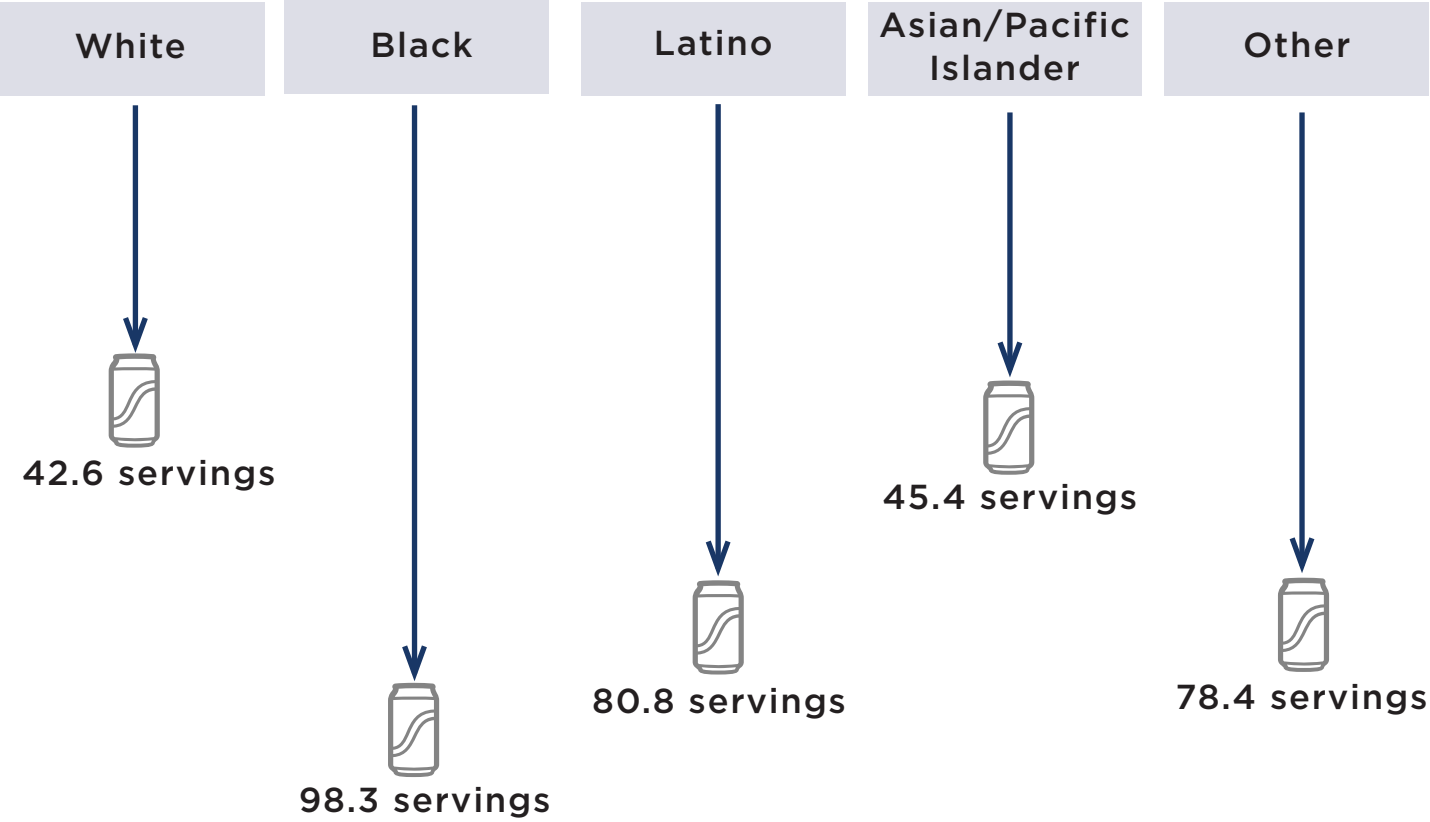
All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted
**Reference category

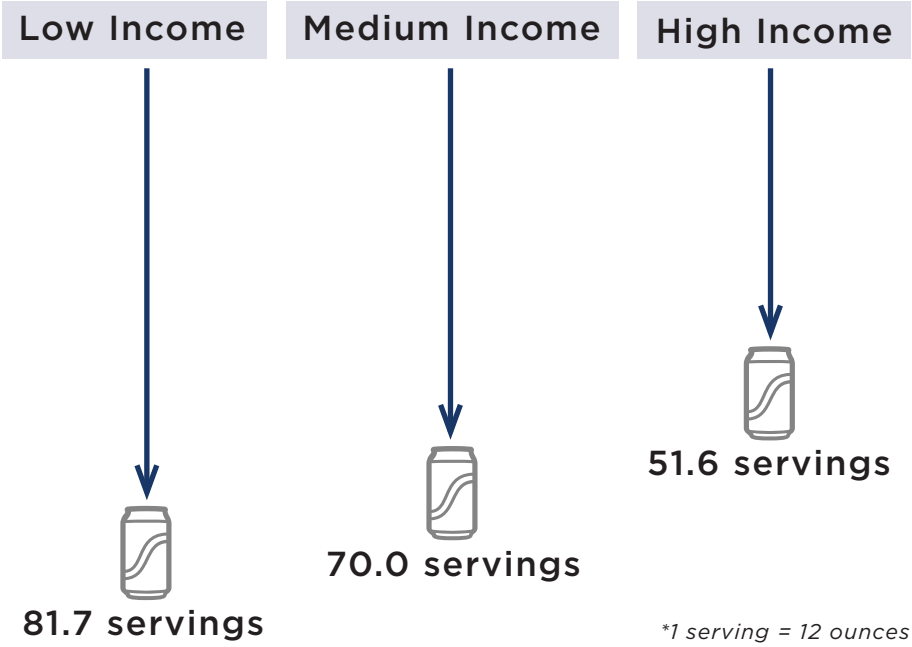
Appendix D.6

$0.015/ounce Excise Tax on Sugary and Diet Drinks: Decreases in Sugary Drink Consumption per Person by Race/Ethnicity and Income Level

A $0.015/ounce excise tax on sugary and diet drinks is expected to result in declines in consumption of servings of sugary drinks during the first year of tax implementation. The Black NYC population would see the largest declines, consume 98.3 fewer sugary drink servings per person, and experience greater health benefits compared to other race/ethnicities.



The NYC population with lower income would see the largest declines, consume 81.7 fewer sugary drink servings, and experience greater health benefits compared to other income levels.



*1 serving = 12 ounces

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.

Appendix D.7
$0.02/ounce Excise Tax on Sugary and Diet Drinks: Results By Race/Ethnicity

Outcome	Selected Results by Race/Ethnicity				
	White	Black	Latino	Asian/Pacific Islander	Other
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	56.9 (29.4; 89.4)	131 (68.1; 206)	108 (55.7; 169)	60.6 (31.4; 95.0)	105 (53.8; 164)
Relative Reduction in Obesity Prevalence in 2027*	1.00** (1.00; 1.00)	2.85 (2.47; 3.31)	2.64 (2.33; 3.09)	1.01 (0.744; 1.30)	1.91 (1.53; 2.50)
Absolute Reduction in Obesity Prevalence in 2027*	0.455% (0.127%; 0.929%)	1.27% (0.369%; 2.52%)	1.19% (0.330%; 2.38%)	0.449% (0.123%; 0.905%)	0.846% (0.257%; 1.66%)
Health Care Costs Saved over 10 Years	79.4 mill (21.7 mill; 164 mill)	106 mill (28.0 mill; 218 mill)	136 mill (36.2 mill; 277 mill)	17.1 mill (4.59 mill; 35.6 mill)	8.72 mill (2.33 mill; 18.2 mill)
Mean QALYs Gained Over 10 Years	3,550 (913; 7,320)	5,480 (1,410; 11,500)	6,020 (1,600; 12,500)	716 (179; 1,480)	419 (100; 893)
Mean Years of Life Gained Over 10 Years	994 (205; 2,140)	1,460 (311; 3,180)	1,140 (271; 2,430)	135 (1.01: 389)	114 (0.00; 335)
Years with Obesity Prevented Over 10 Years	84,100 (22,900; 173,000)	165,000 (47,400; 323,000)	215,000 (59,700; 433,000)	31,400 (8,680; 63,800)	15,800 (4,680; 30,500)
Cases of Obesity Prevented in 2027*	12,200 (3,410; 24,900)	23,900 (6,940; 47,400)	31,200 (8,640; 62,900)	4,970 (1,360; 10,000)	2,390 (724; 4,700)
Cases of Childhood Obesity Prevented in 2027*	2,530 (728; 5,080)	8,160 (2,600; 15,200)	10,500 (3,160; 20,500)	2,520 (737; 5,070)	1,140 (371; 2,210)

White, Black, Asian/Pacific Islander, and Other categories exclude Latino ethnicity. Latino is Hispanic or Latino of any race. Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

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

*Not discounted
**Reference category

Appendix D.8

$0.02/ounce Excise Tax on Sugary and Diet Drinks: Results By Income Level

Outcome	Selected Results by Income Level		
	Low Income	Medium Income	High Income
Decrease in 12-ounce Servings of Sugary Drinks per Person in the First Year*	109 (56.4; 171)	93.5 (48.5; 146)	68.9 (35.7; 108)
Relative Reduction in Obesity Prevalence in 2027*	1.80 (1.64; 1.97)	1.42 (1.30; 1.53)	1.00** (1.00; 1.00)
Absolute Reduction in Obesity Prevalence in 2027*	1.10% (0.311%; 2.19%)	0.887% (0.250%; 1.75%)	0.618% (0.174%; 1.25%)
Health Care Costs Saved over 10 Years	142 mill (38.2 mill; 293 mill)	93.6 mill (25.2 mill; 195 mill)	111 mill (30.1 mill; 227 mill)
Mean QALYs Gained Over 10 Years	6,690 (1,720; 14,000)	4,480 (1,170; 9,380)	5,020 (1,290; 10,400)
Mean Years of Life Gained Over 10 Years	1,420 (319; 3,080)	1,070 (221; 2,290)	1,350 (285; 2,890)
Years with Obesity Prevented Over 10 Years	247,000 (71,600; 491,000)	133,000 (38,000; 265,000)	131,000 (36,700; 261,000)
Cases of Obesity Prevented in 2027*	36,100 (10,200; 71,700)	19,600 (5,610; 39,200)	19,000 (5,380; 38,500)
Cases of Childhood Obesity Prevented in 2027*	14,200 (4,360; 26,600)	5,730 (1,750; 10,800)	5,000 (1,550; 9,670)

Mean data shown above appears with 95% uncertainty intervals. Uncertainty intervals are estimated by running the model 1,000 times, taking into account both uncertainty from data sources and virtual population projections, and calculating a central range in which 95 percent of the model results fell.

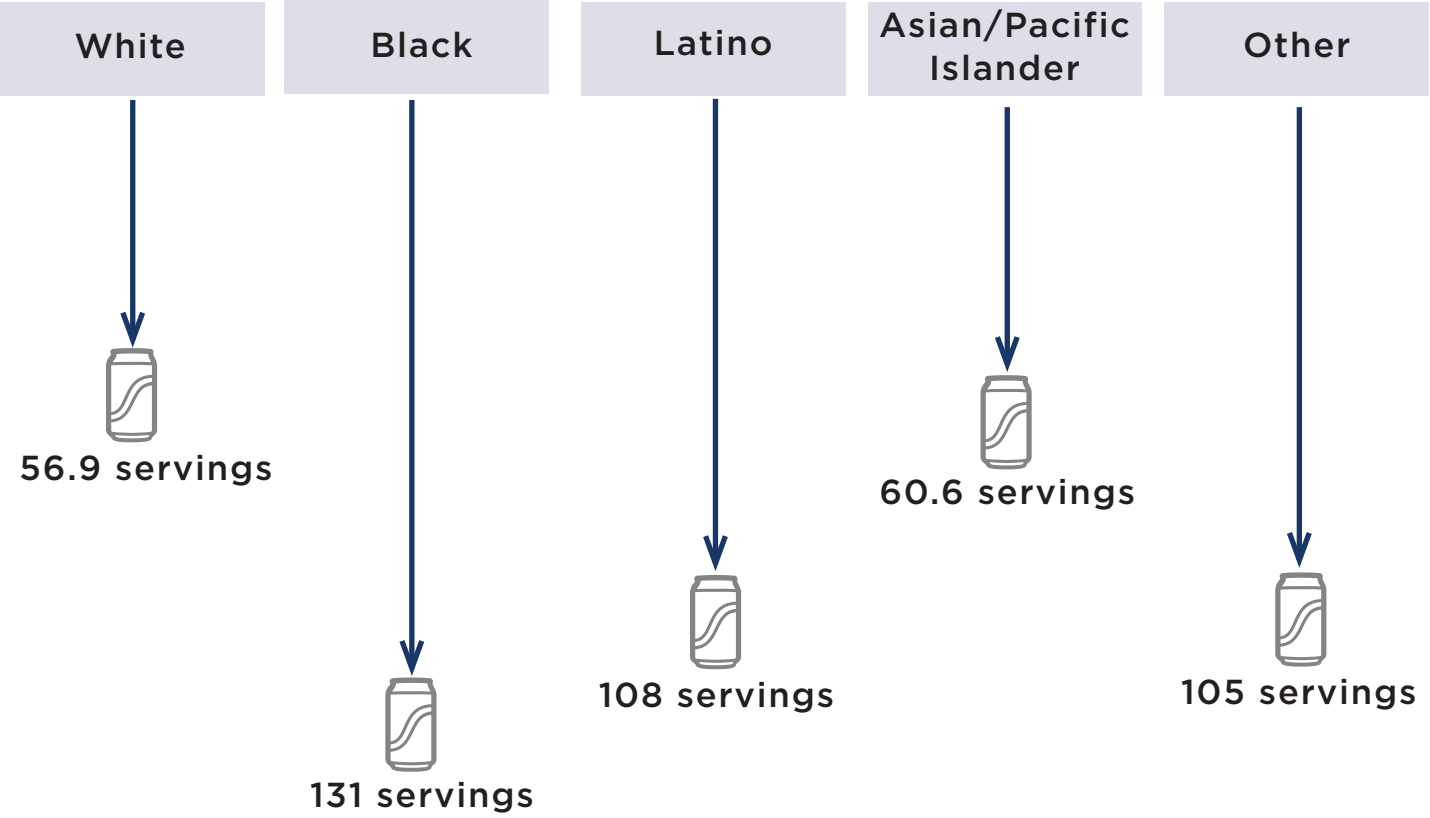
All metrics reported for the population over a 10-year period and discounted at 3% per year, unless otherwise noted.

*Not discounted
**Reference category

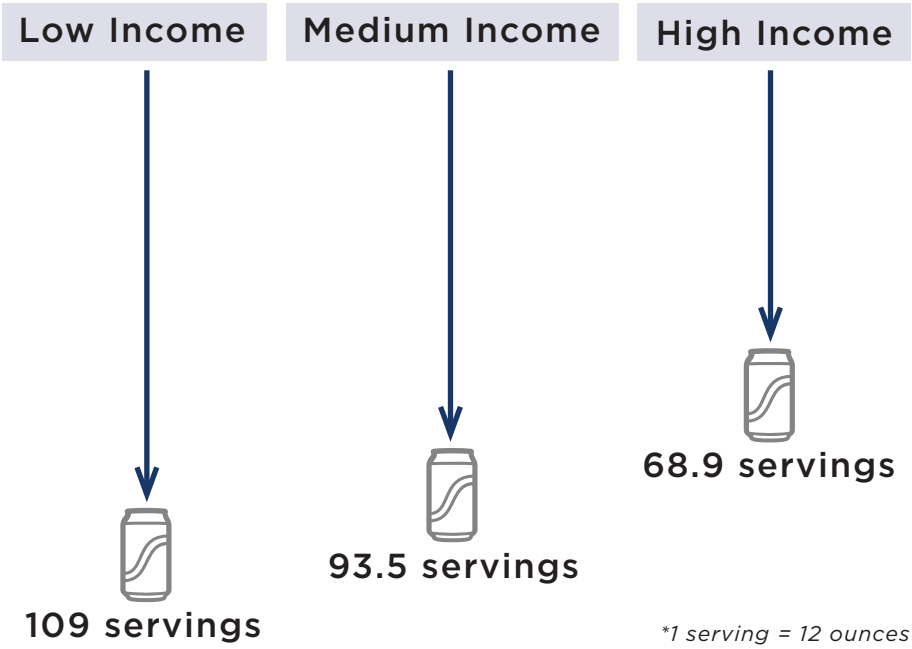
Appendix D.9

$0.02/ounce Excise Tax on Sugary and Diet Drinks: Decreases in Sugary Drink Consumption per Person by Race/Ethnicity and Income Level

A $0.02/ounce excise tax on sugary and diet drinks is expected to result in declines in consumption of servings of sugary drinks during the first year of tax implementation. The Black NYC population would see the largest declines, consume 131 fewer sugary drink servings per person, and experience greater health benefits compared to other race/ethnicities.



The NYC population with lower income would see the largest declines, consume 109 fewer sugary drink servings, and experience greater health benefits compared to other income levels.



*1 serving = 12 ounces

Why do we see these trends?

Sugary drink consumption is influenced by a variety of systemic practices. These include disproportionate, targeted marketing of unhealthy foods to Black and Latino populations and policies that divest money from communities of color and result in unequal access to healthy foods. Altogether, this creates environments that disproportionately disadvantage Black and Latino populations and populations with lower income in opportunities to achieve and maintain health.