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Parents' knowledge, attitudes and behaviors regarding sugar-sweetened beverages in light
of the Berkeley Soda Tax (Measure D)

by

Tara Deanna Benesch

A thesis submitted in partial satisfaction of the

requirements for the degree of

Master of Science

in

Health and Medical Sciences

in the

Graduate Division

of the

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Abstract

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Background: Sugar-sweetened beverages (SSBs) are the leading source of added sugar in the American diet. Frequent consumption of these beverages is associated with diabetes, obesity, and tooth decay. In an effort to curb sugar consumption, Berkeley, California became the first city in the United States to implement an excise tax (Measure D - \$0.01/oz) on SSBs in 2015. While quantitative studies of SSB taxes show that Measure D is decreasing SSB consumption in Berkeley, there is limited qualitative understanding of the mechanisms by which beverage taxes influence individual behavior, particularly among parents, who make the majority of nutritional decisions for young children.

Methods: This study used focus groups and semi-structured individual interviews to explore how parents in Berkeley select beverages for their children following the implementation of Measure D. We also explored opinions regarding taxation with the goal of informing future public health and taxation campaigns. A total of four focus groups with 26 parents and 20 individual interviews were conducted. Qualitative data was transcribed and analyzed using Dedoose data analysis software.

Results: Most participants were aware of the health consequences of excess sugar consumption and were interested in reducing their families' sugar intake, in part due to nutrition education and personal experiences with health consequences associated with excess sugar consumption. However, reactions to Measure D were mixed. While most parents supported taxing SSBs, especially when funds were dedicated to nutrition and/or education programs, Parents also reported decreasing SSB consumption following the implementation of Measure D. On the other hand, many parents did not believe the tax would significantly change behavior, and were suspicious or confused about how funds were being used.

Conclusions: Recent quantitative studies show that Measure D is significantly decreasing SSB consumption in Berkeley. Our findings suggest that Measure D supports parents' existing goals of reducing sugar consumption in their families by making it easier to avoid SSB purchases outside the home. In addition to beverage prices, nutrition education was a major determinant of beverage consumption. Explicitly dedicating revenue from future SSB taxes to children's nutrition education may increase voter support for such taxes while helping to decrease SSB consumption among both parents and children.

Dedication

This thesis is dedicated to Tracey Jones, Jessie Heminway and Jeff Loo – three amazing people who make sure that every student in the Joint Medical Program feels successful and supported. Thank you!

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PART I: LITERATURE REVIEW

The Health Toll of Sugar-Sweetened Beverages

Sugar-sweetened beverages (SSBs) are the leading source of added sugars in the American diet¹, and frequent consumption of these beverages increases the risk of diabetes, obesity, cardiovascular disease, and tooth decay²⁻⁴. Over recent decades, there has been an alarming increase in these chronic diseases, particularly in children and adolescents. Childhood obesity, for example, has more than doubled in children and quadrupled in adolescents in the past 30 years⁵, and children who suffer from obesity are more likely to develop diabetes, osteoarthritis, sleep apnea, psychological problems, and cancer later in life^{6,7}.

Consuming just one additional SSB per day can lead to significant weight change over time if not offset by caloric expenditures⁸. Among children, each extra serving of SSBs consumed per day increases their risk of obesity by 60 percent⁹. In addition, drinks that are rich in free sugars actually reduce appetite control, further contributing to weight gain¹⁰. The ultimate outcome of SSB consumption is staggering: a 2010 study estimated that SSB consumption is responsible for 25,000 deaths per year in the U.S. alone, and 184,000 deaths per year worldwide¹¹.

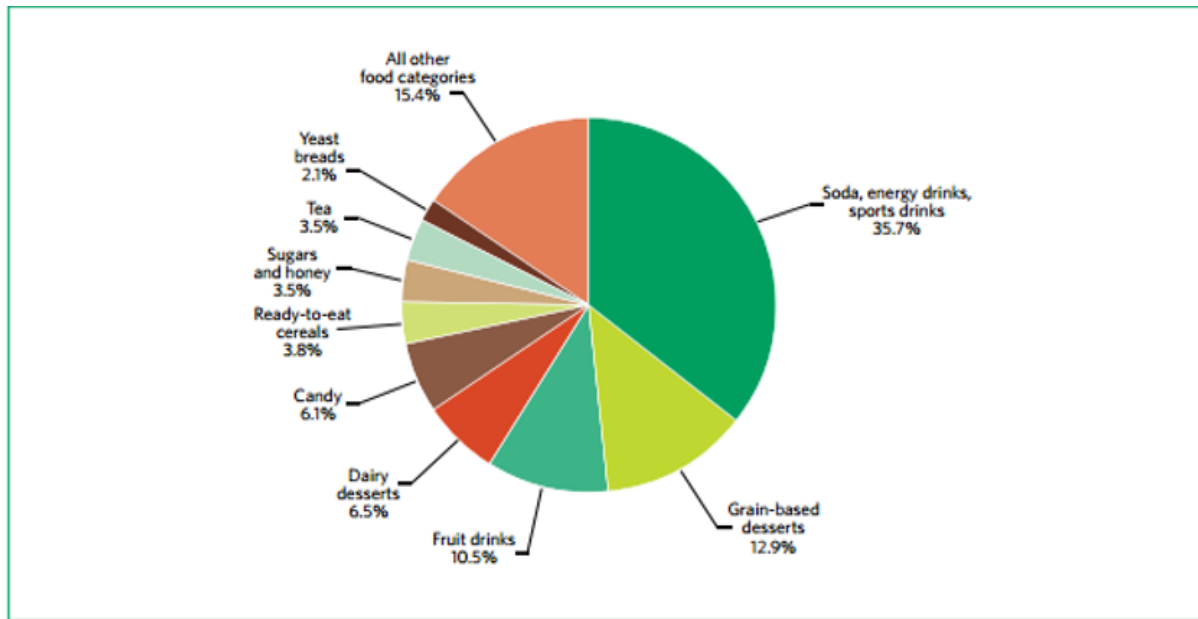


Figure 1 - Sources of Added Sugars in the Diets of the U.S. Population Ages 2 years and older, NHANES 2005-2006. Data are drawn from an analysis of the usual dietary intake conducted by the National Cancer Institute. Foods and beverages consumed were divided into 97 categories and ranked according to added sugars contribution to the diet. "All other food categories" represents all the categories where each contribution made up less than 2% of total added sugar intake.¹²

Obesity

In adults, obesity is defined as having a Body Mass Index (BMI - weight in kilograms divided by the square of height in meters) over 30, and severe obesity is defined as having a BMI over 40. For children and teens, BMI is age- and sex-specific, and is expressed as a percentile. Obesity in this population equates to a BMI at or above the 95th percentile for children and teens of the same age and sex. Both obesity and severe obesity have increased dramatically in the United States over the past 40 years. Results from the 2011–2012 National Health and Nutrition Examination Survey (NHANES) estimate that 33.9% of U.S. adults aged 20 and over are overweight (BMI 25.0-29.9), 35.1% are obese (BMI greater than or equal to 30), and 6.4% are extremely obese (BMI greater than or equal to 40). Among U.S. children and adolescents, obesity rates have plateaued in recent years, with 16.9% of children aged 2-19 classified as obese, and another 14.9% as overweight. Despite this recent trend, conservative regression models still predict a 33% increase in obesity prevalence and a 130% increase in severe obesity in the United States by the year 2030¹³.

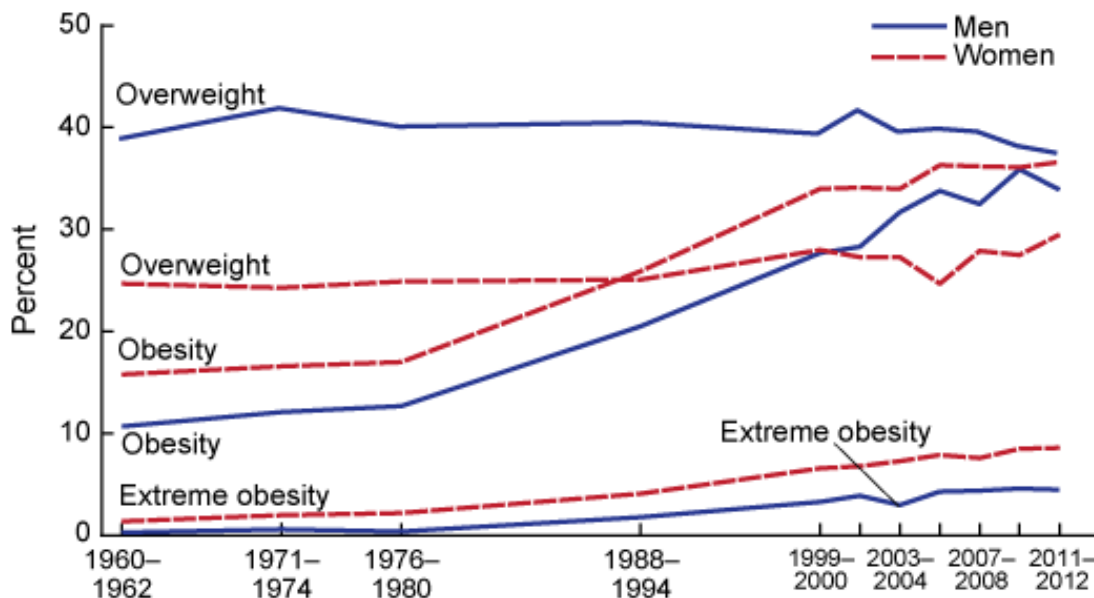


Figure 2 - Rates of elevated Body Mass Index (BMI) among men and women in the United States from 1960 to 2012. In adults, overweight is defined by a BMI of 25-30, obesity is defined as having a BMI greater than or equal to 30, and severe obesity is defined as having a BMI greater than or equal to 40. Notes: pregnant females were excluded⁵.

What is causing this increase in obesity prevalence? One definite culprit is SSB consumption. The link between SSB consumption and obesity has been well-established by prospective studies⁹, randomized controlled trials¹⁴, and other rigorous investigations¹⁵. In fact, consuming liquid calories from SSBs is more likely to lead to obesity than consuming

an equal amount of calories from solid sweets. One randomized controlled trial assigned participants to consume either liquid (soda) or solid (jelly bean) carbohydrates, and found that participants in the liquid consumption group experienced an increase in body weight and BMI, whereas those who ate solid carbohydrates experienced metabolic compensation and did not gain weight¹⁰. What about diet sodas and sugar-free beverages? Although artificial sweeteners have been linked to glucose intolerance, alterations in the gut microbe and metabolism^{16,17}, and toxicity¹⁸, studies comparing SSBs and sugar-free beverages (whether unsweetened or containing artificial sweeteners) have consistently found that SSB consumption leads to greater weight gain than the consumption of sugar-free beverages². For example, a study of children in Australia found that when 8-year-olds were randomly assigned to consume either SSBs or sugar-free beverages, children who consumed SSBs gained more weight over an 18 month period than those who consumed sugar-free beverages¹⁹. In younger children, the same is true: children ages 2 to 5 who consume SSBs exhibit both prospective and cross-sectional correlations with a higher BMI²⁰. Thus, it seems that SSB consumption – as opposed to the consumption of diet soda or other sugary snacks – is an especially important determinant of weight gain in both children and adults.

Considering the economic toll of obesity—estimated to be between \$147 and \$190 billion per year in the U.S.—it is imperative that we consider a variety of methods to address it. Although there is still no definitive evidence that reducing SSB consumption will reduce obesity²¹, studies are beginning to suggest that it will. Randomized controlled trials have shown that replacing SSBs with non-caloric beverages significantly reduced weight gain and body fat among 4-11 year old children, and in overweight and obese adolescents, those in a 1-year intervention to reduce SSB consumption achieved a smaller BMI increase than a control group^{14,19}. In addition to the link between SSB consumption and poor individual health outcomes, on a population level there is a parallel increase in consumption trends and obesity rates in many countries. In fact, a multivariate analysis of obesity, diabetes, and soft drink consumption in 75 countries found that a 1% increase in soft drink consumption is associated with an additional 4.8 overweight adults per 100²². Thus, it is clear that SSBs play a role in obesity, and reducing SSB consumption may play a part in reversing the increase in obesity prevalence seen in recent decades.

Diabetes, Metabolic Syndrome, and Heart Disease

In addition to increasing obesity, SSB consumption has been shown to increase rates of type 2 diabetes. A 2010 study showed that individuals who consumed 1-2 servings of SSBs per day had a 26% greater risk of developing type 2 diabetes than individuals who consumed less than one SSB per month⁴. A prospective cohort study of over 50,000 women enrolled in the Nurses' Health Study II found that consumption of SSBs was positively associated with calorie intake, weight gain, and incidence of diabetes. In fact, the relative risk of type 2 diabetes, adjusting for other dietary and lifestyle factors, was 1.83 (95% CI, 1.42-2.36) for individuals who consumed more than one SSB per day compared with individuals who consumed fewer than one SSB per month. These results held true even

when controlling for BMI. These results suggest that even among women who are already overweight, those who consume SSBs daily are much more likely to develop diabetes than those who rarely consume SSBs²⁴.

In addition to increasing the risk of diabetes, frequent SSB consumption also contributes to cardiovascular disease and metabolic syndrome. A study that followed 42,000 men for twenty-two years found that for each additional SSB consumed per day, the risk of cardiovascular disease increased by 19 percent²⁵. A similar study in women also found a link between heart disease and SSB consumption²⁶.

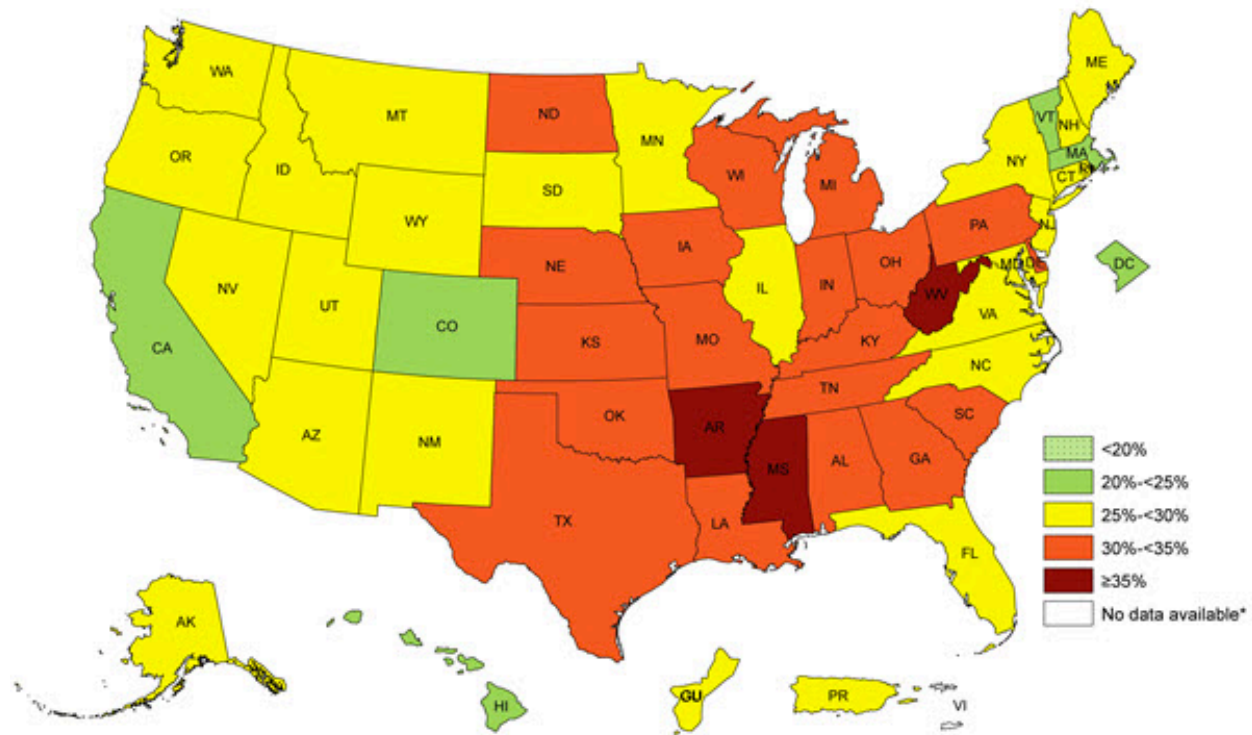


Figure 3 –Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory. Of note, no state had an obesity prevalence less than 20%. Source: Behavioral Risk Factor Surveillance System, CDC. Prevalence estimates reflect BRFSS methodological changes started in 2011, and should not be compared to estimates before 2011.²³

Metabolic syndrome is defined as having at least three of the following five metabolic risk factors: abdominal obesity, high triglycerides, low high-density (HDL) lipoprotein cholesterol, high blood pressure, or high fasting blood sugar. As someone develops more metabolic risk factors, their risk of cardiovascular disease, diabetes, and stroke increases. What causes metabolic syndrome? Metabolic syndrome is correlated with increases in BMI, insulin resistance, and lack of physical activity, and is also linked to frequent SSB consumption. A meta-analysis of three prospective cohort studies found that SSB intake was independently associated with the development of metabolic syndrome, with individuals who consume more than one SSB per day having 1.2 times the risk of

developing metabolic syndrome than individuals who rarely consume SSBs (less than once per month)⁴. The authors of that study posited that, in addition to contributing to weight gain, SSBs independently contribute to the development of metabolic syndrome by providing the body with a large amount of rapidly absorbable carbohydrates in the form of added sugars. These added sugars increase inflammatory biomarkers, lead to insulin resistance, and promote fat synthesis and deposition, thus facilitating the development of metabolic syndrome.

It does not take long for these negative health outcomes to develop in individuals who consume SSBs. Markers of cardiometabolic damage such as increased waist circumference, increased C-reactive protein (indicative of inflammation), and decreased high-density lipoprotein (HDL) cholesterol are also correlated with consumption of sugar-sweetened beverages in children aged 3 to 11²⁷.

Liver Damage and Addiction

Parallels have been drawn between fructose, a type of sugar, and ethanol alcohol, both of which lead to liver damage and addiction. Both substances serve as substrates for de novo lipogenesis, or the synthesis of fat in our bodies. In doing so, both alcohol and sugar promote hepatic insulin resistance, making it harder for sugar to get into our cells to be used. They also lead to dyslipidemia, commonly referred to as “high cholesterol”, and hepatic steatosis, or “fatty liver”. Secondly, fructose can combine with proteins in a process called fructosylation, forming dangerous superoxide radicals that can damage the liver in a process similar to acetaldehyde, an intermediary metabolite of ethanol. Lastly, both alcohol and fructose stimulate the “hedonic” or “reward” pathway of the brain, leading to habit formation and promoting substance dependence²⁸. This constellation of adverse effects may explain why adults who drink more than one SSB per day are 55 percent more likely than nonconsumers to have nonalcoholic fatty liver disease²⁹.

Cancer, Sleep disorders, Asthma and Gout

SSB intake is associated with higher mortality from a variety of different cancers, including colorectal cancer³⁰ and type I endometrial cancer³¹. Caffeinated soda, but not coffee or tea, is associated with the development of sleep-disordered breathing³², and an increase in per-capita sugar consumption is also associated with an increase in severe childhood asthma³³. SSB consumption is also associated with an increased risk of developing gout in both men and women³⁴⁻³⁶.

Tooth Decay

Obesity has dominated much of the public conversation around reducing SSB consumption, but dental caries are often the earliest manifestation of the physical harm of SSBs, particularly in young children^{37,38}. In fact, untreated dental caries are the number one chronic childhood disease, with striking disparities in oral health related to

race/ethnicity and income, including food security status³⁹. Children living at or below 100% of the federal poverty level experience significantly higher levels of dental caries than children living above the poverty level. Findings from the 2009-2010 National Health and Nutrition Examination Survey showed that approximately one in four children between the ages of 3 and 9 years old who were living in poverty had untreated dental caries⁴⁰. The prevalence of dental caries also varies by race/ethnicity, with non-Hispanic blacks, Hispanics, American Indians and Alaska Native adults having the poorest oral health of any racial and ethnic group in the U.S. Disparities in oral health parallel the disparities in obesity seen across the U.S., where obesity rates among Black, Latino and native American children is far greater than in white communities⁴¹.

How does SSB consumption cause dental caries? SSBs contain excessive amounts of sugar, which can disrupt the normal oral microflora and promote the growth of cariogenic (caries-causing) bacteria such as *Streptococcus mutans*, which produces acid and demineralizes the tooth enamel. The mouth is colonized by 200-300 different bacterial species. After eating, some of these bacteria metabolize fermentable carbohydrates and produce acid that demineralizes teeth. In the healthy mouth, the saliva replenishes these minerals between meals in a process called remineralization. However, frequent consumption of fermentable carbohydrates, such as sugars, disrupts this demineralization/remineralization process. Excess sugars lead to more frequent acidification, which favors more aciduric strains of bacteria such as 'low-pH' non-mutans streptococci. As a result of this more frequent and moderate acidification, the bacterial profile of the oral cavity shifts, and mineral loss is increased. At this stage, mutans streptococci and lactobacilli, Actinomyces, bifidobacteria, and yeasts may become dominant, and these are the bacteria that are involved in caries⁴². Although a variety of host factors such as genetics and dental care influence the structure of dental enamel, immunologic responses to cariogenic bacteria, and the composition of saliva, diet – and particularly sugar intake—plays a crucial role in the development of caries^{43,44}. Dental caries can develop within 12-24 months following a primary lesion and significantly impact quality of life, causing significant mouth pain and impeding sleep and eating. Thus, as an early marker of excess sugar consumption, dental caries and oral health are particularly important to examine in the context of SSBs⁴⁵.

Factors That Influence SSB Consumption

Establishing healthy eating habits during childhood is essential, as studies suggest that childhood attitudes towards food choices influence eating behaviors in adulthood^{46,47}. Not only that, but developing healthy eating habits early in life may be a way to prevent diet-related diseases such as childhood obesity⁴⁸. Given the health consequences associated with excessive sugar intake, decreasing SSB consumption has been identified as an important lever for improving health, and understanding the determinants of SSB consumption will help us understand how to reduce it. A meta-analysis of 46,876 studies

concluded that there are twelve determinants correlated with higher SSB consumption among children: a child's preference for SSBs, children's TV viewing/screen time, children's snack consumption, parents' lower socioeconomic status and lower age, parental SSB consumption, feeding children formula, early introduction of solids, using food as rewards, parental-perceived barriers to reducing SSB consumption, attending out-of-home care, and living near a fast food/convenience store. Determinants associated with lower SSB consumption were parental positive modeling, parents' married/co-habiting, school nutrition policies that discouraged SSB consumption, school staff skills, and supermarket nearby⁴⁹. Although this research touches on the individual and interpersonal determinants of SSB consumption, fewer studies have examined the effect of macro-level environmental factors, such as taxation, advertising/marketing, and product price and placement on children's SSB consumption. A survey of 371 Australian parents found that political concerns, price, and advertising were far less important to parents than their child's health and taste preferences when it came to making food choices, suggesting that young children may influence parental decisions around SSBs. At the same time, studies have shown that advertisements for SSBs disproportionately target young children of color, which may in turn influence their preferences, and thus what their parents choose to purchase⁴⁹. Other potential influences affecting parents include health-promoting organizations such as medical centers and Health Maintenance Organizations (HMOs) or the Women, Infants and Children (WIC) program, which frequently distribute nutritional information to parents. Schools may also influence both parents and children's decisions regarding SSBs.

Studies are just beginning to recognize the power of programs such as WIC, which turns out to be a key source of beverage information for Latino parents⁵⁰. And while many school-based interventions have been piloted in an effort to decrease SSB consumption among children and adolescents, the results from such interventions have been mixed. It is increasingly clear that more research is needed to ascertain the effect of policies and other macro-level factors on individual SSB consumption.

Media Influences

Children and adolescents spend about \$200 billion per year in the United States, much of it on food and beverages⁵¹. It's no surprise that food and beverage companies focus marketing efforts on young populations; not only is it profitable, but by investing in children, companies can ensure brand loyalty for years to come. Television advertisements are still the most common advertising modality, but advertisements are constantly evolving and now include video games, product placements, Internet and cell phone pop-ups, and YouTube videos. Unfortunately, the vast majority of advertisements seen by youth are for calorie-dense, low-nutrient foods such as fast food, cereals, and soft drinks.⁵² Although we cannot be certain that advertisements directly influence children's behavior, experimental studies demonstrate that children's preferences for certain foods or beverages increases after being exposed to radio or product placement advertisements containing those beverages^{53,54}. Moving beyond the laboratory, comparisons of families in Quebec (where advertising to children under age 13 is banned) to families in Ontario

(where there is no such ban) show that families in Quebec—particularly French-speaking families who do not watch television in English—buy significantly less cereal than families in Ontario⁵⁵.

Not all children are seeing the same advertisements. According to Yale’s Rudd Center for Food Policy and Obesity, advertisements for sugary beverages (soda, energy drinks, and sports drinks) disproportionately target Black and Latino children, and youth living in poverty; the same children who are disproportionately impacted by dental caries, obesity, and other health issues associated with SSB consumption⁵⁶. Black children and adolescents saw 80 to 90 percent more ads as compared to white youth, and Latino children saw 49 percent more ads for sugary drinks and energy drinks on Spanish-language TV. Beverage advertising to Latino children focused on preschoolers, who saw more Spanish-language ads for products like Coca-Cola, Kool-Aid, 7-Up, and Sunny D than older Latino children and teens.

Parental Influence

We know that dietary behaviors are established in early childhood, and often persist throughout a person’s lifetime⁵⁷. During this critical stage of development, most young children (<6 years old) spend time at home or in child-care settings, meaning that the foods and beverages offered to children in those settings may strongly influence later dietary preferences^{58,59}. In fact, for youth ages 2-19, 55-70% of all SSB energy (kcal) was consumed at home, whereas 7-15% occurred in school (increasing with age)⁶⁰. At home, parents—and particularly the “nutritional gatekeepers” who purchase and prepare food for the family—play an especially important role in shaping children’s future dietary habits⁶¹. On average, the ‘nutritional gatekeeper’ of the family has direct or indirect control over 72% of their child’s diet. When healthful foods such as fruits or vegetables are readily available at home, children and adolescents tend to eat more of them⁶². Frequent consumption of home-cooked meals is also associated with higher intakes of healthful foods in children, whereas eating out is associated with higher intakes of SSBs and unhealthy foods such as processed meats and fried foods⁶³. However, not all parents are able to make fruits and vegetables readily available, and many families eat out regularly. As a result, foods served to children at childcare centers, at least those in New York City, are generally more healthful than foods served at home⁶⁴.

Children naturally prefer sweeter foods than adolescents or adults, yet their preferences can be significantly influenced by exposures to new foods, and the eating behaviors of those around them. Thus, the innate preference for sweetness that is present at infancy is modified by the time children are 6 months old. While all infants prefer a solution of sweet water when they are born, only those children who are routinely fed sweetened water continue to express this preference for sweetness. Children who are not fed sweet water do not show this preference⁶⁵. Therefore, parents and guardians—as the ‘nutritional gatekeepers’—are some of the most powerful influencers of children’s later dietary preferences.

Although parental perceptions of children's diet quality undoubtedly influence their behaviors and food choices for their children, to the best of my knowledge, only one study has compared maternal perceptions of diet quality with actual diet quality. That study found that among 1,759 mothers of Greek children aged 2-5, 83 percent of mothers overestimated the quality of their children's diet (using the Healthy Eating Index). Importantly, this study did not assess mothers' knowledge of what constitutes a healthy diet. If mothers believe that they are serving their children is healthy, then this overestimation of diet quality is more probable⁶⁶.

Thus, for children to establish healthy eating behaviors, parents—the main influence of children's diets—need to understand what constitutes healthy eating. Given the implications of SSB consumption for children's health, understanding parents' knowledge and attitudes regarding SSB consumption is essential to improving children's health. Unfortunately, few studies have examined parental perceptions regarding the healthiness or unhealthiness of different beverages. A 2015 study of parents and children in Switzerland showed that, when asked to rank beverages from least to most healthy, both parents and their 7-10 year old children used information about sugar content, artificial sweeteners, fruit and caffeine to determine the healthiness of beverages. Children and parents agreed on the healthiness of most beverages, supporting the idea that parental modeling is a key determinant of children's dietary behaviors. However, this study did not examine whether perceived healthiness was related to consumption or beverage preference.⁶⁷

Safety Concerns

A 2011 study found that mistrust of tap water discourages plain water intake and leads to a greater intake of sugar-sweetened beverages (SSBs), particularly among Hispanics who did not trust their local tap water. Considering that concerns regarding tap water safety may be an important determinant of SSB intake among Hispanics, public health efforts should promote tap water safety, particularly in Latino populations⁶⁸.

Strategies for Reducing SSB Consumption

Intake of sugar-sweetened beverages has skyrocketed since the 1960s in the U.S. and around the globe. In Mexico, for example, SSB intake doubled between 1999 and 2006 across all age groups, while in the U.S. the per capita intake of caloric beverages doubled between 1977 and 2002⁶⁹. Among children aged 2-18, milk consumption has decreased while juice and SSB consumption has increased significantly. In adults 19 and older, SSB consumption more than doubled in the past half century⁷⁰.

This startling increase in SSB consumption may have finally come to an end, as SSB consumption in the U.S. has slightly decreased since 2002,. However, sugar intake among

Americans still exceeds recommended limits⁷¹. According to Beverage Digest, an industry tracker, while the current per capita consumption of carbonated soft drinks is at its lowest level since 1986, sales of energy drinks and sports drinks are on the rise.

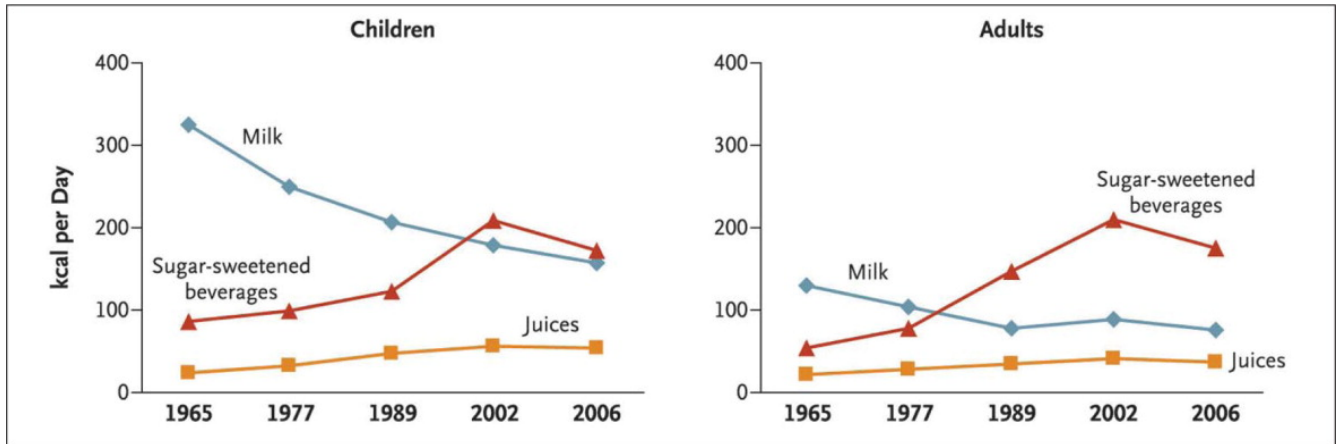


Figure 4 - Trends in SSB, juice, and milk consumption among children and adults from 1965 to 2006⁶⁹.

Why the decrease in SSB consumption? A 2014 Gallup poll showed that Americans have become increasingly wary of drinking soda since Gallup began surveying beverage consumption in 2002.

Americans' Dietary Habits of Drinking Soda

Thinking about the food you eat, for each of the following please say if it is something you actively try to include in your diet, something you actively try to avoid, or something you don't think about either way. How about soda or pop?

| | Include | Avoid | Don't think about |
|----------------|----------------|--------------|--------------------------|
| | % | % | % |
| Jul 7-10, 2014 | 23 | 63 | 13 |
| Jul 8-11, 2004 | 25 | 51 | 24 |
| Jul 9-11, 2002 | 36 | 41 | 23 |

GALLUP®

Figure 5- Results for this Gallup poll are based on telephone interviews conducted July 7-10, 2014, on the Gallup Daily tracking survey with a random sample of 1,013 adults aged 18 and older from across the 50 U.S. states and the District of Columbia.⁷²

This change in consumer habits may be due to increases in public education, beverage regulation, policy, food labeling, and/or taxation.

Regulation, Labeling & Education

Studies show that consumers are largely aware of the negative health impacts of sugar intake, but often have difficulty identifying sugar-laden products⁷³. Providing consumers with calorie information significantly reduces the likelihood that consumers will purchase a SSB – particularly a large SSB – and increases the chance of them switching to a beverage with no calories. These effects persisted even after labels were removed⁷⁴, demonstrating that consumer education may decrease SSB consumption. Other studies support this view, showing that parents were strongly against providing non-nutritive sweetened beverages and foods to their children, but had trouble identifying foods that contained non-nutritive sweeteners. Such findings show that food labeling should be revised in order for consumers to more easily identify non-nutritive sweeteners in foods and beverages.⁷³

Taxation

In Mexico, high-sugar diets have been associated with diabetes and obesity rates that rival or exceed rates in the U.S.^{75,76} This increase in diabetes and obesity has been recent, and is paralleled by an increase in SSB consumption⁷⁷. In response to the increasing public health concerns regarding SSB consumption, Mexico implemented a nationwide tax of one peso per liter on sugary beverages in January 2014. This tax effectively raised the prices of SSBs by about ten percent, and raised the prices of other sugary foods (cookies, cakes, etc.) by about eight percent. Subsequent research by Shu Wen Ng demonstrated a link between this national soda tax and changes in the consumption of SSBs in Mexico. Since the tax passed in January of 2014, preliminary results show a 6-12 percent decline in the purchases of SSBs (recorded in December, 2014 by the UNC Food Research Project)⁷⁸. In her calculations, Ng took into account the decline in soda purchases that was already occurring when the tax passed, which could have been the result of increased awareness of the health effects of SSBs, or the media campaigns surrounding the tax. Other countries have also used taxes to discourage SSB consumption. In Brazil, a one percent increase in the price of SSBs led to a 0.85% reduction in SSB calories consumed, with the effect being greater among poorer populations⁷⁹. These results are consistent with studies that estimate that a 10 percent price increase is estimated to result in an 8-12.6 percent decrease in consumption⁸⁰. Underscoring the influence of price on consumer behavior, studies show that when healthy foods are less expensive than unhealthy foods, studies show that consumers will tend to purchase the healthier items^{81,82}.

Would taxation help decrease SSB consumption in the United States? Currently, 34 states and Washington, D.C. have sales taxes on soft drinks, with the mean tax rate at 5.2 percent⁶⁹. Yet these taxes are too small to substantially reduce SSB consumption and associated health outcomes such as obesity, particularly since they work at the register,

after a customer has already decided to purchase an SSB.^{83,84} They do, however, generate substantial revenue. In the year 2000, taxes on non-nutritive foods such as soft drinks, candy, chewing gum and snack foods raised about \$1 billion annually. More recent estimates from the Yale Rudd Center for Food Policy and Obesity suggest that a national tax of a penny per ounce on SSBs would generate \$39 billion in revenue over three years. In the states with the highest rates of obesity—Mississippi, Louisiana, and West Virginia—a penny per ounce excise tax on SSBs is projected to generate \$136 million, \$210 million, and \$84 million, respectively. In California, revenue is estimated at \$1 billion⁸⁵.

Given the healthcare costs associated with SSB consumption, public health experts have suggested earmarking such tax revenues for programs related to health and nutrition. In addition to benefitting health and nutrition programs, earmarking SSB tax revenue for public health and educational endeavors actually increases public support for such taxes^{83,86,87}. A 2013 survey of 1,184 registered California voters conducted by The California Endowment found that although a majority of voters in California (53%) oppose taxing the sale of sugar-sweetened beverages, if proceeds from the tax are used to improve school nutrition and physical activity programs, support increases dramatically (to 68% in favor vs. 29% opposed)⁸⁷. Support is particularly strong among Latinos (79%), Asian Americans (73%), and African Americans (70%). Similar findings have been observed in New York, where in 2008, 72 percent of state residents supported a tax that's revenue would be used for obesity prevention programs, and in Los Angeles, where 60 percent of adults surveyed supported a soda tax, 74 percent were in favor of restricting SSB advertisements, and between 37 and 44 percent of adults supported restricting SSB sales at fast food restaurants and convenience stores.^{69,88} Support for SSB taxes continues to grow. Since 2009, policymakers in 24 states and 6 cities proposed SSB taxes, and over 25 national and state organizations have endorsed or supported them⁸⁵. And contrary to beverage industry claims that SSB taxes lead to job losses, a study of SSB taxes in Illinois and California found that such taxes do not negatively impact state-level employment, since declines in employment within the beverage industry were more than offset by new employment in non-beverage industries and government sectors⁸⁹.

Even though existing taxes on soda in the United States are too meager to substantially affect overall levels of soda consumption or obesity rates, they do influence consumption patterns among children who are overweight, African American, or who come from low-income families.[ref] This may be because taxes on SSBs are felt more strongly in schools with vending machines⁹⁰. However, evidence suggests that implementing higher taxes would more broadly impact SSB purchases, helping to curb obesity by decreasing SSB consumption. In a randomized controlled trial of SSB price increases, Dutch researchers found when they imposed a 19% tax on SSBs (which are normally taxed at 6% in the Netherlands), participants purchased significantly fewer SSBs from a virtual supermarket than the control group. This SSB tax had no effect on other beverage or snack food categories⁹¹. A meta-analysis of SSB taxes and price increases suggests that increasing taxes reduces the obesity rate⁹², and longitudinal studies also provide evidence that

increases in soda prices are associated with lower daily energy intake among U.S. adults⁹³ and families with preschool children⁹⁴.

Are taxes more effective than other approaches to reducing SSB consumption? A recent microsimulation compared three federal policy approaches to reducing childhood and adolescent obesity: afterschool physical activity programs, a \$0.01/ounce sugar-sweetened beverage (SSB) excise tax, and a ban on child-directed fast food TV advertising. Of these approaches, the SSB excise was predicted reduce obesity the most among adolescents aged 13-18 (2.4 percentage points), whereas afterschool physical activity programs would reduce obesity the most among children 6-12 years (1.8 percentage points)⁹⁵. Thus, it seems that an excise tax—particularly one that funds afterschool nutrition and physical activity programs—may be a powerful tool in the battle against childhood obesity in the U.S.

Berkeley's Measure D: A Case Study in SSB Taxation and Media Campaigns

Measure D: Berkeley's Soda Tax

Berkeley became the first city in the United States to implement an excise tax on SSBs when Measure D was passed in November 2014 and went into effect in January of 2015. Measure D, or the “Berkeley Soda Tax”, charges an excise tax of \$0.01 per ounce on SSBs. This is equivalent to a 20 percent tax on SSBs, which is what Alejandro Calvillo of El Poder del Consumidor – a Mexican advocacy group—originally proposed in Mexico. However, the Berkeley soda tax only affects one city, and Berkeley residents can still buy SSBs in Oakland, San Francisco, and other Bay Area locations without paying an excise tax. Furthermore, soda distributors can absorb this tax, and not pass it on to consumers. Thus, Berkeley's Measure D offers a unique opportunity to investigate a) whether excise taxes are passed onto consumers, b) if citywide excise taxes decrease SSB consumption, and c) how so-called “soda taxes” influence public health.

Is Berkeley's Measure D actually increasing the price of SSBs for consumers? The answer appears to be “yes.” Three months after the implementation of Measure D, researchers at the University of California, Berkeley found that retail prices for SSBs increased more in Berkeley than in neighboring cities, indicating that the excise tax was actually passed onto consumers⁹⁶. For smaller beverages (≤ 33.8 oz), price increases (cents/oz) in Berkeley relative to Oakland and San Francisco were 0.69 for soda, 0.47 for fruit-flavored beverages, and 0.47 overall. For larger beverages (2-liter bottles and multipacks of soda), prices increased by 0.46 cents/oz and 0.49 cents/oz, respectively. There was no relative price increase for nontaxed beverages, suggesting that Measure D is effectively increasing SSB prices⁹⁶.

In addition to increasing SSB prices throughout Berkeley, Measure D also generated substantial revenue for the city's general fund. In the first month alone, the tax raised \$116,000, and it was projected to generate \$1.2 million for the general fund in 2015⁹⁷. The Berkeley City Council formed a panel of experts to make recommendations regarding the use of this revenue, and \$500,000 has already been designated to support health-related community programs, with \$250,000 going towards Berkeley Unified School District's Gardening and Cooking program.

Although prior research suggests that taxation should decrease SSB consumption and childhood obesity, it is too soon to tell whether Berkeley's Measure D has had that effect. Furthermore, given the nationwide decline in SSB consumption even before Berkeley's "Soda Tax" went into effect—it is difficult to ascertain whether the tax is effectively decreasing SSB consumption, or whether decreases in SSB consumption are due to other factors⁹⁸. However, the tax and surrounding media campaigns, including the high-profile "Berkeley vs. Big Soda" campaign as well as the "Open Truth" and other countermarketing campaigns may still have impacted consumers.

Countermarketing Campaigns

Countermarketing campaigns have been a central component of public health media campaigns against the soda and tobacco industries. Such campaigns can be extremely effective; the Centers for Disease Control and Prevention (CDC) recommends countermarketing as one of its "best practices" for tobacco control. Effective countermarketing strategies include alerting youth to the business practices of the tobacco industry, featuring "edgy" youth spokespersons, and ensuring good visibility among the target audience. One example of a particularly effective countermarketing campaign is the truth® campaign, a national smoking prevention campaign designed to reach at-risk youth aged 12-17⁹⁹. The truth® campaign has been rigorously evaluated and found to be associated with reduced youth smoking rates. Campaigns in California, Florida, and Massachusetts were particularly effective in preventing and decreasing youth smoking rates.

Public health departments and private organizations throughout the United States are now using countermarketing campaigns to discourage youth and adults from consuming SSBs. Current campaigns include the "Kick the Can" campaign, "Open Truth," New York City Health Department's "Are You Pouring on the Pounds?" and the "Sugar Bites" campaigns. Unlike the truth® campaign, these anti-SSB countermarketing campaigns still lack evidence to support their efficacy. Yet they come on the heels of vigorous debates about taxing SSBs.

In many locations throughout the U.S.—including the San Francisco Bay Area, Connecticut, Maryland, Indiana and Massachusetts—these campaigns have been accompanied by debates regarding SSB taxation and regulation in public schools and hospitals. According to the Berkeley Media Studies Group (BMSG), in states that considered legislation on school nutrition in 2006, the most prominent frame in news and opinion coverage was that

obesity threatens health. However, only two out of the four states studied actually implemented lasting policies that limited junk food availability in schools. The BMSG also examined news coverage of three efforts in California to enact a tax or fee on soda or junk food: California's short-lived snack tax, its unsuccessful soft-drink excise tax, and San Francisco Mayor Gavin Newsom's 2007 suggestion that retailers who sell soda should pay for his "Shape Up San Francisco" program. The BMSG found that, in every case, opposition frames appeared four times as often as supporting frames. Furthermore, in their interviews with advocates, the BMSG learned that "plan[ning] for a referendum" and "act[ing] as a watchdog" are key strategies used by advocates to anticipate backlash ensure that funds are directed to the program for which they were originally intended.

Findings from the BMSG's studies of nutrition legislation in California and elsewhere suggest that even when legislation to reduce SSB and junk food consumption is passed, opposition messages far surpass supporting frames, and referendums are common. Given these conclusions, it is plausible that even though Measure D passed in Berkeley, the general public may have heard more messages opposing it than supporting it. At the same time, public health countermarketing campaigns relating SSB consumption to adverse health outcomes have also been increasing. So if SSB consumption does significantly change in Berkeley, how much is attributed to Measure D and how much can be attributed to media campaigns and public discourse? What aspects of legislation and media campaigns influence community members – and particularly nutritional gatekeepers—most?¹⁰⁰

We know that children's purchases of unhealthy snack food items were positively related to family socioeconomic status, and negatively related to child age. These results are only part of a wealth of evidence indicating that parental food choice and purchasing behaviors may play a role in the development of children's purchasing of both healthy and unhealthy foods¹⁰¹. Given the role that parents play as "nutritional gatekeepers" of their family, and with the Berkeley soda tax being the first SSB excise tax in the nation to affect families, this study aims to understand how Berkeley parents' knowledge, opinions and behaviors around SSB consumption are shaped by the Berkeley Soda Tax and surrounding countermarketing campaigns.

Study Approach

This study seeks to understand:

1. How do Berkeley parents of children under 12 decide what beverages to purchase for their children?
2. What health effects do parents associate with SSBs, and why? How does oral health, if at all, factor into parents' understanding of the effects of SSBs?
3. What have been parents' experiences and attitudes concerning Measure D – how has Measure D affected their lives?

Epistemology and Theoretical Approach

This research will invoke the economic theories used by Ng to predict changes in consumption of SSBs following the Mexican soda tax. However, economic theories are not enough to predict parents' perception of health outcomes associated with SSBs. Studies have shown that parental concern regarding children's weight is associated with greater restrictive and monitoring feeding practices, behaviors which may have negative consequences for children¹⁰².

It is clear that obesity is a major concern for parents, but what about other health outcomes associated with SSBs? And where, if at all, does oral health fit into the picture? Getting a more complete understanding of how parents' conceptualize health outcomes associated with SSBs will allow us to design more effective policies and media strategies to reduce SSB consumption.

Studies have also suggested that Latino parents may have misconceptions about safety and nutrition that would lead to increased SSB consumption. Latinos already disproportionately suffer from diabetes, obesity, and tooth decay, so understanding these misconceptions is critical to curbing SSB consumption among the large Latino population of California and the greater U.S.¹⁰³.

Methodology

As mentioned earlier, the Berkeley Soda Tax is the first of its' kind. Given that no other city in the country has an excise tax on SSBs, it is important to explore the effects of the tax – not only on SSB prices, but also on the attitudes and behaviors of consumers in the community. With parents being major determinants of children's SSB consumption—especially for young children—it is imperative that we understand how parents select what beverages to serve their family, how health outcomes associated with SSBs influence that decision, and how Berkeley's Measure D the surrounding media campaign influenced their knowledge, attitudes, and behaviors regarding SSB consumption^{104, 64, 105}

Focus groups have been used in market¹⁰⁶ and communication¹⁰⁷ research, program evaluation, and policy analysis, and help increase qualitative insights into specific topics, attitudes, and behaviors—particularly in fields about which people are not yet well informed and for which policy formation is in an early stage and could benefit from citizen participation¹⁰⁸. Given our research goals, we felt that focus groups would be an appropriate preliminary research method. Focus groups have been used in a variety of exploratory studies, including a study of parents' and preschool teachers' opinions of physical activity and beverage consumption in preschool children¹⁰⁹, and a study exploring middle school students' opinions regarding nutrition and physical activity¹¹⁰. Focus groups can also be used to facilitate conversations about perceptions of environmental factors that influence behavior. For example, focus groups with parent-child dyads were used to explore social-environmental influences on children's diets across various continents¹¹¹.

Focus groups with parents and teachers were used to understand factors that influenced physical activity and beverage consumption among preschoolers in six European countries¹⁰⁹. Such focus group studies provide us with valuable insights into complex and often new phenomena. Furthermore, focus groups have historically been used to give voice to marginalized populations¹¹². Considering the dearth of qualitative information on how excise taxes influence parents' behaviors regarding SSB consumption, and given that focus groups have been used to analyze media and engage vulnerable populations, focus groups are particularly well-suited to answering our research questions.

While the facilitated group discussions in focus groups allow researchers to understand candid opinions and rationales, focus groups also have their limitations. Focus groups rely heavily on the skill of the moderator, who should be well trained, ideally from the target population, and unaffiliated with researchers to ensure impartiality. Furthermore, group dynamics can significantly alter data, since outspoken individuals can dominate a discussion, and all participants are self-selected. As a result, many studies choose to combine focus groups with other methods—most frequently, individual interviews or surveys¹¹². Individual interview studies can be used to expand the study population included in research and verify or further examine the conclusions derived from analyses of prior focus groups. Surveys, which provide quantitative data, can complement focus group data, and vice versa. Surveys can be used as a source of follow-up data to examine the prevalence of issues or themes from focus groups. Focus groups can also help inform survey design, and can be used to explain the results of surveys in more detail. Both methods have been used to learn more about parental attitudes and perceptions around nutrition and SSB consumption⁵⁰.

In summary, the strength of focus groups is in providing insights into the sources of complex behaviors and motivations in a group setting, where participants can both question each other and explain themselves to one another. This offers valuable data on the extent of consensus and diversity among participants. Meanwhile, individual interviews are an effective technique for idea generation and understanding individual experiences, and may help us “unpack” themes or sensitive issues that emerged during group discussions in the focus groups. Lastly, surveys help determine the prevalence of any given attitude or experience among a larger population, and can help triangulate data from other methods¹¹². Given the complementary nature of these three study methods, we plan to elaborate on the findings of our focus groups by conducting surveys and interviews following the analysis of our focus groups.

Conclusion

SSBs are the leading source of added sugar in the American diet, and are correlated with a plethora of adverse health outcomes including obesity, cardiovascular disease, diabetes, and tooth decay. Although the public is largely aware of the adverse health outcomes of such beverages, a combination of factors including taste preferences, lack of nutritional

information, beverage availability, aggressive marketing and low price make it difficult for many Americans to completely cut out SSBs. As parents are often the “nutritional gatekeepers” of the family, and significantly influence what children consume, understanding how parents decide whether or not to buy SSBs and serve them to their children has important ramifications for children’s health.

With obesity and diabetes rates continuing to rise, a variety of public health strategies have been proposed to curb SSB consumption, including taxation, countermarketing campaigns, and policies that restrict beverage portion sizes or SSB availability in settings such as schools and hospitals. In 2014, Mexico enacted a nationwide tax on SSBs and highly caloric snacks, increasing the price of SSBs by about ten percent. This led to a subsequent decrease in SSB intake by up to 12 percent in the following year. A similar excise tax was recently passed in Berkeley, making Berkeley the first city in the U.S. to implement an excise tax on SSBs. Measure D – which went into effect on January 1st, 2015, taxes SSBs at a rate of a one-cent per ounce; a price increase that is largely passed onto consumers. Now, more than one year after Measure D was implemented, we are interested in seeing how this policy and the surrounding media campaign is affecting Berkeley parents’ knowledge, attitudes and behaviors regarding SSBs. Understanding how policy and media influence behavior, and further examining how parents’ decide what beverages to serve their children, will inform future public health efforts to limit SSB consumption and reduce excess sugar intake. Furthermore, we hope the results of this study will inform future SSB taxation policies and where taxation revenue should be allocated. Ultimately, this study is a timely investigation into the complex interplay between policy, advertising, health, and personal decisions regarding SSB consumption.

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PART II: ORIGINAL RESEARCH

Background

Sugar-sweetened beverages (SSBs) are the leading source of added sugars in the American diet, and frequent consumption of these beverages is associated with illnesses such as diabetes, obesity, cardiovascular disease, and tooth decay¹⁻³. In an effort to curb sugar intake, Berkeley, CA, passed Measure D, becoming the first city in the U.S. to implement an excise tax on SSBs in 2015. The use of excise taxes to curb consumption of harmful products is not a new concept. Over 100 studies, including a growing number from low- and middle-income countries, demonstrate that tobacco excise taxes not only effectively reduce tobacco use, but also provide a reliable source of government revenue⁴⁻⁵. Tobacco taxes also enjoy broad public support, which has spurred tobacco companies to adopt voter segmentation strategies in order to defeat ballot measures. These industry strategies include using arguments that suggest taxes do not dedicate enough revenue to tobacco control programs, or implying that such taxes benefit hospitals and health maintenance organizations⁶.

Public support for SSB taxes is mixed but growing. When asked about taxing SSBs in a 2012 Field Poll, 53 percent of Californians were opposed and only 40 percent were in favor. However, when voters were told that tax revenue would benefit school health programs, support for a tax on SSBs jumped to 63 percent, with only 29 percent opposed (margin of error +/- three percentage points). These results were reflected in the 2012 election in Richmond, CA, where a SSB tax measure (Measure N), which would implement a one-cent-per-ounce “business license fee” on SSBs with revenue going towards a general fund—was defeated 67 percent to 33 percent⁷. However, this vote followed an aggressive “No on N” campaign paid for by the American Beverage Association, which highlighted the fact that revenue would go to a general fund and suggested that the tax would disproportionately affect working class families. One such message, featured in movie theaters, said, “Measure

N, the Richmond beverage tax, is unfair. It hits people who can least afford it the hardest, and there's no guarantee the money will be spent as promised. Millions of new taxes, and not one dime guaranteed for our kids."⁸

Despite the beverage industry spending over \$2.4 million dollars fighting Berkeley's Measure D, the measure was approved by over 75 percent of voters in November, 2014⁹. In the year following Measure D's implementation, consumption of SSBs decreased by 21 percent among low-income Berkeley residents. In contrast, consumption of SSBs increased by 4 percent in Oakland and San Francisco—two cities that did not pass a soda tax—during the same year¹⁰. Furthermore, only 2 percent of respondents surveyed reported that the recent tax led them to shop for SSBs in neighboring cities.

In addition to markedly reducing SSB consumption, Measure D has also generated substantial revenue for the City of Berkeley, raising approximately \$1.2 million within the first year. Although the revenue from Measure D goes to the City's General Fund, the Berkeley City council voted unanimously to dedicate \$1.5 million from the general fund in 2016 to pay for school nutrition programs and support programs that reduce the consumption of sugary drinks¹¹.

A similar tax was implemented nationally in Mexico in 2014, leading to a 6-12% decrease in SSB purchases within 12 months, with an even greater decrease (up to 17%) in low-income communities¹². Following the success of Measure D and other SSB excise taxes, in 2016, the voters of Oakland, Albany, and San Francisco approved ballot measures that created one-cent-per-ounce excise taxes on beverages with more than 25 calories per 12 ounces¹³. Yet while quantitative studies of SSB taxes show promising results, there is a very limited qualitative understanding of the mechanisms by which beverage taxes influence individual behavior.

"Nutritional gatekeepers" - adults who make the majority of the nutritional decisions for their family - play a critical role in determining children's SSB consumption. These individuals purchase and prepare food for their family members, model behaviors for their children, and influence their children's diet outside the home by providing them with money for food purchases or with snacks prepared at home. It is estimated that an average of 72 percent of what children eat is directly or indirectly determined by these nutritional gatekeepers¹⁴. In order to understand how Measure D may affect children's health, we must understand how nutritional gatekeepers decide what beverages to serve their children, and how Measure D influences those decisions. Exploring parents' knowledge, attitudes, and behaviors regarding SSBs in light of Measure D will allow us to design better public policies and health campaigns to reduce SSB consumption. With these goals in mind, we chose to focus on the following research questions:

4. What are parents' knowledge, attitudes, and behaviors regarding serving their children SSBs?

5. What have been parents' experiences and attitudes concerning Measure D – how has Measure D affected their lives?
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Methods

Study Design

Focus groups have been used in market and communication research, program evaluation, and policy analysis, and help increase qualitative insights into topics, attitudes, and behaviors in relatively unstudied fields¹⁵. Given the exploratory nature of the project, we chose to use focus groups and interviews to gain a better understanding of the central themes and ideas around SSBs and beverage taxes. The University of California, Berkeley's Institutional Review Board, Berkeley Unified School District, YMCA Head Start, and the University of California Village Housing board approved the study. All names used described respondents are pseudonyms.

Study Population

The city of Berkeley, California, is located in the San Francisco Bay Area and is home to approximately 112,000 people. While the majority of Berkeley residents identify as White, over one quarter of the city's population speaks a primary language other than English, and areas such as South and West Berkeley are home to a large number of Latino and African American families. Although Berkeley is a relatively healthy community where 85% of adult residents have attended at least some college, the city faces some glaring health inequities related to race/ethnicity, income, housing status and education. For example, 20% of Berkeley Latino children live in poverty—four times the rate among white children. Furthermore, 29% of Berkeley Unified School District students are overweight or obese, and this percentage is higher among African American and Latino children¹⁶.

The authors began recruiting participants for focus groups in 2015: the first year that Measure D was in effect in Berkeley. Convenience sampling was used to recruit parents of children aged 0-12 who lived, studied, or worked in Berkeley. Given that young adults, nonwhites, and low-income individuals in the U.S. drink more regular soda than other Americans¹⁷, we partnered with YMCA Head Start—a federal program that promotes school readiness for low-income children from ages 0 to 5—the Berkeley Unified School District (BUSD), and student-parent housing (“UC Village”) to recruit a diverse sample of parents for focus groups and interviews. Focus group participants were recruited from the YMCA Head Start program and BUSD and were largely low-income (<\$24,000 for a family of four), college-educated women from diverse racial and ethnic backgrounds (37% Latino, 25% white, 25% black and 13% South Asian). Interview participants were recruited from

YMCA Head Start and the UC Village. The majority of interview participants were low-income Latinas.

Procedure

Focus Groups

Researchers developed focus group guides that explored parents’ knowledge, attitudes, and behaviors regarding SSB consumption following Measure D, as well as their opinions of the tax.

Four focus groups were conducted (three in English and one in Spanish) with 4-7 participants (mean number of members = 6) recruited from YMCA Head Start and BUSD. Focus groups were approximately 1.5 hours in length. Parents recruited at BUSD attended focus groups (n = 2) at a local BUSD elementary school, and parents recruited at Head Start attended focus groups (n = 2) at the YMCA Head Start central office.

All members of the research team completed a focus group training to ensure consistency among the different focus group moderators and interviewers. Focus groups were led by a trained moderator and assisted by a co-moderator. Moderator and co-moderator debriefed for 20-30 minutes following each focus group session to discuss their reactions, suggestions for future groups, questions and topics that came up, and overall impressions. Notes from these debrief sessions, along with preliminary analysis of the focus group transcripts, served as the basis for the semi-structured interview guide that followed.

Interviews

Based on preliminary analysis of the focus groups, a semi-structured interview guide was developed to examine main themes and concepts in greater depth. A total of twenty interviews lasting 20-40 minutes each were conducted. Interviews were audio-recorded following the consent of all participants.

Table 1: Overview of focus group and interview participants by age, race, gender, education and socioeconomic status

| | Focus Groups | Interviews |
|-------------------------------|---|--|
| Number of participants | 24 | 20 |
| Age | <u>18-24</u> : 4 <u>25-34</u> : 4 <u>35-44</u> : 11 <u>45-64</u> : 4 | <u>18-24</u> : 5 <u>25-34</u> : 7 <u>35-44</u> : 5 <u>45-64</u> : 3 |
| Gender | Male: 4 Female: 20 | Male: 4 Female: 16 |

| | | |
|-----------------------------|---|---|
| Race | Latino: 9 Black: 6 White: 6 South Asian: 3 | Latino: 12 Black: 2 White: 2 South Asian: 2 East Asian: 2 |
| Socioeconomic Status | \$0-24,000: 11 \$25-49,000: 3 \$50-74,000: 2 \$75-99,000: 2 \$100,000+: 2 | \$0-24,000: 20 |
| Education | High School: 3 Some College: 9 College Graduate: 12 | Some college: 20 |

Data Analysis

Focus group and interview transcripts were analyzed using a grounded theory methodology and content analysis approach¹⁸⁻¹⁹. Two researchers coded data separately using an inductive approach to identify emerging themes. Researchers then met to compare codes and memos, revising codes until a preliminary codebook of 91 codes was mutually decided on. These codes were then re-applied to all focus group transcripts and used as the basis for deductive analysis of interviews. Following the first-pass coding of interviews, researchers met once more to further refine the original codebook to a total of 63 codes. Both focus groups and interviews were re-coded using this final codebook and findings were summarized into a report that included quotes and excerpts from the transcripts. This report was reviewed and validated by the research team as well as community partners at YMCA Head Start and the Berkeley Unified School District.

Results

Parents' knowledge, attitudes, and practices around serving their children SSBs

The vast majority of focus group and interview participants understood that excess sugar is harmful, but recognized that children often preferred SSBs to healthier beverages.

"If you give kids the option – kids have an insatiable appetite for sugar! They'd drink soda and eat candy all day!" (Joelle, UC Village)

"I give them a choice, it will be soda. That's their favorite drink." (Naima, John Muir Elementary School)

While most parents we spoke to did not regularly consume SSBs, they recognized how delicious, addictive, affordable, and accessible SSBs were. In fact, at least half of participants regularly consumed soda at some point in their lives. Cultural and social norms played a large role in whether or not participants were accustomed to drinking soda.

“My wife and I have very different sugar opinions, she's German and sugar is part of her daily diet. I'm raised here in Berkeley, and sugar isn't what is part of our daily diet.” (Paul, John Muir Elementary School)

“It's soda. It tastes good. Who doesn't like soda?” (Gabriela, UC Village)

“That's the real problem with sugar - is so addictive. You don't think of it in the sense of other drugs that are out there, but it is.” (Christopher, John Muir Elementary)

Interestingly, most parents we spoke to had drastically reduced their SSB consumption prior to Measure D, and/or severely restricted their children's access to SSBs at home. Personal experiences with adverse health outcomes and recognizing an “addiction” to soda were major motivators for this behavior change.

“I used to be addicted to soda. When I was younger, I'd drink like 4 or 5 cans a day...That's why I watch it with [son] - because I know how that can be. Because when you start that, it's hard to stop.” (Maribel, UC Village)

Experiences with diabetes, obesity, and tooth decay were particularly powerful motivators to limit consumption of SSBs.

“I'm diabetic, which is one of the reasons why I have curbed a lot of what we have at home.” (Leslie, UC Village)

“My family consumed a lot of soda when I was young, and we didn't have proper medical or dental care. I had dental problems where my baby teeth rotted through to the adult teeth, so that when my adult teeth came in, they were already in decay. So when I had my own children, I really limit how much sugar they have so that they don't have to experience that. And now they don't have any cavities, which is pretty awesome.” (Candace, UC Village)

“I have a kidney transplant and I think my soda consumption had something to do with it...sometimes I drank 3 sodas per day. So....for me, after my transplant, just water. And for my whole family: water. After my transplant, more nutritious foods and only water. I had to live through that to realize the damages associated with sugar.” (Xochitl, Head Start, Translated from Spanish)

Once parents learned of the health outcomes associated with sugar consumption—either through their own experiences or through formal and informal education—they were

motivated to decrease their sugar consumption. Nutrition education played a crucial role in giving parents the tools to do so. After learning to read nutrition labels and identify sugar-laden beverages, parents often began cutting these beverages out of their diets. Because the majority of study participants were “nutritional gatekeepers” who purchased groceries for their children and families, once they consumed fewer SSBs, so did their children.

“You want to take care of yourself and live long; you want your kids to, as well! So the information I received in my education helped me transition away from bad things and towards more healthier options.” (Jennifer, interview)

“I grew up in a house where we’d drink soda all of the time! My parents loved soda...And they didn’t see anything wrong with it. Now, I’ve had to educate myself about nutrition, to keep my child healthy...we used to stay in a homeless shelter...and they gave us workshops. And so that was beneficial. And I think even in school, I’ve seen people give presentations on it, so just really raised my awareness.” (Sara, UC Village)

Some parents reported learning about the detrimental effects of SSBs from their children.

“My daughter loves water. Recently she’s been saying ‘Mommy, you know soda is bad for you. You need to drink water’...So she’s getting me to drink more water.” (Catalina, Head Start)

“When I took my kids to the clinic, I saw some flyers that said how many tablespoons of sugar are in a drink... and then my kids did a science project [where] they soaked teeth in soda for several days. The teeth changed color and it changed the strength of the teeth, so now we know how terrible those sugary beverages [are].” (Hong, UC Village)

In order to protect their children from the adverse health outcomes associated with excess sugar consumption, parents felt the need to restrict access to SSBs or water down beverages at home.

“[My daughter] doesn’t drink soda at all. I don’t let her. As far as juice or sugary items, I water it down.” (Maisha, UC Village)

“I buy soda. But I kinda stick it way back in the cabinet so that no one can see it. And I pull it out when we have something like tacos that soda would go good with.” (Charlene, Head Start)

However, these restrictions tended to break down at parties or restaurants, where SSBs—particularly sodas—were more accessible.

“When we go to a restaurant, for example, she likes this restaurant Wing Stop, and she usually gets soda there.” (Alondra, UC Village)

“When you're invited to a friend's BBQ, and the cooler is out there with tons of soda and any time you turn around they're having more. Without your permission.” (Naima, John Muir Elementary School)

In social settings, “enablers”—adults who were not a child’s primary caregiver but played a caretaker role—would defy nutritional gatekeepers’ wishes and serve children soda. These “enablers” often used SSBs as a treat, or a way to gain the affection of children they care for.

“I don't really keep soda in the house. He goes to his dad's house, and his dad gives him a lot of soda; he doesn't regulate it at all. And then my mom's house – he'll go there and she will give him soda as a treat,” (Sara, UC Village)

“If she's around her relatives, they'll probably give her soda. But she would ask them for a soda.” (Briana, UC Village)

“Sometimes when I'm not with them, they'll talk someone into taking them to McDonald's and probably have soda. But it doesn't really happen on my watch.” (Brandon, UC village)

Being a “nutritional gatekeeper” and limiting their children’s access to delicious, highly addicting, and widely available SSBs in the face of enablers and at social gatherings caused parents a significant amount of stress. Parents acknowledged that children tended to drink whatever the adults around them were drinking, and constantly felt pressure to monitor not only their children’s beverage intake, but also the beverage selection of the entire family.

“You can never escape this battle....if you give children sweets, it's ‘why do you feed them sweets?!’ But if you don't, it's, ‘Why do you limit them?’” (Yolanda, Head Start, Translated from Spanish)

“It's really not done on purpose...My youngest daughter—she's 7 now – but her grandmother, she wanted to take the upper hand because older people tend to just take charge. And she goes, “get that baby some sugar water! Give me that bottle!” And she went and she mixed up this sugar-water thing and I was just really irritated. But I kinda of felt pushed back because she's my elder, and she's the grandmother, and she wants this. So I felt myself taking a step back, but it's like: “That's my baby!...When they do that old school sugar thing, with the sugar and the water, they think it's the best for the baby. They're not trying to hurt the baby, they really believe that that little combination right there is what the baby needs, and I'm thinking: ‘No!’” (Charlene, Head Start)

Organizational policies restricting SSBs relieved parents of some of the responsibility of controlling their children’s SSB intake. Instead of debating whether to purchase SSBs for their children, parents were able to defer to policies that encouraged consuming only healthy beverages.

“At school, they limit everything.” (Marilyn, Head Start, Translated from Spanish)

“Because of school, I have to supply for him milk and water... And then also at kids’ tournaments now, they ask for a hundred percent juice or water. So they stopped actually asking for a soda and Gatorade.” (Gabriela, Head Start)

“Soda isn’t allowed at schools – and additionally, during snack time, some teachers will only allow their students to have fruits or veggies; they won’t even allow a granola bar! So I think it’s taught kids to make healthier decisions; that’s what they’re forced to do!” (Jennifer, UC Village)

Parents’ Responses to Measure D

Would policies such as Measure D help relieve the stress faced by nutritional gatekeepers, by making SSBs more inaccessible or raising awareness of the health consequences associated with them? Although the majority of participants who voted in Berkeley reported supporting Measure D, reactions to the tax and its implementation were mixed. Parents expressed doubt and skepticism about whether the tax would work, and many felt uncertain or resentful about the populations perceived to be targeted by the tax.

“I don’t think raising the taxes will get people to stop buying it.” (Loretta, Head Start)

“People want soda; people are going to get soda; people are going to pay for soda. What we have to do is educate people on why they should not drink soda!” (Jennifer, UC Village)

Interestingly, the perceived ineffectiveness of the tax contrasted with self-reported changes in behavior following the implementation of Measure D. Regardless of how they felt about the tax, many parents—particularly low-income parents at Head Start—reported reducing SSB purchases in response to higher prices.

“[Soda] is expensive, it’s pricier, I don’t like it. Even though I was for Measure D, because it’s going to a good cause, you know, the schools. But it actually brought me down to drink more water and give up other things. It hits you hard though.” (Gabriela, Head Start)

“The day after [the tax] I grabbed a soda like I always did every other day. For about one week I was like that, but afterwards, no more. Now it’s better that I don’t grab the soda. I’ll grab water, or I’ll grab juice or something like that, but now that it’s \$1.75 per day, well I said, “Better save that money. For laundry.” (Mariela, Head Start, Translated from Spanish)

“And it’s not just sodas – it’s sugary drinks, right? It’s the Starbucks drinks they sell, all those Gatorades, all that, right? Makes you get a cheap bottle of water.” (Karina, Head Start)

Underlying all conversations about the tax was a feeling of confusion: nearly all the parents we spoke to did not understand how Measure D worked, and many did not know how funds were being spent. This led to feelings of mistrust and anger among some parents.

"If they're taxing the corporations, I think that's a good thing... I think that they should be taxed because they are being harmful to us and to our community. If they are taxing the consumer, I think it might deter consumers from wanting to purchase sugary drinks, but at the same time, who are the people that are buying these drinks? And does it make sense to tax people if there are trends of poverty among consumers?" (Amy, UC Village)

"I did vote 'yes' on Measure D, without much thought about who pays the tax and where the money's going to go." (Aparna, John Muir Elementary)

Most parents had a vague notion that Measure D revenue was being used at least in part for school programs. This was one of the main reasons that parents supported the tax. Participants expressed a desire for more transparency around the use of tax revenue, and hoped that funds would be dedicated towards school and nutrition programs, particularly in low-income communities.

"I think [money should be spent on] school programs, definitely. But I would target school programs in lower-income communities, especially since this tax is a bigger burden on the lower-income community... I believe that if you give all the funding equally across all schools, some schools don't need it, and they don't have as big of a problem. They're children aren't as addicted to sugar. It would make no sense to put a program in [a wealthy neighborhood], because they don't need it, and their parents are educated." (Jarrod, UC Village)

"Half of the community never looks at the nutrition labels...If I ask my mom like: "hey mom, how much sugar do you think is in this?" she'd be clueless. So definitely bringing knowledge of what...the nutrition label means...I just want them to visualize what they are consuming, that way they understand what the nutrition label is saying." (Ximena, UC Village)

"Programs to fight childhood obesity, like go to schools and educate the kids; talk to them about dental health or dental hygiene, but a way of eating healthy; that's the best way for them to spend [revenue] – with the kids. Because kids are the ones who are going to be fighting this battle next." (Sara, UC Village)

When asked about interventions that might make it easier to avoid SSBs, and limit children's access to them, parents had a variety of suggestions including increasing SSB taxes, adding warning labels to sugary beverages, making healthy beverages more affordable, and increasing education for both parents and children.

"Outreach would probably be in my first thought, and then somehow providing more affordable options for families." (Paola, UC Village)

“I would tax the manufacturers, like, ridiculously. Also, make it like a specialty aisle thing - like the way alcohol is. It's a drug. (Manuel, UC Village)

“I would agree that if your goal is to reduce people drinking soda, then using [tax] money for, you know, an advertising campaign so that to combat the...you know, the advertising from the soda companies. It's nice that you have a fund that you can kind of neutralize that.” (Sameer, John Muir Elementary School)

Discussion

Recent quantitative studies show that Berkeley’s Measure D led to increased retail prices of SSBs and decreased SSB consumption—particularly in Berkeley’s low-income communities—within one year of it taking effect. Interviews and focus groups with parents who live, work, or attend school in Berkeley helped elucidate possible mechanisms for this decreased consumption, allowing us to better understand ways of supporting parents in their goals restricting their children’s sugar intake.

Figure 1: Drivers of increased and decreased SSB consumption

| Increase SSB Consumption | Decrease SSB Consumption |
|---------------------------------|---|
| Taste | Personal experiences with adverse health outcomes |
| Addictive properties of SSBs | Perceived responsibility and power to control their children’s beverage intake* |
| Social and cultural norms* | Nutrition Education* |
| Advertising | Restrictive Policies |
| Price* | |
| Availability* | Measure D |
| Enablers | |

*Factors that are influenced directly or indirectly by Measure D. Measure D increases the price of SSBs, thus decreasing their availability. Tax revenue is channeled into nutrition education programs that may help increase parents’ perceived responsibility and power to control their children’s beverage intake, and may ultimately change social and cultural norms that normalize SSB consumption.

A major struggle for parents who acted as “nutritional gatekeepers” in their families was limiting the availability of SSBs. Parents reported that when SSBs were available—in parties, at restaurants, and during special events at home—it was difficult to restrict children’s consumption of them. Even when parents did succeed in limiting their children’s SSB intake, their children would seek out enablers who would circumvent parental restrictions and serve them SSBs as a treat. Confronting enablers and the social norm of having soda at parties and restaurants was a source of stress for parents, who knew that SSBs caused illnesses such as tooth decay, diabetes, and obesity but were reluctant to break

cultural and social norms in order to limit them. Environments that discouraged SSB consumption, such as communities with more access to healthy foods and nutrition education and schools with policies that restrict SSBs, supported parents in their goals of restricting children's SSB intake.

Although the affordability, accessibility, and social acceptability of SSBs promote SSB consumption, nutritional education and personal experiences with adverse health outcomes played crucial roles in drastically reducing SSB intake for participants and therefore, their children. Most parents cited nutrition education—whether from their children's schools, community organizations such as WIC, or college classes—as a key impetus for making dietary changes. This was especially important for parents who grew up in low-income communities, where soda was heavily advertised and widely available, or in families where drinking SSBs was common. Access to nutrition education separated these participants from their communities of origin, prompting parents to make drastic changes to their diets but also leading to the additional stress of deviating from cultural and family norms.

Revenue from Measure D was originally collected for the City of Berkeley's General Fund. The Measure created a panel of nine experts to “make recommendations on how and to what extent the City should establish and/or fund programs to reduce the consumption of sugar-sweetened beverages in Berkeley and to address the effects of such consumption.”²⁰ However, it wasn't until one year after the implementation of the tax that the Berkeley City Council voted to allocated \$1.5 million from the general fund for school nutrition programs and grants that focus on decreasing SSB consumption among vulnerable populations in Berkeley¹¹. Unfortunately, nearly all parents we spoke to did not understand how Measure D worked, from who paid the tax, to how money was collected and spent. Although parents reported reducing SSB purchases in response to the tax, they were skeptical that it would have much of an effect overall. Furthermore, they were mistrustful of the government and uncomfortable with the fact that the tax disproportionately affected low-income populations. Even so, the majority of parents supported the tax, largely because of their pre-existing knowledge of the health consequences of SSB consumption, and their desire to increase funds for children's nutrition and education.

Findings from focus groups and interviews suggest that parents are well aware of the detrimental effects of SSBs, but often feel powerless to avoid them completely. Participants cited the addictiveness of SSBs as a major factor promoting consumption, and compared SSBs to drugs like tobacco. Excise taxes have been effective in discouraging tobacco consumption in the United States and across the world, and are an integral part of tobacco control programs to this day. As tobacco control has become increasingly accepted by the public and translated into legislation, tobacco companies have had to implement more aggressive voter segmentation tactics and channel more funds into fighting proposed tobacco control programs. Examination of recent SSB taxation campaigns in Richmond, Berkeley, Oakland, Albany and San Francisco suggest that the beverage industry is adopting similar tactics as public support for SSB taxes increases. Furthermore, just as tobacco

control programs have changed the narrative around smoking in the U.S., our conversations with parents suggest that Measure D may be changing the narrative regarding SSB consumption in Berkeley, by both altering the availability and accessibility of SSBs and increasing funding for nutrition and health programs that may significantly change the beverage selection of nutritional gatekeepers and their entire families.

Excise taxes support parents in their attempts to limit their children’s consumption of sugary drinks by making these drinks more inaccessible and increasing nutrition education. In fact, funds for nutrition education may be just as effective—if not more effective—than the tax itself at reducing SSB consumption, considering the fact that nutrition education had already spurred parents to decrease SSB consumption years before Measure D was in place.

Table 2: An ecological approach to supporting parents in decreasing children’s SSB consumption

| | |
|-----------------------|---|
| Policy | Explicitly designate SSB tax revenue to children’s health, education, and nutrition programs |
| Community | Nutrition and health education for adults and children |
| Organizational | Restrict SSBs in public settings (e.g schools, hospitals) |
| Interpersonal | Ensure dentists, teachers, and doctors talk to parents about restricting SSBs Use social media for health messaging |
| Individual | Continue qualitative research (e.g. with low-income parents who have less nutrition education, and in cities without a SSB taxes) |

Strengths and Limitations

The qualitative nature of this study provides rich exploratory data that allows for the development of proposed mechanisms that explore the intersection of policy, education, and personal experience. However, this study was conducted with a small and very specific sample population in Berkeley. Measures of SSB consumption were self-reported, which likely underestimates the true SSB consumption among parents. Furthermore, a social desirability bias may have skewed participants’ responses in both focus groups and interviews.

Conclusion

In general, parents support SSB taxes and policies that restrict SSBs in schools and other social settings, as these policies relieve parents of the stress of limiting their children’s access to beverages that are commonly perceived as treats. Our findings suggest that

explicitly dedicating revenue from Measure D to children's school, health, and nutrition programs would both increase voter support for the tax while helping to decrease SSB consumption among the next generation. Effective public health messaging that explicitly draws attention to the health consequences of excess sugar and the sugar content of SSBs may also prepare the public to support future SSB taxes.

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