REDUCING OBESITY IN LOS ANGELES COUNTY:

TOWARD A TAX ON SUGAR-SWEETENED BEVERAGES

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Reducing Obesity in Los Angeles County: Toward a Tax on Sugar-Sweetened Beverages

Policy and Implications

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EXECUTIVE SUMMARY

Obesity is a public health crisis in the United States. The Greater Los Angeles region has been hit particularly hard: obesity costs L.A. County several billion dollars per year. In recent years, policy-makers across the country have looked to taxes on sugar-sweetened beverages (“SSBs”)—a class of drinks containing caloric sweeteners, including sodas, fruit drinks, flavored milk, and sports drinks—as a way to reduce total calorie consumption and, in turn, reduce obesity rates.

On the recommendation of our client, Dr. Arturo Vargas Bustamante of the UCLA Center for Health Policy, this report charts a path toward a tax on SSBs in order to drive down SSB consumption and reduce obesity rates in L.A. County, partially mitigating the social and economic costs associated with obesity.

First, we provide an overview of the costs of and potential responses to the problem of obesity, linking a rise in the consumption of SSBs with a rise in obesity rates. We then explore three different policy methods of reducing SSB consumption: marketing and education campaigns, total bans, and taxes. Marketing and education campaigns are effective but costly. Bans are often subverted and subject to strict legal restrictions. We conclude that a tax would be a particularly effective intervention.

We then explore a potential SSB tax in depth. We begin with a discussion of the economics of a tax on SSBs, outlining why and how a tax is expected to affect consumption. Next, we investigate the legal restrictions on instituting a new tax on SSBs in L.A. County, exploring the benefits and drawbacks of a “special tax,” whose revenue is allocated for specific policy purposes, and a “general tax,” whose revenue is funneled into a municipality’s general fund. We then provide a full discussion of tax design, studying and making decisions regarding the following elements: tax subject (i.e., what is an SSB for the purposes of the tax?); tax type (i.e., excise or sales?); tax level (i.e., what is the price change?); and taxed unit (i.e., which element of an SSB will be taxed—ounces, sugar content, or something else?).

Based on this analysis, we find that a cent-per-ounce or two-cent-per-ounce excise tax on a broad class of beverages containing caloric sweetener would be effective at reducing SSB consumption and raising revenue. A simple economic simulation demonstrates that a cent-per-ounce tax on an individual who consumes one can of soda per day could produce a 3.3- to 7.1-lb. reduction in weight per year.

We then consider revenue allocation. Revenue can be used as a policy tool; funds that are allocated to anti-obesity programs can further our overall policy goal of obesity reduction. Revenue can also be used as a political tool, since the projected revenue from a cent-per-ounce tax—between $100 and $300 million per year in our estimation—would be highly coveted by lawmakers and interest groups. We recognize that the current political climate in L.A. County is not amenable to the passage of a tax, but we also recognize that SSB taxes present the next frontier in health policy-making around California. We conclude that a general tax, which requires a simple majority of votes from L.A. County voters for approval, is more politically feasible but would largely strip away the opportunity to create and fund further anti-obesity interventions. A special tax, which requires a ⅔ supermajority approval by the general electorate, is a harder sell but would allow for the creation of new anti-obesity interventions or the funding of exemplary existing programs. We then identify potential new and existing beneficiaries of a special fund.

Finally, we outline next steps and action items for our client and other policy entrepreneurs interested in using a tax on SSBs to reduce obesity in L.A. County.
I. Introduction

II. The Problem of Obesity in Los Angeles County

Rising rates of obesity in Los Angeles County create significant economic and social costs to obese individuals and to society at large. Sugar-sweetened beverages are closely linked to obesity. Reducing the consumption of sugar-sweetened beverages can assist in mitigating the externalities generated by obesity-related illnesses.

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CLIENT

Our policy analysis and recommendations will be delivered to Professor Arturo Vargas Bustamante, M.A., M.P.P., Ph.D. Dr. Bustamante is a full-time faculty member at the University of California, Los Angeles (UCLA) Center for Health Policy Research. This center is a leader in health policy, utilizing the most up-to-date evidence based research, striving to alleviate health disparities locally and nationally. Dr. Bustamante specializes in health care disparities for vulnerable populations, who are disproportionately uninsured and have poor access to health care. Dr. Bustamante continues to appreciate and understand the many social determinants of health and is constantly looking for ways to improve the public health of our communities. To that end, Dr. Bustamante is keenly interested in the potential economic and social benefits attached to reducing the consumption of sugar-sweetened beverages in Los Angeles County.

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GLOSSARY OF TERMS

- Obesity – body mass index greater than or equal to 30.
- Sugar-sweetened beverages (“SSBs”) – beverages with caloric sweeteners.¹
- Externality – the cost or benefit that affects a party who did not choose to incur that cost or benefit.
- Comorbidity – two or more coexisting medical conditions or diseases processes that are additional to an initial diagnosis.²
- General tax – a tax imposed at the state or local level whose revenue is directed into a municipality’s general fund for use in any governmental program.³
- Special tax – a tax imposed at the state or local level whose revenue is directed into a special fund created for a specific purpose.⁴
- Randomized control trial (“RCT”) – a type of study design that is experimental in nature, where subjects are randomly assigned to treatment or placebo. When applied to behavioral studies, the control is a comparable population that received no intervention. It is currently considered to be the strongest study design for determining causality.⁵
- Market failure – when an outcome exists in the free market that can make at least one individual better off without making anyone worse off, but is not the outcome in use. An inefficient allocation of resources by a free market.
- Welfare loss – “the decreased economic well-being caused by the imposition of a tax.”⁶ The result of individuals altering their actions to avoid a tax leads to a less efficient market that produces deadweight loss.⁷ When a tax is placed on a product it causes people to lose interest in that product overall.

⁴ Ibid., Section 1(d).
⁷ Ibid.
I. INTRODUCTION

The obesity epidemic is a public health crisis. The U.S. is home to the greatest number of obese adults—approximately 72.5 million of them.\(^8\) Obesity leads to a number of preventable causes of death, including heart disease, stroke, type II diabetes, and certain types of cancer.\(^9\) It can cause physical limitations, social stigmatization, and discrimination, and is generally associated with a decreased quality of life.\(^10\) By 2008, the costs of treating these diseases had risen to roughly $147 billion in the United States alone.\(^11\) The epidemic affects children as well; today, an estimated 17% of American children are obese.\(^12\) Hispanic communities tend to have the highest rates of obesity—currently 22%—and black youth are a close second, at 20.2%.\(^13\)

Our local Los Angeles communities have been seriously affected by obesity, too. Obesity prevalence has increased from 13.6% in 1996 to 22.2% in 2007,\(^14\) to an estimated 23.9% in 2011.\(^15\) Obesity has cost the County $3.6 billion in health expenditures and a total of $6 billion including associated expenditures per year.\(^16\)

There are many ways to address obesity at both the individual and population level. The area of food policy is a particularly exciting emerging field of public policy, as it often focuses on “upstream,” or determinative, factors of obesity. Among population-level interventions, our client was most interested in how a tax could be best designed to reduce SSB consumption and raise revenue. A tax on SSBs can be envisioned as a classic example of a Pigouvian tax designed to correct for the externalities caused by SSB consumption by incorporating these costs into the price of the good. In this analysis, we consider taxes in conjunction with other population-level interventions, including a ban on SSBs and existing marketing and educational campaigns.

The first policy proposal for a tax on SSBs was introduced in 2009 by the Yale Rudd Center for Food Policy and Obesity in an effort to reduce consumption of SSBs and, in turn, lower obesity rates.\(^17\) In November 2014, the first tax on sugar-sweetened beverages (“SSBs”)

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\(^11\) Ibid.

\(^12\) Ibid.

\(^13\) Ibid.


\(^16\) Ibid.

was approved by the electorate in Berkeley, California. The revenue generated by the tax (which has not yet been fully implemented) will flow into the general fund, helping to balance the Berkeley city budget. Other cities have tried unsuccessfully to tax SSBs, including San Francisco, where a SSB tax initiative was defeated by voters in November 2014.

In this analysis, we address the following policy questions:

1. **What are viable policy options for reducing obesity in Los Angeles County?**

2. **What are the design elements of a sugar-sweetened beverage tax that contribute to its effectiveness and feasibility in reducing obesity? How does the consumer’s expected behavioral response influence these elements?**
   - Tax subject: how an SSB is defined
   - Tax type: excise and sales
   - Tax level: intended percentage increase in price
   - Taxable unit: calorie, nutrient, or ounce

3. **What are the ways that tax revenue funds can be used? How does the intended use of tax revenue affect the political feasibility of an SSB tax proposal?**

We created a logic model (see figure below) to help understand the impact of an SSB tax and the revenue generated by such a tax on obesity in Los Angeles County. The model relies on evidence that consumers will reduce their consumption of SSBs when faced with price increases. As SSB consumption decreases, so will an individual’s total calorie consumption, leading to a reduction in the overall obesity rate and better health outcomes on both the individual and community level. A tax also creates revenue, opening up the possibility of developing and implementing new anti-obesity behavioral intervention programs and furthering the overall policy goal of reducing obesity.

Our analysis is based on a review of relevant literature on obesity, food policy, economics, and tax law. Experts in the fields of health, food policy, and economics were also consulted. We limited our literature search to peer-reviewed journals. We chose, whenever possible, articles that were published within the last 5 years, as research on obesity and SSB consumption has evolved significantly in this time. Methodological improvements in these more recent studies build on the insights of earlier models and offer more reliable estimates from which to draw conclusions about the effects of a tax. We also focused on studies that specifically address the link between obesity interventions and quantitative outcomes such as calories consumed and changes in BMI. When using literature surrounding experimental studies, we prioritized randomized controlled trials (“RCTs”) and studies that produced statistically significant results.

In evaluating the literature on the effects of SSB taxation, we relied on multiple demand model estimations from recent studies. We then ran a simple simulation using consumption data from the UCLA Center for Health Policy and following a model used by the USDA Economic Research Service in a 2011 publication on SSB taxation. We studied the California state constitution, Los Angeles County administrative codes, and legal memoranda written by ChangeLab Solutions, a California-based health policy consulting group, to understand the relevant laws regarding a potential tax and tax-generated revenue. Finally, we studied the literature on anti-obesity behavioral interventions and examined existing anti-obesity programs in Los Angeles County in order to develop revenue allocation recommendations.
The experts, data, and literature contributed to informing our analysis through the following evaluative criteria:

- **Effectiveness**
  - How does the intervention serve the objective of reducing SSB consumption?
  - What is the scope of the intervention? Is it sustainable?

- **Cost**
  - How much is the cost to implement and maintain?
  - Where will funds arise?

- **Strength of evidence**
  - How current are studies?
  - Is the study design strong?
  - Does the study sample represent our target population?

- **Political feasibility**
  - Is there precedent?
  - What is the level of support by the public and political leaders?
  - What is the level of opposition among affected sectors (beverage and dairy industry, small business)?

- **Projected Effectiveness**
  - How much will the tax lower SSB consumption, lower BMI, and lower health burden?

We considered the following criteria in our analysis of **SSB tax design**:

- **Salience**
  - How noticeable is the tax to consumers?

- **Revenue generation**
  - How much revenue will be raised per year?

- **Incidence**
  - Is the tax fully passed on to consumer from producers?
  - Which groups of consumers will bear the costs? How much?

- **Ease of implementation**
  - What design elements are most easily implemented?
  - What are the potential pitfalls and loopholes?

- **Sustainability**
  - How might revenue degrade over time (e.g., as a result of inflation)?

**Report Roadmap**

In this report, we analyze a potential tax on SSBs in order to drive down consumption and reduce obesity rates in Los Angeles County, partially mitigating the social and economic costs associated with obesity.
In Chapter II, we provide an overview of the costs of and potential responses to the problem of obesity. First, we outline the costs of obesity: national and local economic costs, community- and individual-level medical costs, and social costs. Next, we link a rise in the consumption of SSBs with a rise in obesity. Finally, we explore three different policy methods of reducing SSB consumption: marketing and education campaigns, total bans, and taxes. By analyzing each of these three options, we conclude that a tax on SSBs would be a particularly effective and feasible intervention.

In Chapter III, we explore a potential SSB tax in depth. We begin with a discussion of the economics of a tax on SSBs, outlining why and how a tax is expected to affect consumption patterns. Next, we investigate the legal restrictions on instituting a new tax on SSBs in Los Angeles County, exploring the benefits and drawbacks of a “special tax,” whose revenue is allocated for specific policy purposes, and a “general tax,” whose revenue is funneled into a municipality’s general fund. We then dive into a full discussion of tax design, studying and making decisions regarding the following elements: tax subject (i.e., what is an SSB for the purposes of the tax?); tax type (i.e., excise or sales?); tax level (i.e., what is the price change?); and taxed unit (i.e., which element of an SSB will be taxed—ounces, sugar content, or something else?). Based on this analysis, we find that a cent-per-ounce or two-cent-per-ounce excise tax on a broad class of beverages containing caloric sweetener would be most effective at reducing SSB consumption and raising revenue. Next, we explore the elasticity of SSBs and whether and how consumers might substitute SSB consumption with other beverages or foods. Finally, we conduct an economic illustration demonstrating that a cent-per-ounce tax on an individual who consumes one 12-ounce SSB (e.g., one soda can) per day would produce a 3.33-7.1-pound reduction in weight per year. While the lack of data specific to Los Angeles County and the limitations of the literature on SSB taxation do not allow us to determine a socially optimal tax level, we aim in this analysis to capture all of the design considerations and anticipated consequences of implementing a tax.

In Chapter IV, we take up the final stage of our analysis: revenue allocation. Revenue can be used as a policy tool; funds that are allocated to anti-obesity programs can further our overall policy goal of obesity reduction. Revenue can also be used as a political tool, since the projected revenue from a cent-per-ounce tax—between $100 and $300 million per year in our estimation—would be highly coveted by lawmakers and interest groups. In an extension of the legal discussion in Chapter III, we discuss the benefits and drawbacks of a special tax against a general tax. Finally, we offer suggestions for cost-effective new and existing behavioral intervention programs if a special fund for anti-obesity efforts is created by the approval of a special tax.

In Chapter V, we conclude our report by summarizing our recommendations and outlining next steps for policymakers and policy entrepreneurs willing to take up the cause of a SSB tax in Los Angeles County.
II. THE PROBLEM OF OBESITY IN LOS ANGELES COUNTY

A. The Economic and Social Costs of Obesity

Obesity is associated with significant economic and social costs for both communities and obese individuals. These costs appear in the form of system-wide costs—strains on the medical and health insurance systems—as well as individual costs borne by overweight and obese individuals. Obesity is associated with many serious health problems, the majority of which are tied to endocrine and metabolic changes that the human body undergoes when severely overweight. Obese individuals also tend to experience a lower quality of life, and tend to be more functionally limited, and tend to experience a reduced life expectancy. These health issues are tied to direct medical costs, including treatments and the purchase of prescription drugs, as well as indirect economic costs, including lost workplace efficiency and early death.

There are numerous studies examining the “cost of illness” of obesity. Analyses of direct costs take into account the costs of prescription drugs, non-inpatient treatment, and inpatient treatment. Indirect costs generally include presenteeism (lost workplace efficiency due to illness), absenteeism (lost workplace efficiency due to absence), and premature death. A 2010 study in the United States found that the annual direct cost of obesity-related conditions and treatment was $30.3 billion. The same study found that the annual indirect cost of obesity was $42.8 billion. One meta-analysis of obesity cost of illness studies found that the annual per capita cost of overweight was 9.9% higher than normal weight, and the per capita cost of obesity was 42.7% higher. A 2005 study found that morbidly obese individuals pay $2,845 more in annual medical costs than a normal-weight individual, and a 2006 study found that the average moderately obese individual paid $1,474 more in incremental medical costs than a normal-weight individual.

With regard to Los Angeles County in particular, the costs of obesity are alarming. One review, dating from 2002, estimated that the County incurred $3.43 billion annually of direct costs due to obesity-related conditions. The adult obesity rate for Los Angeles County in 2002

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23 Ibid.
was 19%. By 2007, the obesity rate had risen to 22.2% of adults and the total economic burden was estimated at $6 billion. According to the Centers for Disease Control, the obesity rate had risen to 24.3% in 2013, and the economic costs have almost certainly risen in tandem.

B. The Link between the Consumption of Sugar-Sweetened Beverages and Obesity

SSBs have been the target of much inquiry regarding their link to obesity. This interest stems in part from the parallel trends in SSB consumption and BMI nationwide. After increasing dramatically from the late 1970s to 2001, consumption of SSBs has decreased overall in the last decade. Yet data from 2009-2010 show that it remains high; over 50% of adults and 30% of youths in the United States still drink more than one SSB per day. There are over 1,000 articles that relate to the link between SSBs and obesity. Within this universe, there are a variety of study designs, including RCTs, cross-sectional and longitudinal observational studies, and meta-analyses.

One meta-analysis of 88 studies revealed that the strength of the correlation between SSBs and indicators such as weight gain and comorbidities increased as the sample size of the study increased. The same meta-analysis revealed that longitudinal and experimental studies produced stronger associations between SSBs and weight when compared to weaker cross-sectional studies. A 2012 meta-analysis of twelve RCTs demonstrated that there was a link between weight and sweetened beverages but highlighted that two studies in which researchers attempted to lower SSB consumption did not translate into changes in BMI. However, three of the investigators regularly receive funding from over ten pharmaceutical, food, and beverage firms, casting doubt on these results. This meta-analysis weighted studies that showed a negative link more heavily than the other studies.

A large portion of the data linking SSBs with obesity has been partially funded by industry sources. This could be contributing to conflicting evidence in the field. The meta-analysis of 88 studies, referenced above, revealed that studies funded by beverage industries are

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31 Ibid.
34 Ibid.
more associated with a weaker link between SSBs and obesity. Linking obesity to SSBs therefore relies on examining strong, recent, experimental, primary studies.

There are a few randomized controlled trials examining the effects of reducing SSB consumption. A British study of school-aged children from 2004 demonstrated that the 325 students who switched from soda to water experienced a statistically significant decrease in BMI. However, this was done in concert with dietary counseling. Another large RCT in Brazil involving 1,140 children aged nine to twelve years revealed that students who decreased their soda intake had a decrease in BMI, though not significantly. However, the girls who were overweight did experience a significant drop in their BMI. Other RCTs mirrored this finding: reducing SSB consumption produced a significant reduction in BMI only for overweight individuals.

The handful of sound experimental studies available in the literature strongly suggests that interventions to reduce weight most significantly help those who are overweight or obese to begin with. This has policy implications: reducing SSB consumption can help those most vulnerable to its deleterious effects.

C. Reducing the Consumption of Sugar-Sweetened Beverages: Alternatives

In this project, we focus on three robust categories of policy interventions to reduce the consumption of SSBs: education and marketing campaigns, bans, and taxes. Each of these alternative sets has the potential to induce widespread change in Los Angeles. Thus, we performed a thorough literature search to better understand the strengths and limitations of these three options.

1. Marketing and Educational Campaigns

Lack of knowledge and awareness regarding the harmful effects of SSBs is associated with higher levels of SSB consumption. Thus, a large-scale marketing campaign throughout Los Angeles County may be an effective tool to decrease SSB consumption rates. Such a tactic would likely include, but not be limited to: billboards, television, and radio commercials, internet advertisements, and bus advertisements. Nutritional facts and catchy slogans could discourage excess consumption of SSBs.

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Several studies have evaluated the effectiveness of large-scale, citywide and countywide marketing campaigns with the goal of reducing SSB consumption. Some provide evidence that increased nutritional knowledge is correlated with decreased SSB consumption. For example, following a yearlong Los Angeles marketing campaign designed to increase awareness of the health implications of SSBs, 62.6% of respondents stated that they were likely or very likely to reduce SSB consumption as a result of the campaign. There are several ongoing Los Angeles-based programs that focus on increasing nutritional knowledge. Some of these programs include: LAUSD Healthy Schools Campaign, UCLA Student Nutrition Awareness Program, Choose Health LA, and numerous initiatives held at churches and hospitals.

There is little strong evidence linking marketing and education campaigns to reduced SSB consumption and/or weight change directly. The vast majority of studies are cross-sectional in design and measure intention and knowledge, in contrast to RCTs that use anthropometric measurements to assess weight and BMI changes or actual consumption changes. These studies also rely on self-reported intention of change in behavior, which can be biased.

An additional challenge associated with education and marketing campaigns is their cost. For example, the 2011-2012 “Sugar Pack” health marketing campaign in Los Angeles County linking SSB consumption with calorie intake cost approximately $920,000. Much of the work in this area has been implemented with grant funds, and securing sustainable funding is difficult. Potentially, existing county revenue streams could be reallocated to support these educational campaigns, but this budgetary consideration is beyond the scope of this project. Funding aside, we see from recent experience that the general public and political leaders would not oppose a large-scale education campaign in Los Angeles designed to reduce SSB consumption. Given the evidence we do have, this policy option would likely be most effective in concert with an SSB tax, as part of a comprehensive strategy to both reinforce the intended effect on consumption behavior and potentially create a sustainable revenue stream for obesity-related campaigns.

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41 Ibid.
43 Ibid.
2. Bans

A ban is another policy option for reducing SSB consumption. A ban in this case would be placed on SSBs of a particular size or sugar content.

A ban’s effectiveness depends in large part on its design and implementation, as bans can easily be subverted. For example, a cross-sectional study of consumption patterns among adolescents from schools where sodas were banned were compared to similar students at schools where sodas were sold. It revealed that consumption patterns were the same, as students would visit liquor stores or off-campus retailers before or after school.\footnote{Taber, Daniel R. "Banning All Sugar-Sweetened Beverages in Middle Schools." Archives of Pediatrics & Adolescent Medicine, 2012, 256.} Another behavioral study revealed that consumers tended to bundle smaller, more acceptable sizes of SSBs when faced with a ban on larger sizes; in fact, when faced with a ban, people ended up consuming more than before.\footnote{Wilson, Brent M., Stephanie Stolarz-Fantino, Edmund Fantino, and Amanda Bruce. "Regulating the Way to Obesity: Unintended Consequences of Limiting Sugary Drink Sizes." PLoS ONE, 2013, E61081.}

This was also the case when mayor Michael Bloomberg advocated for a ban on the sale of SSBs over 16 ounces in New York City. It was ultimately overturned by New York’s highest court of appeals, which held that it had too many loopholes. The bill was also largely unpopular among both businesses and the general public. A survey conducted around that time showed that over 60% of New Yorkers did not want it.\footnote{Petrecca, Laura. "Judge Blocks NYC Large Soda Ban; Bloomberg Vows Appeal." USA Today. March 11, 2013. Accessed March 7, 2015. http://www.usatoday.com/story/news/nation/2013/03/11/soda-ban-new-york-city/1979653/; Ibid.} Many residents cited the threat to their autonomy and feelings that a ban was too draconian and overreaching.\footnote{Ibid.} Political feasibility therefore presents another barrier to the implementation of bans.

A possible benefit of a ban is that it is theoretically lower in cost to implement than an educational campaign and simpler to regulate than a tax, though this is far outweighed by its many obvious disadvantages.

3. Taxes

Taxes on SSBs have also been proposed, and in some cases implemented, to decrease SSB consumption. As discussed in Chapter III below, a tax on SSBs works to decrease the demand for SSBs by increasing the product price. An SSB tax would also create revenue that could be used to further public health efforts. Several studies simulate taxes on SSBs, and these will be discussed in detail below.\footnote{Escobar, Maria A Cabrera, J. Veerman, Stephen M Tollman, Melanie Y Bertram, and Karen J Hofman. "Evidence That a Tax on Sugar Sweetened Beverages Reduces the Obesity Rate: A Meta-analysis." BMC Public Health, 2013, 1072.}

Although there is ample data that suggests that price increases in SSBs reduce consumption, much of the work done to assess the resulting changes in BMI are via projections and models. The lack of data may change in the near future; some regions, both nationally and internationally, have recently implemented SSB taxes. Furthermore, even if SSB taxes are shown to have a minimal direct effect on BMI through reduced consumption, the potential overall
effect is much greater. An SSB tax in Los Angeles County will raise revenue, and the smart allocation of these funds could further serve the objective of obesity reduction and prevention. For these reasons, a SSB tax has been of great political interest as of late. It is, therefore, an option we consider in significant detail for Los Angeles.
III. TOWARD A TAX ON SUGAR-SWEETENED BEVERAGES

In this chapter, we address each of the design elements of a tax in turn: tax subject, tax type, tax level, and unit taxed. We also discuss the legality of levying the tax in Los Angeles County and the distribution of the tax burden throughout the population. The conclusion of our tax design proposal provides a transition into our discussion of revenue allocation, in which we consider the implications of various forms of revenue recycling.

Below is a visualization of the chapter:

We address the individual design elements of a tax and the implications of each through the lens of our evaluative criteria: effectiveness, salience, ease of implementation, potential for revenue generation, incidence, and sustainability. We then present our policy options, two variants of a tax design developed as a result of this analysis:

Policy Option 1: A cent-per-ounce excise tax on SSBs including all categories of sugar-sweetened beverages referenced in this report.

Policy Option 2: A two-cent-per-ounce excise tax on SSBs including all categories of sugar-sweetened beverages referenced in this report.

At the conclusion of this section, we summarize the considerations behind these policy options and address the potential consequences of pursuing each of them.
A. The Economics of Sugar-Sweetened Beverage Taxation

The policy alternative of a tax on sugar-sweetened beverages we discuss here is designed to discourage consumption of SSBs by making them relatively more expensive to the consumer. There are significant differences, however, between the economic and public health approaches to a tax and its expected outcomes.\(^53\) As we describe in our discussion of the costs of obesity in the previous chapter, there are negative externalities associated with SSB consumption. From the perspective of traditional economics, this suggests that a Pigouvian tax, designed to induce consumers to “internalize” these costs to society by incorporating them into the price of SSBs, is appropriate.

The important assumption behind this tax is that there is “no over-consumption”—that is, the consumer who buys an SSB is in any case making a rational choice, fully cognizant of any future health risk and potential future costs.\(^54\) While external costs are included in a Pigouvian tax, it “should not interfere with private choices that do not harm others [emphasis added].” This approach to taxation does not justify a tax designed to exclusively serve the goal of discouraging SSB consumption.\(^55\)

The insights of behavioral economics, however, may inform a tax design that more closely approximates the aims of public health. From this perspective, a tax on SSBs should also reflect the costs to the individual—the so-called internalities of future poor health or lost productivity from SSB consumption.\(^56\) This is because there is an assumption that the consumer may not always weigh the future costs and the immediate benefits of SSBs accurately in the decision to consume them. The presence of “time-inconsistent preferences”\(^57\) makes it possible for consumers to make suboptimal decisions. This justifies a tax that optimally seeks to discourage consumption among those with “self-control problems” while inflicting minimal welfare losses on those better able to regulate their SSB habits.\(^58\)

Even if there is sufficient basis for a tax on SSBs, a common criticism is that a tax on SSBs is regressive, meaning that the burden of the tax will fall disproportionately on low-income consumers. For example, Zhen et al. (2011) estimate that the tax burden on low-income households from a one-cent per-ounce tax on SSBs could represent about 0.1% of annual household income, compared with about 0.03% for high-income households.\(^59\)

One justification for the tax is that the potential health benefits of curtailed SSB consumption outweigh the costs to individuals because SSBs are not necessary to the nutrition


\(^{58}\) Ibid.

and health of consumers—in fact, the vast majority offer very little nutrition whatsoever. A more compelling argument is that an SSB tax is potentially equitable if the revenue it creates is used to benefit the health of individuals who consume SSBs. Low-income households have higher consumption rates of SSBs and would therefore be the target of anti-obesity or other health programming. We will address the differential effects of an SSB tax on different income levels throughout this section and the potential uses of tax revenue in the discussion that follows.

B. Overview of California and Los Angeles County Tax Law

Taxes have both policy and legal dimensions. Before proposing a tax on SSBs, it is important to take stock of California and Los Angeles County tax law in order to understand the limitations under which our proposed framework must operate. The County, rather than the City of Los Angeles, is used as the operative jurisdictional unit in this proposal in order to avoid geographic subversion of the tax—e.g., if consumers simply drive to the next municipality within the County in order to buy their SSBs.

1. General Tax versus Special Tax

The authority to levy taxes in Los Angeles County flows ultimately from the Constitution of the State of California. Article XIII(C) of the California Constitution lays out basic rules for local tax levies. Section 1 of this Article offers definitions of different local tax levies, distinguishing between a “general tax,” a tax whose revenue is allocated to a municipality’s general fund for any government-related use, and a “special tax,” a tax whose revenue is earmarked to a “special fund” for specific use. Special taxes necessitate heightened specificity in the design of the proposed text—the text of the initiative must have the following traits: be clear about the goals of the tax and must require that all revenue is directed toward the advancement of those goals; provide for the creation of a special fund for that purpose; and require the annual reporting of all expenditures and projects related to the tax and fund.

In Section 2 of Article XIII(C), the Constitution lays out the requirement that all local taxes must be approved by the electorate. A simple majority is required to pass a general tax. A special tax, however, requires a two-thirds supermajority to get approved.

Within Los Angeles County, there are three ways to get a tax onto the ballot. For a general tax, the Board of Supervisors must vote by a two-thirds supermajority to place such a tax on the ballot. For a special tax, however, there is no such stricture, so the Board of Supervisors may vote by a simple majority to place such a tax on the ballot. Finally (and rather

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uncommonly), for either type of tax, members of the public may petition to get onto the ballot.64 Once the tax is on the ballot, a general tax requires a simple majority of voters (50% plus one) and a special tax requires a supermajority of two-thirds of voters.65

**So You Want to Pass a County Excise Tax in California...**

**General Tax**

1. County Board of Supervisors
   - Two-Thirds Majority
   - You’re On the Ballot!
   - General Electorate
     - Simple Majority
   - General Fund

2. County Board of Supervisors
   - Simple Majority
   - You’ve Got a Tax — Revenue, Too!
   - General Electorate
     - Two-Thirds Majority
   - Special Fund

**Special Tax**

As discussed in Chapter IV below, an ideal tax on SSBs is a special tax whose revenue is directed to other anti-obesity programs in order to compound the positive behavioral effects of the tax, but political realities may in fact circumscribe what is feasible. 67

2. **Sales versus Excise Tax**

Sales taxes in all cities and counties in California are administered under the terms of the Bradley-Burns Uniform Local Sales and Use Tax Law (“Bradley-Burns Law”), which was enacted in 1955 in order to achieve sales tax uniformity in the state. Those jurisdictions which abide by the terms of the Bradley-Burns Law are entitled to use the State Board of Equalization to administer and collect sales taxes, relieving those municipalities of the burden of doing it themselves. As a side effect of the existence of this law and uniform structure, no municipalities below the state level have the ability to impose their own sales tax on businesses within their

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66 Ibid.

67 Ibid.
jurisdiction. The benefits of abiding by Bradley-Burns are immense, and there would have to be an immediate, compelling, and overwhelming reason for any municipality to derogate from Bradley-Burns. A sales tax on SSBs would not rise to that level. Furthermore, the California Constitution prohibits new local sales taxes on food products beyond the level set by the state government.

Thus, the question of whether to impose a sales or excise tax is obviated by the legal and policy limitations; Los Angeles County would, in reality, only pursue an excise tax on SSBs.

C. Tax Design Options

1. Tax Subject: Definition of a Sugar-Sweetened Beverage

The definition of a sugar-sweetened beverage varies slightly depending on the source. However, the basic distinction between SSBs and other non-alcoholic beverages is the addition of caloric sweetener. Practically speaking, this includes the following categories: carbonated soda beverage with added sugar, sugar-sweetened tea or coffee drink, sugar-sweetened fruit drink, sugar-sweetened milk, or sports drink.

The simplicity of the SSB definition is somewhat misleading, as there are major implications of including or excluding certain beverages from the list of taxed items. For instance, the studies we reviewed do not address milk with added sweeteners, focusing instead on consumption patterns in the categories of plain whole, low-fat, or skim milk. The Berkeley Measure D tax excludes all types of milk—including those with sweeteners. Two other recent SSB proposals, the San Francisco Proposition E and the SWEET Act proposed in the U.S. House of Representatives also exempted beverages in which the “primary ingredient” is milk. While the argument can be made that milk is unique in its nutritional value, the sweetened variety is highly caloric.

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73 One cup of chocolate milk contains about 209 calories.
This is significant because changes in relative price differences between beverages can easily lead consumers to switch from soda—the source of most SSB consumption—74 to a relatively cheaper, calorie-dense alternative, and regular and flavored milk both fit the bill. There is also some preliminary evidence that non-caloric artificial sweeteners have similar physiological effects as caloric sweeteners.75 Since diet sodas have no caloric sweetener, a SSB tax might similarly prove ineffective if indeed there is a link between artificial sweeteners and obesity.

In other words, the definition of SSBs is of primary importance to our proposal because it will determine which beverages experience a tax-induced increase in price and which do not. While there is no way to comprehensively prevent substitution from occurring between SSBs and sugary foods, natural juices, or regular milk,76 the general principle when considering what beverage categories are subject to the tax is that “broader is better.”77

Anticipating the reaction of the beverage industry is key to the political calculus behind this design element of an SSB tax proposal. During the campaign around Measure D in Berkeley, the American Beverage Association alone spent over $2.4 million to oppose the measure.78 In San Francisco, it spent $9.1 million against the failed Proposition E.79 It is a given that the industry will play a formidable role in a future campaign for an SSB tax in Los Angeles. The dairy industry could pursue a similar strategy, and possibly persuade marginal voters to oppose the tax because of the inclusion of sweetened milk. These should all be taken into consideration before applying the simple definition of “sugar-sweetened beverage” in designing and promoting a tax in Los Angeles County.

2. Excise versus Sales Tax

There are many existing taxes on beverages, including both sales and excise taxes that specifically target soda.80 An excise tax can be levied based on the value of the good (percentage of the factory or retail price; ad valorem) or on the quantity of the good (specific), but it is in both cases levied on the producer or distributor.81 The tax is then passed through to the consumer in

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76 Taxing sugar would prevent substitution. However, Los Angeles County cannot tax sugar, as this would implicate interstate commerce, which is solely under the purview of the federal government.
the shelf price. A sales tax, on the other hand, is levied on the price of a good at the point of sale.

Sales taxes have the characteristic of being comparatively less “salient,” meaning that the consumer is not aware of the tax until actually purchasing the good, and therefore does not take it into account when making the consumption decision. This is a desirable quality when the objective is to maximize revenue generation. For the purposes of public health, however, the salience of the tax is important to its effectiveness in discouraging consumption of SSBs. Some research on cigarette taxation by Goldin & Hominoff (2013) suggests that sales taxes may in fact be salient for the low-income consumer because of greater “attentiveness” to price; however, there is no evidence that this same consumer response applies to SSBs.

In contrast, Chetty et al. (2007) show that consumers are likely to perceive excise taxes because the “tax-inclusive price is visible” on the shelf; that is, the tax is fully salient and the consumer is able to make the optimal consumption choice. In addition to consumer attentiveness, a specific excise tax levied on SSBs has the advantage of minimizing the “relative price gap” between taxed beverages, making it less likely that consumers will substitute to cheaper brands or product types.

Furthermore, since they are collected at an earlier point in the distribution chain, excise taxes are administratively simpler for governments to implement than a sales tax. In the case of Berkeley, this is exemplified by the way Measure D also allows the city to tax fountain drink consumption: the tax is levied on “the largest volume, in fluid ounces, of sugar-sweetened beverages that could be produced.” There is also precedent: if SSB taxation is to follow in the footsteps of tobacco and alcohol taxation, to which it is often compared, then it will adopt the model of the “sin tax,” an excise tax levied on a good intended to reduce its consumption and raise revenue.

Most importantly, there is a very practical reason to favor excise taxes in a discussion of SSB tax type. As discussed above, new sales taxes on food products at the county level are not permitted under the California constitution.

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3. Tax Level

There is much variation in beverage taxation by state: some exempt beverages from the general sales tax, some subject soda to the food tax rate, and some levy a separate soda tax entirely. Studies of hypothetical SSB taxes assume that taxes can have a meaningful effect on caloric intake, but are currently at levels too low to realize that potential. A key part of the discourse on SSB taxes focuses on the level of tax necessary to induce a desirable change in SSB consumption with minimum welfare loss. The general consensus in the literature is that taxes even as high as 10% do virtually nothing to affect consumption but only serve as modest sources of revenue. For example, Smith et al. (2010), among many others, note that there is no established relationship between taxes in a state and BMI based on current levels. 

At what point, then, does a tax on SSBs become salient to the consumer? It is clear from existing taxes that it must be higher than 10%. In the majority of studies we reviewed, a 20% price increase appears to be the “benchmark” percentage, which most find would lead to a statistically significant reduction in calories. Many studies cite tobacco tax literature as a point of reference; state taxes on cigarettes and tobacco products are on average much higher than 10%. Another reason may be that the earliest versions of an SSB tax as originally issued was a half-cent per ounce tax, which they state is in “the middle of the range of tax rates or proposed by states,” and produces statistically significant but minimal results. Zhen et al. (2011) tests a half-cent per ounce tax, which they state is in “the middle of the range of tax rates or proposed by states,” and produces statistically significant but minimal results.

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96 Zhen et al. (2011) tests a half-cent per ounce tax, which they state is in “the middle of the range of tax rates or proposed by states,” and produces statistically significant but minimal results. Zhen, C., M. K. Wohlgenant, S. Karns, and P. Kaufman. "Habit Formation and Demand for Sugar-Sweetened Beverages." American Journal of Agricultural Economics 93, no. 1 (2011): 175-93.
proposed by Brownell et al. (2009) at the Yale Rudd Center for Food Policy and Obesity called for a penny-per-ounce tax, which another study, Wang et al. (2012), estimated would amount to an approximately 20–25% increase in the price of SSBs for a 20-ounce bottle.  

An important question for our analysis is to what extent tax policy in Los Angeles County should be anchored to this 20% price increase. A 40% increase could lead to twice the reduction in calories, and would still be lower than that of cigarette taxes in California. However, this raises the question of whether the revenue from an assumedly regressive tax at 40% is sufficient to justify its implementation, given that the burden it would place on low-income households would be higher. It is also difficult to determine at what point a SSB tax would discourage consumption to such a degree that the tax is no longer a reliable source of revenue. The same can be said for the political response to expected price increases of this nature. San Francisco’s Proposition E proposed a tax twice as large as that of Berkeley's Measure D; this might well have played a role in denying it the two-thirds majority needed to pass the tax.

After Measure D is implemented in Berkeley, policy analysts will have real data with which to evaluate the effectiveness of a penny-per-ounce tax and determine whether subsequent tax efforts in Los Angeles and elsewhere should be based on this model. For the time being, the precedent of cigarette taxes and the insights of economic modeling must suffice as the basis for the SSB tax policy option. As we will discuss below, discussions about tax level are based on two important assumptions. One is about elasticity, the consumer response to a percent change in price. The other is about incidence, the extent to which the tax will be passed through from producer to consumer in the price.

4. Taxed Unit

Many studies that address tax design in their models assume that an SSB tax would be levied by ounce. The majority of existing SSB excise tax proposals in the United States specify a per-ounce tax. However, there is some evidence that a nutrient-specific tax—for example, a

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99 The estimated average retail price of a pack of cigarettes in 2014 was "close to $6." Cigarette producers pay an "equivalent to a $.60 excise tax" plus a federal excise tax of $1.01 per pack of cigarettes. Together with the California state excise tax of $.87 on cigarettes, about $2.48 of the retail price consists of excise taxes, a price increase of approximately 41%. See "Review of Statutory Initiative (A.G. File No. 14-0005) That Would Increase the State’s Cigarette Excise Tax from 87 Cents to $1.87 per Pack." California Legislative Analyst's Office. February 24, 2014. Accessed March 11, 2015; and "OPTIONS FOR REDUCING THE DEFICIT: 2014 TO 2023." Congressional Budget Office. November 13, 2013. Accessed March 11, 2015. This is also noted by Fletcher et al. (2010).

100 Zhen et al. (2011) point out that "tax revenue is inversely related to the size of the price elasticity of demand and demand for sugar-sweetened beverages is likely to be more price elastic than tobacco because of the abundance of substitutes." Zhen, C., M. K. Wohlgenant, S. Karns, and P. Kaufman. "Habit Formation and Demand for Sugar-Sweetened Beverages." American Journal of Agricultural Economics 93, no. 1 (2011): 175-93.

per-volume tax on sugar—may be more effective in reducing calorie consumption while causing the lowest decrease in household utility.\textsuperscript{102}

Another application of an SSB tax proposed in the literature is a calorie-based tax. Since calories in SSBs are primarily composed of added sugar, Zhen et al. (2014) argue that a tax on calorie density “is essentially a tax on sugar”; that is, akin to a nutrient-based tax.\textsuperscript{103} Unlike an ounce-based SSB tax, both taxes would distinguish between the levels of “harmfulness” contained in different types of SSBs based on the amount of the harmful ingredients or added calories. Although this approach may function well or even better than an ounce-based tax in many cases, its practicality as an initial version of an SSB tax is questionable.

First and foremost, the advantage of an excise tax, as discussed above, is in its relative simplicity. Mandating that the sugar content or calorie density of beverages be calculated in order to determine the tax amount introduces another layer of complexity into its implementation that may not be worth the added benefit. It is telling that of the recently proposed SSB taxation, only the federal SWEET Act attempted a tax on sweetener inputs. Secondly, if we look to existing excise taxes on alcohol or cigarettes in California, we see that the tax is uniform across cigarette brands and within alcohol type (with the exception of liquor; over 100 proof is taxed twice the amount). For example, a 20-cent tax on a gallon of wine applies regardless of alcohol content, and the 87 cents levied on a pack of cigarettes does not distinguish between nicotine content.\textsuperscript{104}

While not all SSBs are created equally, it is reasonable to expect that a straightforward and clearly defined per-ounce excise tax can systematically reduce SSB consumption. At a time when SSB taxation is at best a contentious policy tool, taking on sugar or other sweetener inputs appears a far more daunting task that is part of a larger conversation beyond beverages. Likewise, levying a tax on calorie density invites a degree of administrative complexity that could compromise its implementation, particularly at the city and county level. If the results of the Berkeley per-ounce excise tax indicate otherwise, a consideration of a more sophisticated tax scheme may be in order—though this inevitably comes with a host of political and administrative considerations that may pose barriers to its adoption.

5. Elasticity and Substitution Considerations

Several studies have been conducted to estimate the consumer response to a change in price from a tax on SSBs. Most of these studies estimate demand systems using household

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\textsuperscript{104} "California City & County Sales & Use Tax Rates." CA City & County Sales & Use Tax Rates. Accessed March 7, 2015. \texttt{http://www.boe.ca.gov/sutax/pam71.htm}. 

- 27 -
consumption data, though some studies apply other methods using variation in states’ taxes on sodas or other sugary beverages.\textsuperscript{105}

\textit{a. Own-Price Elasticity of Demand}

The own-price elasticity of demand of SSBs is important to this analysis in a most basic way: it reveals whether and to what extent consumers will respond to the change in price. Specifically, own-price elasticity is a measurement of the percent change in quantity demanded for a good in response to a percent change in its price. A good is considered “elastic” when its elasticity (in absolute value terms) is greater than or equal to one.

Studies show that unlike most foods,\textsuperscript{106} SSBs are own-price elastic, meaning that consumers are sensitive to a change in their price. This appears to be a recent finding; for example, Lin et al. (2011) note that while several studies published in the last five years present estimates that surpass an own-price elasticity of -1.0, earlier studies did not.\textsuperscript{107} This information on its own indicates that a tax—if set at an appropriate level—will influence consumption of SSBs in some way.\textsuperscript{108}

Searching the literature for own-price elasticity estimates for the entire category of SSBs (which vary by interpretation) yields figures as low as -.79\textsuperscript{109} and as high as -1.299\textsuperscript{110}. Since these estimates are often presented as an average of elasticities across several product categories, they do not allow for a more detailed overview of consumer responsiveness to price changes. Dharmasena and Capps warn that presenting elasticity in this way “not only masks potential demand interrelationships among SSBs, but also own-price estimates associated with SSBs may differ noticeably.”\textsuperscript{111} Indeed, we found in our literature review that studies that break down beverages by product category show significant heterogeneity in own-price elasticity estimates.\textsuperscript{112} The most recent studies approach their simulations in this way.


\textsuperscript{111} Dharmasena, Senarath, and Oral Capps. "Intended and Unintended Consequences of a Proposed National Tax on Sugar-sweetened Beverages to Combat the U.S. Obesity Problem." \textit{Health Economics} 21, no. 6 (2012): 669-94.

\textsuperscript{112} Ibid.
We found that elasticity estimates varied not only between beverage categories, but also within the same beverage product category. For example, studies by Harding and Lovenheim and Dharmasena & Capps (2012) estimate the own-price elasticity of carbonated soda drinks (“CSDs”), a category comprising sugar-sweetened carbonated soda drinks, as -2.26, significantly more elastic than estimates of -1.035 by Zhen et al. (2014) and -1.3 by Zhen et al. (2011).113

An important question—one that cannot be answered with these models—is which is most representative of the Los Angeles population. Since we were unable to obtain detailed consumption data on the Los Angeles region, we, like all of the studies we reviewed here, must rely on nationally representative industry and health data.114 The assumption that must be made is that consumption patterns in Los Angeles roughly resemble national consumption patterns. There are surely marked differences between the two, but we assume that on average, they are not great enough to amount to elasticity estimates far off the mark.

Differences in elasticity estimates may be due to several factors. These include methodological improvements in more recent studies,115 greater variation in price data,116 a longer time span of data,117 and more detailed categorization.118 We average the elasticity estimates taken from these studies to discuss the own-price elasticity of each beverage in our simulation below. We also present the full range of elasticities from each study in the own-price elasticity table; see below.

There are some challenges to comparing between studies. For one, some of the studies we reviewed estimate separate elasticities for low- and high-income groups or “myopic” versus “rational” demand.119 In addition, because these studies divide beverage categories differently and include a varying number of categories, some of our elasticity averages are calculated from a smaller number of studies.

Nevertheless, we can make some general statements regarding the own-price elasticity of a beverage relative to other beverage categories. The most highly own-price-elastic products appear to be sports drinks, with a mean elasticity of -2.65,120 sugar-sweetened fruit juices, with a mean elasticity of -1.31, and carbonated soda drinks (“CSDs”), with a mean elasticity of -1.73

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115 Specifically, “correcting for price endogeneity” (Zhen et al., 2011) or using a demand system model (Dharmasena & Capps, 2011) rather than a linear equation.
118 Ibid.
120 A important exception here is low-income consumers of sports drinks, for which Zhen et al 2011 reports an elasticity of -0.58.
Relatively less elastic products include milk (whole and low-fat), bottled water, and diet CSDs.

b. Cross-Price Elasticity of Demand

While own-price elasticity estimates are evidence that beverage consumers are—to varying degrees—sensitive to changes in price, it is not clear how these changes will affect total calorie consumption. Taxing SSBs will make them relatively more expensive, which may cause consumers to substitute, or purchase other calorie-dense or “unhealthy” foods and beverages. Understanding substitution, one of the “unintended consequences” of taxation, is critical to evaluating the effectiveness of the tax.

We can gain some insights into which beverages and foods act as substitutes for SSBs through cross-price elasticity of demand, or the percentage change in consumption of a good when the price of another good changes. However, cross-price elasticities are also limited in the extent to which they accurately predict substitution, as they are calculated based on previous consumption data. An individual cross-price elasticity estimate is confined to the ceteris paribus change in price of one of the two goods, though this is rarely, if ever, the case. In reality, the relationships between beverages and foods are much more dynamic and complex. This represents an area of considerable uncertainty to the policymaker, who for obvious reasons is concerned with how substitution patterns may undermine the effectiveness of a proposed SSB tax.

Not all studies account for substitution when calculating the average reduction in calories consumed and related weight loss. Similar to the omission of own-price elasticity estimates for individual product categories, ignoring this possibility can lead to overestimates of both. This is because a tax may reduce consumption of sugar-sweetened beverages, but the caloric reduction can be “offset” by increases in calories from other sources, including “calorie-dense foods.”

For example, Zhen et al. (2014) find that an SSB tax may lead to substitution of “foods with high fat or sodium content.” However, the substitution patterns between SSBs and foods are not entirely clear. Finkelstein et al. (2013) finds “no evidence of substitution to sugary foods and [shows] that complementary foods could contribute to decreasing energy purchases.”

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Similarly, Harding & Lovenheim (2014) find that a tax on SSBs would cause “a small decline in other nutrient categories [salt and fat].”

Substitution between SSBs and non-sweetened beverages presents a more direct challenge to estimating the effects of a SSB tax. Harding and Lovenheim find that consumers may substitute whole milk for soda, a switch that creates a net reduction in calories much smaller than that calculated using the own-price elasticity of demand for CSDs. Lin et al. (2011) also find a strong cross-price relationship between soda and whole milk, though only among low-income households, while high-income households are more likely to substitute to low-fat and skim milk. Both Lin et al. (2011) and Dharmasena & Capps (2012) find that all income level households tend to substitute toward (natural) fruit juices when the price of SSBs increases, with a similarly small net reduction in total calories consumed.

In the final analysis, however, the studies we reviewed still estimated a net decrease in CSDs, sports drinks, and sugar-sweetened fruit drinks that would translate to fewer calories consumed and resulting weight loss. These estimates vary, but are generally small. Finkelstein et al. (2013) estimate a decrease of 1.6 pounds in the first year and Dharmasena & Capps (2012) a range of 1.54 to 2.55 pounds per capita per year from a 20% increase in the price of SSBs. Zhen et al. (2014) estimate a smaller decrease of .81 pounds for low-income households and 0.35 pounds for low-income households per capita in the first year, though these estimates are based on a half-cent per-ounce excise tax. Though they do not estimate a decrease in weight, Smith et al. estimate a daily per capita reduction of 36.9 calories and Lin et al. a range of 34-47 calories, while Harding & Lovenheim (2012) stand out with a dramatic estimated decrease of

133 calories per day, all from a 20% increase in the price of SSBs. Finally, Fletcher et al. estimate a decrease in BMI of .06 for the same price increase.

Interestingly, three studies find that diet and regular CSDs are likely complements. Zhen et al. (2011) note that this is “a seemingly counter-intuitive result” but is “consistent with the beverage industry’s intense reaction to taxing SSBs.” Since diet sodas lack caloric sweeteners, they are not subject to an SSB tax. Their complementary relationship with regular sodas, if these estimations are accurate, implies that consumers would not purchase more diet sodas if the SSB tax is implemented.


Estimated Elasticity of Beverages

- Carbonated Soda Drink
- Diet Carbonated Soda Drink
- Low-Fat Milk
- Whole Milk
- Sports Drinks
- Sugar-Sweetened Fruit Drinks
- 100% Fruit Drinks
- Bottled Water


D. A Simple Simulation: Sugar-Sweetened Beverage Tax on Soda

In order to anticipate the effects of a tax on SSBs, there must be an assumption about tax incidence—that is, to what extent an excise tax levied on the producer is ultimately paid by the consumer. Studies that estimate the percentage change in consumption from a percentage increase in price of SSBs assume that there is a complete “pass-through” of the excise tax from producers to the consumer. The literature on cigarette taxation indicates that this assumption may be accurate. In the case of a cent-per-ounce tax, we assume that the percent change in the price of an SSB is based on exactly the size of the excise tax, e.g., a 12-ounce can of soda would increase in price by 12 cents.

However, there are some data indicating heterogeneity in the pass-through to consumers and that in some cases there is “overshifting” of the tax to consumers; that is, consumers end up with a higher price increase than even the tax amount. Finkelstein et al (2013) suggest “overshifting of SSB taxes is a possibility given that the soft-drink and related retail industries are highly concentrated.” We assume here that the pass-through is one-to-one, though as further study of SSB taxation emerges and the possibility of taxation in Los Angeles County arises, this important mechanism should be re-evaluated.

We can use the model presented by Smith et al. (2010) to show roughly how a 20% increase in the price of an SSB—in this case, soda—might play out in Los Angeles. In order to complete this estimation, we had to draw from the limited data available on the “average” Angeleno’s SSB consumption. The California Health Interview Survey contains a question on daily soda consumption among adults; their 2012-2013 data show that 11.2% of adults drink one or more sodas per day in Los Angeles County. Consumption is much higher for adolescents, who reported 68% who report that they have consumed one or more sodas or sugary drinks on the previous day. We make the further assumption here that among the 11.2% of adults who report consuming soda, the average consumption is one soda per day—which is likely an underestimation of the change in calories consumed. Focusing only on soda is reasonable because it constitutes by far the majority of SSB consumption and is therefore responsible for most of the reduction in calories.

With this information, we make the simple calculation of the reduction in calories consumed and resulting weight change from a 20% change in price assuming three different

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elasticities: the upper bound of -2.26, the highest estimate of the studies we reviewed; the lower bound of -1.035, the lowest estimate of the studies we reviewed; and a middle point of -1.54, the median estimate of the studies we reviewed.

We chose these elasticities to elucidate the bearing these estimates have on the outcome of interest: weight loss. We chose the median estimate because of the relatively extreme estimates by two of our studies (-2.66 by Harding & Lovenheim (2012) and Dharmasena & Capps (2012)), which skew the average elasticity and ultimately lead to weight loss close to 7.21 pounds. None of these estimates distinguishes itself from the others as derived from a more methodologically sound study, so these three elasticities represent a reasonable range of expected outcomes. We have reason to assume, based on our discussion above, that the weight loss from a decrease in soda consumption is moderate. This simulation does not take into account substitution, which will almost certainly result in a net reduction in calories, and therefore net weight loss, that is lower than what we see here. This leads us to conclude that the realistic outcome is closer to the lower bound figure of 3.3 pounds per year.

<table>
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<th>Elasticity</th>
<th>Change in Demand (percent)</th>
<th>Change in Calories per Day (change in % demand x average calories in 12-oz. soda)</th>
<th>Change in Pounds per Year (change in calories per day ÷ 3,500)</th>
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<td>-.452</td>
<td>-69.16</td>
<td>-7.21</td>
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</table>

E. Policy Options

Based on our analysis above, we identified the following policy options to consider. Both of these tax options should be indexed to inflation to ensure the sustainability of the tax in the long-run:

Policy Option 1: A cent-per-ounce excise tax on SSBs including all categories of sugar-sweetened beverages referenced above.

This option would amount to a roughly 20 percent increase in SSBs, which the evidence suggests is at a level of salience that will lead to a significant, if modest, reduction in calorie consumption. This policy option also suggests political feasibility, as it follows the penny-per

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ounce excise tax levied in Berkeley—with the exception of flavored milk, which would not be exempted here. The benefit to public health of including flavored milk should be weighed against the inevitable aggressive public information campaign necessary to pass a ballot measure and decided accordingly.

The relative ease of implementation of an excise tax by the ounce (rather than by grams of sweetener or calorie) also factors into this policy option, as does the legal limitation that the California constitution places on counties in levying taxes. Thus far, the only extant SSB tax in the country is a cent-per-ounce excise tax, which was approved by voters in Berkeley in November 2014.

**Policy Option 2: A two-cent-per-ounce excise tax on SSBs including all categories of sugar-sweetened beverages referenced above.**

This option builds on Policy Option 1, but doubles the tax amount. The difference between the two options largely implicates political climate and the strength of campaigning. San Francisco’s Measure E, a proposal for a two-cent-per-ounce tax, garnered a majority of the votes but failed to win the supermajority necessary to approve a special tax. A general tax, in contrast, might have passed in San Francisco with a simple majority. The beverage industry outspent pro-tax campaigners in San Francisco by a significant margin, underlining the uphill battle that SSB taxes face in general. (Indeed, the beverage industry outspent campaigners in Berkeley but voters still approved a general tax, suggesting that the outcome relies upon a combination of both tax design and politics.) As in Policy Option 1—and perhaps more so—the public and industry reaction to the inclusion of milk products in the definition of SSBs should be seriously considered and decided upon accordingly.

Furthermore, while there is reason to assume that doubling the tax may lead to a more pronounced change in consumer behavior and therefore comparatively better weight outcomes, there is also the concern of how producers may react to this significant tax burden. If there is no overshifting of the tax to consumers, there is still the concern of regressivity: since revenue collection is of central importance to the potential equitability of the SSB tax, we must consider how a dramatic reduction in SSB consumption might translate into less revenue to recycle in the first place. The relative elasticity of SSBs indicates that this concern is a legitimate one.
IV. Revenue Allocation

The implementation of the tax schema proposed above naturally raises questions about how to use the revenue generated by the tax. This issue is central to our policy proposal for two separate but intertwined reasons: (1) the revenue allocation framework attached to the tax proposal will impact the proposal’s political feasibility, and (2) revenue allocation, if appropriately targeted and executed, can further our overall policy goal of reducing obesity rates in Los Angeles County even beyond the market-based behavioral changes induced by the tax itself.

These issues are discrete because they implicate two separate processes—passing the proposal and executing the proposal—but they are intertwined, too, because a revenue “recycling” framework designed to supplement the County’s battle against obesity will enhance and reinforce the coherence of the overall policy proposal. This will make the proposal not only more politically palatable but also more effective.

In this chapter, we first discuss the role of revenue allocation as a political and policy tool. We then analyze the benefits and drawbacks of special taxes compared to general taxes. A special fund created by a special tax, in this case, would focus on obesity prevention and intervention programs, discussed in the subsequent section. Finally, we offer recommendations for a revenue recycling framework based on political feasibility and program effectiveness.

A. Revenue Allocation as a Political and Policy Tool

Revenue allocation is often a highly contentious subject. At any given moment, local governments have dozens of potential projects seeking funding, and political officials as well as members of the public have strong feelings about which projects are most deserving of governmental support. Allocation plays a central role in citizens’ calculation of the benefit-to-tax ratio, because specific allocation may form part of the “benefit” accrued by taxation.143

Revenue can also be used as a tool of political compromise: for example, Colorado’s initially controversial marijuana legalization program garnered increased support when it was stipulated that the first $40 million generated each year by excise taxes would go toward school construction.144 Earmarking the revenue for popular recipients—education, for example—could make a tax proposal more politically palatable. Studies have shown that public support for SSB taxes in particular is highest when tax revenues are kept for promoting nutrition or obesity prevention.145

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Offering the revenue to a municipality’s general fund, however, could also be an effective tool of compromise because revenue from general taxes can help balance a city or county’s budget. Indeed, allowing for a general tax wouldn’t doom SSB tax receipts to be spent on unrelated projects. General funds are spent on a variety of projects within each municipality. A comprehensive and collaborative working group comprising key legislators and stakeholders could reach an agreement on the earmarking of general funds for anti-obesity efforts.

A special fund for SSBs would not be unprecedented, and it is possible that such a fund would go relatively unnoticed. However, the City Controller of the City of Los Angeles publishes an annual special report on the state of the City’s 970 special funds, so it is possible that the public will still be privy to the annual allocation of SSB tax revenue. In addition, tax revenue may (and will likely) become a political issue during the public deliberation of this proposal. In Berkeley and San Francisco, for example, the issue was raised when both municipalities put forth ballot measures proposing a tax on SSBs (discussed below). Even if annual records per se are not published by the County, the politics of the revenue will become a factor in whether the proposal is able to succeed.

Earmarking the tax revenue for specific use could enhance the political palatability of the proposal, communicating to political officials and to the public that the beneficiaries of the tax revenue—that is, overweight and obese consumers of SSBs—are the same as the targets of the tax itself. The funds come back to them. This “recycling” could alleviate some of the concerns about the potential regressivity of the tax raised in the previous chapter.

Secondly, a properly designed revenue allocation framework could further our overall policy goal of reducing obesity rates in Los Angeles County. There are numerous public health and nutrition programs dedicated to reducing obesity within the County; these programs could benefit from an injection of funds. These specific programs are discussed below.

More central to our proposal, however, is the potential of doubling down on anti-obesity efforts in the County by combating the issue on two fronts: first, the market-based behavioral changes induced by the price increase, discussed in the chapters above, and second, behavioral changes encouraged by prevention and intervention programs funded by the County. This twofold approach produces a more complete and comprehensive program than simply one or the other option.

B. Legality of Earmarking Tax Revenue in Los Angeles

Article XIII(C) of the California state constitution is specifically concerned with local tax levies. Section 1 of this Article introduces both general and special taxes. Revenue generated by general taxes must go into a local government’s general fund, whereas revenue generated by special taxes must be earmarked for specific use.

The Los Angeles County Code of Ordinances does not specifically mention “special taxes” or “general taxes,” rendering difficult an assessment of the county-specific process of designing and approving a tax. But it may be instructive to study the regulations of the City of Los Angeles, home to roughly one-third of Los Angeles County residents. The Los Angeles
(City) Charter has provisions regarding the use of money paid into the City Treasury; Volume I, Article III, Section 302(a) reads: “[t]he General Fund is established as a medium of control of and accounting for municipal activities other than activities authorized or contemplated by special funds” (emphasis added). The Los Angeles (City) Administrative Code repeats this language in Division 5, Chapter 6, Section 5.116, and adds a non-exhaustive list of special funds established by the City. The open language at the end of this Section allows for the creation of new funds. The text dates back to September 1980, and there are now 970 special funds in the City of Los Angeles. Therefore, there appears to be ample precedent for establishing a special fund for obesity prevention and intervention with the revenue collected from a special tax.

C. Lessons from Berkeley’s Measure D

Voters in Berkeley approved Measure D, an SSB tax similar to the one proposed in this text, in November 2014. The tax is a “general tax,” so funds will be placed into a general fund. The Berkeley City Council had considered presenting a special tax to voters, but in California, a special tax initiative requires a two-thirds supermajority vote from general voters. In contrast, a general tax initiative requires a simple majority vote (50% plus one vote). The Berkeley general tax passed with 76% support from voters, suggesting that voters may have provided a supermajority if a special tax had been presented to voters instead of a general tax. According to the California Center for Public Health Advocacy, in the lead-up to the vote in Berkeley, a statewide poll suggested that two-thirds of California voters supported the creation of a special tax on SSBs, but only one-third supported the creation of a general tax on SSBs. This is consonant with other studies that have shown that public support for an SSB tax is highest when the tax is used for nutrition or obesity prevention programs.

What can we learn from the Berkeley example? In Los Angeles County, too, a special tax can only pass if it garners a two-thirds supermajority of voter support. The Berkeley City Council appeared to make a strategic decision to propose a general tax in order to avoid a situation in which a majority, but not a supermajority, of voters approved a special tax and the initiative failed.

150 Ibid.
This may be a consideration in Los Angeles as well; on its face, the political climate in Los Angeles does not appear to be nearly as sympathetic to government intervention as in Berkeley, so a special tax that relies on two-thirds’ voter support may be doomed to fail in Los Angeles County.

Thus, while a general tax is unappealing in this context because the funds cannot be earmarked for specific nutrition or anti-obesity programs, opting for a general tax may be necessary in order to avoid dooming the whole proposal to failure if Los Angeles residents provide majority, but not supermajority, support.

D. Identifying Special Fund Beneficiaries

1. Projected Revenue

Pinpointing a projected tax revenue estimate is difficult in this situation because there is a dearth of data on SSB consumption habits in Los Angeles County in particular.

However, the Yale Rudd Center on Food Policy and Obesity offers a “Soda Tax Calculator” that projects annual tax revenue based on 2011 national and regional consumption data and a cent-per-ounce tax.\textsuperscript{153} The calculator estimates that a tax on the City of Los Angeles would draw in $113.5 million per year based on a consumption profile of 88.6 million gallons of SSBs per year.\textsuperscript{154} If the City can draw in this amount per year having only roughly 40% of the population of the County, the County’s potential revenue would be significantly higher. Assuming that the consumer profile and consumption habits are the same in the rest of the County, the County could possibly draw in $283.5 million per year—a significant amount of money, to say the least.

In addition to these data, two rough calculations are illustrative. When Berkeley’s cent-per-ounce tax was proposed, studies estimated that the tax would draw in $1.5 million annually.\textsuperscript{155} Berkeley’s population is around 116,000; Los Angeles County’s population is roughly 85 times larger. Simply working off of these numbers would suggest that the County has the potential to draw in $127.5 million annually from a cent-per-ounce tax, assuming that the consumer profile and consumption per capita is identical between the two jurisdictions. The drastic difference between this rough estimate and the estimate above suggests that the consumer profiles between Berkeley and Los Angeles County are, in fact, radically different.

What having such a large potential pot of money means is that the County would be able not only to expand the funding of existing programs, but also to explore the creation of new nutrition and anti-obesity programs. The particular design of such new programs is beyond the scope of the current project, but the sections below offer some initial suggestions on not only existing programs in Los Angeles County that may benefit from increased funding, but

\textsuperscript{154} Ibid.
also external studies that have piloted nutritional or obesity intervention programs that could be brought into use in the County.

2. Data on Prevention and Intervention Programs

Obesity, as described in Chapter II above, is a relatively intractable issue with grave consequences for overweight, obese, and morbidly obese individuals. As obesity rates have risen in the United States over the past few decades, a number of programs have simultaneously arisen to prevent obesity among youth and intervene among the already obese.

One exhaustive meta-analysis conducted in 2013 studied differential outcomes among 124 interventional studies.\textsuperscript{156} The reviewers defined success as a statistically significant reduction in BMI with a follow up of at least 1 year (6 months in school-only settings) to confirm the reduction. The reviewers assessed the risk of bias as well as the strength of evidence for each of these 124 studies. These are all critically important evaluative criteria in assessing the policy value of a particular intervention program.

The following types of programs were assessed to have strong (“high”) evidentiary support for success:

- school-based with a home component—physical activity intervention; and
- school-based with home and community components—diet and physical activity interventions.

The following types of programs were assessed to have moderate evidentiary support:

- school-based—diet or physical activity interventions;
- school-based with a home component—diet and physical activity interventions;
- school-based with a community component—diet and physical activity interventions; and
- community with a school component—diet and physical activity interventions.

These data demonstrate that there must be a combination of factors to ensure that a prevention program succeeds; it cannot be just school-based, or just community-based, or just diet, or just physical activity—the most effective prevention programs have some combination of these traits. On its face this makes intuitive sense. A school-based program wouldn’t be effective if students went home and ate poorly, and vice versa. In addition, support grounded in the local community could provide a much-needed morale booster for kids trying to remain healthy.

The interest in youth prevention programs has blossomed in the last few years. Indeed, a 2008 article (just 5 years prior to the 2013 meta-analysis above) complained of a dearth in school-based obesity prevention programs hindering a comprehensive meta-analysis of the effectiveness of such interventions.\textsuperscript{157}


A meta-analytical review of obesity interventions, including medical interventions, among adult populations was conducted in 2007.\textsuperscript{158} The review noted that, at that point, not enough data existed on youth populations to conduct such a review. The review judged adult intervention programs by their cost-effectiveness, using “quality-adjusted life-year” ("QALY"), a measure of disease burden commonly used to assess medical interventions, as the unit of benefit. The review noted that Orlistat, an anti-obesity drug, resulted in a significant $8,327 savings in cost per QALY. Planet Health, a “school-based intervention to improve nutrition and increase physical activity,” produced a $4,305 savings in cost per QALY among middle-school girls in 2003, but not among boys. Bariatric surgery resulted in a $10,700 to $35,600 savings among morbidly obese middle-aged men, and a $5,400 to $16,100 savings among morbidly obese middle-aged women. Finally, diet, exercise, and behavioral modification—behavioral interventions—among adult women resulted in a $12,640 savings in 2006.

Using public funds for surgery or medicine would be politically contentious, as demonstrated by the heated debates spawned by the Patient Protection and Affordable Care Act of 2010. Therefore, this project will focus only on behavioral interventions. Adjusted for inflation, the behavioral intervention among middle-school girls produced a roughly $5,540 QALY cost savings in 2014 dollars. Similarly, the behavioral intervention among adult women produced a roughly $14,840 QALY cost savings in 2014 dollars.

These numbers are important in calculating the tax-benefit ratio of any intervention program funded by tax dollars, since a program would be judged valuable only if the tax-benefit ratio were, at most, one. Working off of the rough numbers above, then, a government-funded obesity intervention program would contribute $5,540 or less to preventative interventions among school-aged girls, and a reduction intervention program among obese adult women would cost the government $14,840 or less, in order to produce a politically palatable tax-benefit ratio.

3. Existing Programs in Los Angeles County

Another approach would be to direct the funds raised by the SSB tax toward existing programs within the County. There are a number of preeminent facilities within Los Angeles County whose work would be enhanced by an injection of governmental funds. Many of these programs—particularly the ones described below—are run by well-respected organizations, but it is difficult to obtain data on the actual success rates of these programs and the strength of the evidence behind their work, raising questions about the cost-effectiveness of the revenue allocation. However, it may be more politically feasible to redirect funds toward known and well-regarded programs rather than beginning unknown or unfamiliar programs within the County.

The Children’s Hospital Los Angeles (CHLA) Diabetes and Obesity Community Engagement program, for example, comprises a multidisciplinary team that addresses obesity

prevention and intervention among obese, overweight, or at-risk children. This program works hand-in-hand with the Keck School of Medicine at the University of Southern California, so there are several top-end researchers contributing to the success of the program. The CHLA program appears to work with faith-based initiatives, which makes sense from a community outreach perspective, but may harm the political feasibility of redirecting SSB tax revenue toward this program.

At some AltaMed clinics in the County, the STOMP program—Solutions and Treatments in Obesity Management and Prevention—produces results. STOMP involves a 12-month pediatric weight-control program, including nutrition classes, fitness education, motivation, and medical consultation. Unlike CHLA, AltaMed is neither public nor associated with a local university, which may make difficult the political feasibility of redirecting public funds toward a private enterprise.

A happy medium may be found in Choose Health LA, a joint enterprise between the Los Angeles County Public Health Department and First 5 LA, a baby and toddler support service in the County. Choose Health LA addresses obesity from a multitude of angles, involving parents, food demonstrations, grocery store tours, and restaurant outreach. Choose Health LA appears to embody the best traits of an intervention program as culled from the literature meta-analysis described in the previous section.

E. Recommendations

Revenue allocation, as described above, is contentious, but the political feasibility of the tax proposal may ultimately be enhanced by a carefully designed allocation schema. The precedent exists in the Los Angeles record for special funds, but the Berkeley example demonstrates that political considerations may require a general tax rather than a special tax. While revenues generated by a general tax are not guaranteed to be used for particular anti-obesity programs, careful politicking among key legislators and stakeholders could ensure at least a portion of the revenue to be redirected toward intervention programs.

If the County were indeed working with a large pot of money generated by a special tax, on the order of $100 to $300 million, then the government should consider establishing a new program, including:

- school-based programs with a home component—physical activity intervention; or
- school-based programs with home and community components—diet and physical activity interventions;
- with careful consideration to the cost-effectiveness of such programs.

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Choose Health LA, with its multifaceted approach to obesity prevention and intervention, its nonpartisan and non-denominational nature, and its extant public-funded structure, would be an ideal existing beneficiary of a special fund.
V. CONCLUSIONS AND NEXT STEPS

We recommend pursuing advocacy promoting Policy Option 1, a cent-per-ounce excise tax on all beverages containing caloric sweeteners. In addition to weight loss induced by behavioral changes caused by an SSB tax, such a tax can create a revenue stream that allows for more robust, comprehensive, and sustainable obesity interventions, in particular public information and education campaigns and “counter-advertising” against the beverage and food industries.

In recommending this option, however, we recognize that there does not appear to be a policy window for an SSB tax in Los Angeles County at the moment. Although Berkeley’s general tax was approved in November, San Francisco’s special tax failed to garner enough votes—and, indeed, provoked an intense reaction from the beverage industry. Los Angeles County’s politics are different from both Berkeley and San Francisco. SSB tax initiatives in smaller cities within the County, El Monte and Richmond, have failed in the past.162 After each tax made it to the ballot, the nature of each pro-tax campaign (and its opposition) proved to be a decisive factor. A realistic advocacy strategy must take all of these data into consideration.

The climate will change in Los Angeles with time. SSB taxes represent the next frontier in health policy-making. Hundreds of articles have been written on the subject in the last decade, and SSB taxes dominate policy discussions surrounding America’s obesity epidemic. This report is intended to serve as a resource when the policy window finally opens. Indeed, if Los Angeles is successful in passing a tax on SSBs, the state—and the country—will take notice. With a population of over 10 million in Los Angeles County, what is politically achievable here may become feasible on an even larger scale.

As part of a broader strategy to encourage the proposal of an SSB tax in Los Angeles County, we recommend to our client, Dr. Arturo Vargas Bustamante and the UCLA Center for Health Policy Research, to engage with county health officials and members of the Board of Supervisors to track interest in the policy and encourage coalition-building within the ranks of decision makers. In particular, it is critical to engage with the County Department of Public Health to increase the quality and frequency of data collection, including consumption habits and more recent and detailed obesity figures.

It is also a strength of Dr. Bustamante and the UCLA Center for Health Policy Research that it is connected to numerous community-based organizations and nonprofits working to improve the health of Angelenos. This positioning lends itself well to building support around the issue of an SSB tax, perhaps with a task force dedicated to weighing the potential costs and benefits of such a policy in Los Angeles County. A task force, comprised of county-level officials, leading nonprofits, academics, and community members could go a long way to making an SSB tax measure a reality in Los Angeles.