Taxing Soda

strategies for dealing with the obesity and diabetes epidemic

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ABSTRACT Over the past several decades, the United States has been experiencing a twin epidemic of obesity and type 2 diabetes. Recently, advocacy efforts to tax sugary drinks, place warning labels on soda, improve nutritional labeling, and reduce sugar overconsumption have swept across the nation to address public health concerns from sugary drinks that strain our nation's health-care resources. In this article, the historical and scientific framework of this public health policy and valuable lessons learned from implementation efforts thus far will be examined to shape the next steps forward for the movement. Additional goals of this article are to share a surgeon's perspective about trends in bariatric surgery and the link between obesity and type 2 diabetes as a result of peripheral insulin resistance.

Obesity is one of the most common health problems facing children and society today. Since 1960, the obesity rate among adults has risen to 34% in the United States, and morbid obesity is up six-fold (Glickman et al. 2012). In

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Decades from now, the benefits from the passage of Prop V will likely have an enduring impact in San Francisco, across the nation, and around the globe. The world may likely not recall the names of those individuals who decades earlier battled the soda industry over this life-saving measure in 2016, but the intent of this article is to chronicle those individuals who played an important role in this victory. The author would like to dedicate this article in deep appreciation and gratitude to Mayor Michael Bloomberg, for making the difference and being the margin of victory in Berkeley, Philadelphia, San Francisco, and Oakland in particular.

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1980, only 14% of adult Americans were obese, but this figure had skyrocketed to 31% by 2000 (nearly 85 million Americans). Two out of three Americans today are overweight or obese, and one in 20 suffers from extreme obesity. In 2012, Reuters reported that obesity in America added $190 billion to annual national health-care costs, passing smoking for the first time (Begley 2012).

Following closely on the heels of this epidemic is an explosion in the number of cases of diabetes, particularly among children, which has been steadily increasing since a spike in 2003. According to the Centers for Disease Control, the rate of diabetes soared from 5.8 million in 1980, to 17.9 million in 2009, and reached 29.1 million in 2014 (1 of 11 people in the United States) (Reusch and Manson 2017). This represents 9.3% of the population (21 million diabetics are diagnosed, while another 8.1 million are undiagnosed). Diabetes added another $245 billion to national costs in 2012, including both medical costs and lost wages, and one out of 10 health-care dollars is attributed to the care of patients with diabetes (Hill, Nielsen, and Fox 2013; Menke et al. 2015). Particularly concerning is the explosion of type 2 "adult onset" diabetes that is now being increasingly diagnosed in adolescents and teenagers (Dabalea et al. 2017). Many researchers attribute this second wave as resulting from the epidemic of childhood obesity. Together, obesity and diabetes increase the risk of cardiovascular disease (both heart disease and stroke), renal failure, peripheral vascular disease, depression, dementia, retinal disease, and the risk of amputation (Laiteerapong and Cifu 2016). Type 2 diabetes and obesity are both a cyclical process; they result from and contribute to poorer health-care outcomes (Hill, Nielsen, and Fox 2013). Strategies to reduce the trillions spent each year on health care must find ways to curb the dual tidal waves of obesity and diabetes and the resulting economic burden.

The Rise of Bariatric Surgery

As a medical student in the early 1990s, I never scrubbed for an operation of a patient requiring obesity surgery. This was likely the result of a very valuable lesson learned by the profession of general surgery decades prior. Between the 1960s and the 1980s, the jejunoileal bypass (which bypassed all but 30 cm of the intestinal tract) had been championed as the solution to morbid obesity. The procedure was abandoned as dangerous years later, when it was recognized that some patients developed serious complications of malnutrition, leading to liver failure requiring transplantation (Singh et al. 2009). In the absence of any effective therapy for obesity, some advocated wiring the jaws of obese patients shut, but for the most part, surgical intervention for morbid obesity was regarded as unfruitful.

During the first three years of my general surgery residency, I cared for only a handful of patients with morbid obesity, mostly those who had suffered serious complications from the jejunoileal bypass. But something changed during the years I spent in the research laboratory in the middle of my residency. The first

bariatric programs were being introduced in academic medical centers in the mid-1990s, and by the time I returned to finish my training in 2000 after three years in the laboratory, the Roux-en-y gastric bypass (commonly known as stomach stapling) had become one of the most popular treatments for morbid obesity. The procedure had been championed by organizations such as the American Society for Metabolic and Bariatric Surgery (ASMBS), founded in 1983.

Between 1998 and 2004, the national annual rate of "stomach stapling" for obesity would soar by 800% (Lim, Blackburn, and Jones 2010). The field of "bariatric surgery" soon became a very active and lucrative service line within hospitals, and membership in the ASMBS soared to 4,000 surgeons. Caring for morbidly obese patients in America's hospitals required modifications, including larger-sized hospital gurneys and beds, waiting room chairs, CT scanners, operating tables, and other special equipment to accommodate patients over 350 pounds. The gastric bypass became one of the most common operations I performed in the last two years of my surgical residency. According to the Agency for Healthcare Research and Quality, the number of bariatric operations nationally rose nine-fold, from 13,386 in 1998 to 121,055 in 2004 (Nguyen et al. 2011). In 2008, nearly 220,000 patients in America underwent surgery for weight control (at which time the rates plateaued) (Livingston 2010), and the ASMBS estimates that between 2010 and 2015, nearly 1 million Americans underwent one of the various types of bariatric procedures, of which stomach stapling is the most commonly performed procedure.

Ethical controversies and debate arose when the first bariatric procedures were performed on adolescents. Some argued that it was unethical to alter the internal anatomy of teenagers who were suffering from a simple condition that might respond to exercise and diet change. In 2004, Lucille Packard Children's Hospital performed the first adolescent bariatric procedure in California on a teenager, though choosing the laparoscopic band procedure rather than the more radical anatomy-altering gastric bypass. Between 2005 and 2007, 590 adolescents underwent bariatric surgery in California, and by 2009 an estimated 1,000 adolescents in America underwent bariatric surgery annually (Klebanoff et al. 2017). The new thresholds in bariatric surgery from preschoolers in Saudi Arabia have been even more concerning. In 2010, a two-and-a-half-year-old child underwent a sleeve gastrectomy for obesity, following on the heels of a five-year-old who had undergone a similar procedure (Al Mohaidly, Suliman, and Malawi 2013).

But there is a downside of the rise of bariatric surgery too, beyond the anticipated long-term nutrition and micronutrient deficiency (Brito, Montori, and Davis 2017). Complications and catastrophic outcomes from bariatric surgery have become a prime source of medical liability litigation, and there is a lack of surgeons with expertise in bariatric surgery to solve the obesity crisis at a population level (Blackstone 2015). The extra procedures and caring for the complications of bariatric surgery add enormous costs to the health-care delivery system and strain

operating room resources and schedules across America. Later modifications of the gastric bypass that are technically easier to perform (the sleeve gastrectomy), as well as the laparoscopic banding procedure, have proved to be less effective in achieving long-term sustained weight loss or a decrease in cure rates of diabetes after longer-term follow-up, and they have fallen into disfavor (Golomb et al. 2015). For patients who underwent these less invasive procedures, surgery has proved to be a temporary solution.

Hollywood celebrities who have had their stomachs stapled may have contributed to making Americans less concerned about the health risks of being obese and leading them to regard bariatric surgery as a permanent solution. Hearing only the success stories after bariatric surgery (and not the treatment failures with weight regain) may have encouraged Americans to mistakenly believe that being obese is not a problem—and that surgeons have perfected a simple "solution." Celebrity stories are amplified in the media, and perhaps serve as an impetus for others to choose surgery over natural approaches for weight control. The more cautious approach to weight loss, through improved nutrition and increased activity, was reflected in a recent *New York Times* article titled "Think About Options Before Spending $26,000 on Bariatric Surgery" (Castellano 2016).

What Is Driving the Epidemic?

More Americans, including children, either have diabetes or are in the early stages of diabetes than at any time in our history. The increase has come primarily from the increased consumption of sugary beverages. Yet if one reads the arguments of the soda industry and other opponents of warning labels on sugary beverages and soda taxes, the source of this dual epidemic of obesity and diabetes is a mystery. Culprits, they claim, include a lack of exercise, poor parenting, a possible virus, a lack of walkable neighborhoods, processed foods, and lower smoking rates (smoking suppresses appetite), among others (Nestle 2015).

The medical community, including respected organizations like the American Heart Association (AHA) and American Diabetes Association (ADA), has attempted to raise awareness of the problem and promote civic action to build support for education campaigns and taxes on sugary drinks. The soda industry response has catalyzed the soda tax campaigns nationally and worldwide. To try to weaken the further connection to diabetes, industry proponents often argue anecdotally about a thin diabetic that they know personally who consumes soda regularly. What the industry experts are doing here is citing the minority of cases and ignoring the overwhelming majority of obese type 2 diabetics. Part of the confusion also stems from the existence of two distinct types of diabetes. Type 1 juvenile diabetics are often thin due to the inability to store carbohydrates, and this genetic condition typically does not result from soda consumption. Type 2 diabetes accounts for an estimated 90 to 95% of all diabetes cases in the United States, and almost 90% of

people with type 2 diabetes are either obese or overweight. Thus over 80% of all diabetics in America are obese or overweight diabetics (CDC 2011). Soda remains a major source of excess dietary sugar and calories in U.S. diets.

The Missing Link: Insulin Resistance

As a medical student, one of the more intriguing lessons I learned in physiology classes was the principle of insulin resistance—the inability of peripheral fatty tissues and cells to properly respond to the hormone insulin. Insulin is the hormone of anabolism, telling the body that there are plenty of nutrients around, and to store them. In type 1 juvenile diabetes, the body does not make enough insulin in the pancreas, resulting in elevated blood sugars. These cases represent a small fraction of total diabetes cases (5%), and what is confusing is that type 1 diabetics are often thin, as a dramatic loss of weight is a key symptom of type 1 diabetes. In type 2 diabetes, the body makes normal amounts of insulin, but the peripheral fatty tissues—in other words, obesity—cannot respond properly to the hormonal signals. Type 2 diabetes can be prevented and also cured by losing weight, healthy eating, and being more active.

The current projected risk is that one of every three Americans will develop type 2 diabetes in their lifetime, and the greater concern is that the risk of diabetes rises exponentially as one's BMI increases in a nonlinear fashion. Being overweight increases the risk of developing diabetes five-fold, but being seriously obese increases the risk over 40-fold (Chan et al. 1994). Even more concerning is that while type 2 diabetes is commonly described as "adult onset," it is increasingly being diagnosed in adolescents and teenagers. People who develop type 2 diabetes often have undiagnosed insulin resistance first, before progressing to full-blown diabetes. This is a common precursor in the condition known as prediabetes, which afflicts an estimated 86 million Americans (CDC 2014). The fascinating silver lining is that this condition is reversible. If the excess weight is lost, then the diabetes often resolves. Not many conditions in medicine are so easily curable through a balance of exercise and dietary change.

The other challenge is that this constellation of obesity and diabetes can be wrapped up with other co-morbidities in a condition known as the metabolic syndrome, which includes a whole package of troubling health problems once the BMI crosses 35, including sleep apnea, hypertension, depression, decreased fertility, heartburn, arthritis, and urinary stress incontinence. A BMI between 25 and 30 is defined as overweight, over 30 is obese, and morbid obesity is reached either at a BMI over 35, or if one is over 100 pounds over ideal weight. Recognizing the effectiveness of surgery in treating co-morbidities, the National Institutes of Health recommends that those with coexisting diabetes undergo surgery at a lower BMI threshold of 30, instead of 35 (Arterburn and McCullock 2016). Most insurers will authorize bariatric surgery if the BMI is over 30 and there is coexisting di-

abetes. In 2006, nearly one-third of all patients in the United States undergoing bariatric surgery had coexisting obesity and diabetes (Nguyen et al. 2011). Up to 80% of bariatric patients are able to stop taking diabetes medications two years after surgery as they shed their extra weight—further proof of the relationship between obesity and diabetes (Johnson et al. 2013). The temporary diabetes induced by the weight gain of pregnancy (gestational diabetes) is also further proof of the role of insulin resistance.

As a surgeon, I saw in an interesting manifestation of this silver lining. One of the common procedures a general surgeon performs is to repair incisional hernias, which often result from diabetes, obesity, and smoking. We would routinely counsel patients to lose 10% of their body weight preoperatively. Many frustrated patients would say that losing even five pounds was hard, but others succeeded in losing 50 or 75 pounds or even more. They would often share that while losing the first pounds was the hardest, afterwards the weight loss would accelerate. It became easier to exercise as they carried less body extra weight, they spent less time snacking on processed foods, and their spirits lifted as their body image improved. I also believe they were losing the peripheral fat with insulin resistance first, especially those with an "apple" body type, where they carry more weight around their waist, than those with a "pear" body type, who carry more weight in their hips and thighs.

The triple hazard of soda derives first from undesired weight gain, which results in peripheral insulin resistance and in turn leads to diabetes as a third adverse health impact. Insulin resistance is the missing link. What the soda industry counterarguments are ignoring is the critical link—the fact that the chronic consumption of beverages containing 10 teaspoons of added sugar will contribute to obesity and peripheral fatty tissue deposition. These tissues do not respond to glucose and insulin signals properly, and the peripheral insulin resistance strains the pancreas and accelerates the development of type 2 diabetes. We have now likely witnessed insulin resistance unfold at the level of population health as an entire nation over the past 25 years. In the early 1990s, the United States experienced an epidemic of obesity, followed by an epidemic of diabetes that spiked a decade later. A similar process is now being recognized around the world, jeopardizing global public health. A 2012 *Harvard Gazette* article featuring researchers who were "targeting obesity and its cousin diabetes" reflected that, as a nation, the United States "have been set up" (Powell 2012). We have witnessed an "obese nation, a health crisis," and a "hard-to-escape cycle of weight gain, insulin resistance, and weight-retaining diabetic medication, leading to more pounds." One Harvard professor summarized: "it's not just a trap, it's a trap and a downward spiral."

Sugar-Sweetened Beverages and Insulin Resistance

Sugary drinks highlight the harm of "liquid sugar." High fructose corn syrup is the most common sweetener used by the beverage industry, and the excess sugar consumption it engenders can also lead to addiction. Consuming solid food sends signals to the brain through a combination of gastric distension, vagal nerve activation, and hormones such as ghrelin that one is full and to stop eating. But these signals to stop eating are reduced from a concentrated liquid sugar diet. Unlike solid foods, our bodies cannot effectively process sugar in liquid form, creating a stress to the liver and pancreas that result in a greater weight gain than from consuming solid food with an equal calorie content. The danger from the average 12-ounce soda is the 10 teaspoons of sugar dissolved within—a danger that is not obvious to the drinker, who may mistakenly believe that the caloric content is similar to water. On average, the content of a packet of sugar is one teaspoon. Imagine if you were to observe someone at a café adding eight packets of sugar to their coffee. Individuals who regularly drink sugar-sweetened beverages also often have less healthy diets, containing fewer vegetables, higher sodium, and more processed meats, and they often are consuming empty calories with fewer nutritional benefits (Micha et al. 2017). Sodas are the number one source of added sugars in U.S. diets. Combined with inadequate physical activity, excessive sugar-sweetened beverage consumption has contributed to millions of individuals becoming overweight and obese over the past years; these actions are also detrimental to heart and brain health. Drinking just one sugary beverage a day increases the risk of developing type 2 diabetes by 26%.

Emerging Awareness of a New Public Health Problem

In the early 2000s, the AHA led the way in characterizing the accelerating public health crisis of both childhood and adult obesity. As early as 1977, internal Coca-Cola documents discussed the possible connection between soda consumption and obesity and tried to counterargue that genetics was the key determinant of obesity (Nestle 2015). The dramatic increase in obesity rates that first began in the 1980s and then spiked in the 1990s (following the popularity of supersized soft drinks) was the focus of several AHA initiatives. In 2000, the World Health Organization recognized obesity as a global epidemic. In 2006, the Alliance for a Healthier Generation, a joint AHA initiative in partnership with the Clinton Foundation, was formed to address childhood obesity. One area of focus was the removal of full-calorie soft drinks in schools across the country and their replacement with smaller, lower-calorie options (Laberthe 2011). The spike in diabetes was not yet fully recognized because of the time lag of years between first becoming obese, then developing insulin resistance and later diabetes. But the diabetes

spike would logically follow in the mid-1990s and peak by 2003. The increased rates of adult onset diabetes in children and adolescents have been relatively recent in most populations (Dabalea et al. 2017).

My own awareness of the soda-related obesity problem emerged after I finished my residency in general surgery in 2002 and became a health-care policy fellow at the University of California–San Francisco, where I learned about the decades-long tobacco wars, the tobacco control champions at UCSF, and the tactics and strategy of Big Tobacco to confuse the science, influence our legislators, and challenge public health legislation in court. Subsequently, as a junior faculty member at UCSF, I met pediatric endocrinologist Robert Lustig. In 2009, Lustig produced a YouTube video on "The Bitter Truth" about sugar, which has now been viewed by nearly 7 million people. In that video, Lustig highlights the special health hazards from sugar in its liquid form. The *Financial Times* has called the revelations in the video "sugar's tobacco moment" (Kaminska 2016). I also worked with health services researcher Laura Schmidt at UCSF, who has made invaluable academic contributions towards the conceptualization of a soda tax in San Francisco.

Taxing Soda and the Parallels with Big Tobacco

The goal of the soda tax efforts is to find an alternative, nonsurgical solution to the global obesity and diabetes epidemics. The major value of the soda tax campaigns is to raise awareness among regular sugary beverage drinkers so that they reduce their sugar intake for their own benefit. From that perspective, even soda tax campaigns that result in defeat at the ballot box remain a victory by educating voters of the health hazards of sugary drinks.

When President Obama raised the concept of a national soda tax in 2009, the beverage industry went into overdrive and spent millions of dollars to lobby Congress to ensure this idea was never introduced into the drafting of the Affordable Care Act. In California, efforts to tax soda statewide trace back to Senate Bill 1520, which was introduced in 2002, but decades of overwhelming beverage industry lobbying had resulted in the defeat of the handful of soda tax bills in Sacramento. In 2009, the San Francisco Medical Society (SFMS) succeeded in having the California Medical Association (CMA) support increased taxes on sodas and other relevant sugar-sweetened beverages, but an early effort in 2011 to introduce a soda tax in San Francisco vanished under an onslaught of soda industry lobbying. That same year, the SFMS introduced a second CMA resolution to reduce the marketing of unhealthy foods and beverages to children, which would lead to legislative efforts in Sacramento to ban sugary drinks from being sold on school campuses. This would help to inspire Senate Bill 1000 in Sacramento in 2014, which sought to place a warning label on sodas. The bill was defeated in the face of overwhelming industry lobbying (Maa 2014).

My professional research had been focused on reducing the impact of smoking on surgical outcomes, leading me to become very involved with the Proposition 29 tobacco tax campaign in June 2012. In the fall of 2012, I attended a presentation in which Councilman Jeff Ritterman, a doctor, spoke about a recent effort to tax soda in Richmond, a city across the Bay from San Francisco. What I heard from Ritterman was an inspiration. Though the Richmond soda tax was defeated by a two-to-one margin, it was one of the first salvos in the U.S. soda wars. Ritterman also pointed to how Big Soda was using strategies earlier employed by Big Tobacco to defeat the soda tax campaign. There were striking similarities in the overall messaging by the opposition, particularly in the attempts to minimize the overall dangers of their products to the health of the public. One of the most powerful arguments in support of the Richmond soda tax was the effectiveness of cigarette taxes in significantly reducing the smoking epidemic. The numerous precedents for warning labels, advertising restrictions, and policies restricting use of public funds for substances such as tobacco and alcohol would also prove very powerful in the Richmond soda tax campaign.

Within months, Lustig's work with the Mexican government resulted in passage of Mexico's landmark 2013 soda tax, which would accelerate efforts back home in the United States. The early data after Mexico instituted its tax in January 2014 demonstrated an immediate effect, with national soda consumption falling by an estimated 7%. In the latter half of 2013, I received a call from the communications firm of Erwin and Muir inviting me to assist with the San Francisco soda tax (Proposition E, or Prop E) campaign that was beginning to organize, and to speak at the press conference kickoff with San Francisco Supervisors Scott Wiener, Malia Cohen, David Chiu, and Eric Mar. I serve on the Board of Directors of both the AHA and the SFMS, two organizations that have endorsed sugar-sweetened beverage bills in Sacramento and San Francisco. Both organizations would later speak at the San Francisco City Hall hearings, press events, and newspaper editorial meetings on behalf of the soda tax, and they were featured in the Voter Information pamphlet in support of the measure.

Prop E sought to provide up to $54 million for physical education and nutrition programs in San Francisco public schools, active recreation programs, food access, oral health and dental programs, water fountains, and water bottle filling stations citywide through a 2¢ per ounce special tax, paid by the distributors of sugary beverages (Maa 2014). As a special tax, it would require a two-thirds majority to pass, and the revenue would not go into the general program but instead support the designated special programs. The effort was supported by the CMA, the California Nurses Association, and the California Dental Association. Several months later, soda tax advocates announced that the City of Berkeley would place a 1¢ per ounce tax on the November 2014 ballot; as a general tax, it would only require a simple majority to pass. Instead of supporting specific programs, the funds would be deposited into the City's general fund.

The Bay Area campaigns that ensued in the following months were followed closely across the nation. The soda industry shattered all local records by spending more than $10 million to defeat Prop E in San Francisco, utilizing the funds for an aggressive mail, television, billboard, and marketing campaign to portray the tax as regressive, and arguing that its passage would make living in San Francisco unaffordable. The Yes campaign was massively outspent and relied heavily on earned media counter-messages against the avalanche of soda industry advertising. In the smaller city of Berkeley, campaign manager Larry Tramutola focused on a door-to-door campaign and community activism to build public support; the campaign eventually attracted a major financial investment by Bloomberg Philanthropies to run television advertisements in support of the tax and to combat the tidal wave of $2.4 million spent by Big Soda. The proximity of a sister campaign across the Bay benefitted both the Berkeley and San Francisco campaigns, and as the election approached, the two campaigns began to host joint press events to unify their efforts. This twin-city approach was highly effective. Earned media carried a double impact, and paid media reached voters in both cities, some of whom might work in San Francisco and live in Berkeley or vice versa. Election night was a success on both fronts: Prop D passed with over 75% of the vote, as Berkeley became the first city in America to pass a soda tax. Although Prop E in San Francisco failed, there was a silver lining in the defeat. Despite being heavily outspent 35 to 1, Prop E had garnered nearly 56% of the vote. This was short of the two-thirds majority required for passage, but the fact that a majority of voters had supported the soda tax provided the strongest polling data that a general soda tax effort (requiring only a simple majority) could succeed in San Francisco in the future. The only question would be when?

In the afterglow of the Berkeley Prop D victory, valuable lessons were identified. Berkeley's mayor and the entire City Council endorsed Prop D, unlike San Francisco, where four Supervisors voted against placing Prop E on the ballot. Matching the soda industry dollar-for-dollar in raising campaign funds was not required: instead, keeping the ratio of being outspent by the industry to around three to one could successfully get the message out. For me, the most striking realization was that nearly the identical public relations, campaign managers, communications firms, lobbyists, and legal teams used by Big Tobacco to defeat Prop 29 had been employed to defeat Prop E. We were fighting a common opponent.

In 2016, Philadelphia Mayor Jim Kenney looked to improve health outcomes in Philadelphia, as well as to provide needed improvements to city services, and proposed a tax on sugary beverages. Unlike California cities, in Philadelphia, the City Council has taxing authority. New York Mayor Michael Bloomberg and the AHA helped Mayor Kenney stand up against a vigorous $11.2 million campaign by the beverage industry, and Philadelphia Council members voted to support the tax.

In the fall of 2016, the San Francisco Bay Area became ground zero for the soda wars. In the intervening 20 months, Supervisors Wiener, Mar, and Cohen had kept busy at San Francisco City Hall with a set of legislative proposals signed by the Mayor to place a warning label about sugary drinks on billboards, buses, transit shelters, sports stadiums, and posters, to limit sugary drink sales on City property and in vending machines, and to reduce the impact of industry advertising (Maa 2015). These efforts kept the American Beverage Association (ABA) attorneys occupied, as a legal challenge to the warning label would find its way first to federal court and then to an appeal in the 9th District Court. An injunction motion by the ABA blocking the implementation of the San Francisco soda warning label is still waiting to be ruled upon as of the writing of this article. Another focus in the intervening months was to organize and strengthen the scientific arguments for the upcoming public debate.

The successful 2016 efforts in San Francisco with Prop V rested on the foundation built by the 2014 Prop E campaign. Larry Tramutola, the winning campaign manager from Berkeley's Prop D, was brought back to lead another twin-city effort: San Francisco and Oakland. After careful consideration, the San Francisco soda tax Prop V was placed on the ballot by Supervisor Cohen, this time as a general tax without the need for a full vote at City Hall, and with a strong endorsement by Mayor Ed Lee. Only a simple majority would be needed for victory. In Oakland, a nearly identical Measure HH was spearheaded by Vice Mayor Annie Campbell Washington and received the support of the entire City Council and Oakland Mayor Libby Schaaf.

The game changer in San Francisco was the generous $10 million support from Michael Bloomberg, who, along with the Arnold family, contributed over $12 million to oppose the $22.6 million spent by Big Soda to defeat Prop V. This total of nearly $35 million spent by both sides on a local initiative in San Francisco easily dwarfed the record $10 million spent in 2014 to defeat Prop E, and stands as a record nationally for the amount spent on a local measure in a single city. A similar investment was made in Oakland, and the final expenditures by the beverage industry to defeat both Prop V and Measure HH surpassed $30 million.

Another change in 2016 was that the messaging was crystal clear, concise, and scientifically strong, and the talking points encompassed the dual threats of obesity and diabetes, along with tooth decay. The extra campaign funds helped support phone banking, canvassing, social media, technology devices, and additional outreach that had been unavailable for Prop E. Separate campaign managers were brought on in both Oakland (Diane Woloshin) and San Francisco (Monica Chinchilla) to implement the overarching plan of Larry Tramutola. The aerial coverage in support of both soda taxes with paid media, mailers, and signage complemented a series of earned media in *Politico*, the Associated Press, Reuters, the *New York Times*, the *San Francisco Chronicle* (by journalist Heather Knight), and elsewhere.

The passion, determination, dedication and hard work of the coordinated campaign teams in both cities are what ultimately carried the campaign to victory.

Another beneficiary was the tiny city of Albany, which neighbors Berkeley to the north, and which placed an identical 1¢ per ounce general tax named Measure O1 on the same ballot. Advocates raised just over $6,000, and the ABA spent $185,000 to try to defeat this measure, which quietly moved forward in the updraft of the massive battles in neighboring Oakland and San Francisco.

Soda taxes in the Bay Area became a Goliath versus Goliath battle of epic media proportions, dominating the television airwaves through the election season. It was noteworthy that the spokespersons for the soda industry had become repetitive and tangential in their media response, choosing an unusual path of trying to argue that the soda tax was a grocery tax. This argument failed in Philadelphia, failed again to resonate with voters in the Bay Area, and would result in ethics complaints against the ABA in both cities after an Alameda County Superior Court judge ruled that the soda tax was not a grocery tax. Another error on the part on the ABA was to use archived video of Senator Bernie Sanders to imply that he opposed Prop V and Measure HH. Senator Sanders's subsequent request to the ABA to stop utilizing his likeness in their television commercials would garner national attention and raise public suspicion of the Big Soda ads with the voters.

After overwhelming victories on the November 8, 2016 ballot in San Francisco (won with 62%), Oakland (won with 61%), Albany (won with 71%) and Boulder, Colorado (won by an eight-point margin), other cities quickly followed suit. A movement had caught fire. In Cook County, Illinois (which includes Chicago), a 1¢ per ounce soda tax was approved by the City Council on November 10. Santa Fe, New Mexico, announced plans for a 2017 soda ballot measure shortly thereafter, and Seattle and Portland would soon follow. A media spokeswoman for the soda industry tried to downplay the significance of these ballot victories, claiming that the taxes had only passed in the most liberal of American cities. But the attention of the world had been captured. The string of victories in the United States has sent a strong message with worldwide significance. At the 3rd World Innovation Summit in Health in Doha, Qatar, in November 2016, 1,400 health leaders from over 100 nations convened to discuss novel strategies to reform health care and control rising global health-care costs. The momentum of soda taxes in America was discussed during the plenary sessions, and also during a special panel session on improving cardiovascular health. Ireland, Oman, South Africa, and the United Kingdom would soon either announce or finalize their plans for national soda taxes.

The Legal Challenges

Another beverage industry strategy borrowed from the tobacco industry has been to challenge soda taxes and advocacy successes in court, in an effort to either overturn or delay the implementation of sugary drink legislation. In 2014, the soft drink industry achieved a victory when the New York State Court of Appeals ruled that New York City could not limit sales on jumbo sugary drinks (Grynbaum 2014). Later that year, the Alameda County Superior Court ruled partly in favor of two Berkeley residents who filed a lawsuit to change the phrases "high-calorie, sugary drinks" and "high-calorie, low nutrition products" in ballot materials to the phrase "sugar sweetened beverages" (Raguso 2014). However, the judge dismissed their companion claim, which sought to remove the statement that the sugary drink tax would be paid by distributors, and "not the customer." This theme would return as the core of an August 2016 lawsuit by the ABA against the City of Oakland to remove the Measure HH ballot statement that "this tax is not paid by your local grocer." An Alameda County Court Commissioner ruled against the soda industry, writing further that Measure HH was indeed a soda tax, and not a grocery tax (BondGraham 2016).

In addition to the ABA litigation against the trio of San Francisco sugary drink bills in 2015, the beverage industry also filed a lawsuit over the Philadelphia soda tax in 2016, arguing that the soda tax there would duplicate existing sales taxes and interfere with a federal mandate regarding SNAP funds. The Court of Common Pleas struck down this lawsuit on all counts in December 2016 (Erb 2016); an immediate appeal was filed with the Commonwealth Court, and the matter is likely destined for the Pennsylvania Supreme Court. In the interim, the Philadelphia soda tax was implemented January 1, 2017, and in the first month collected $5.7 million in revenue for the city (Zwirn 2017). Throughout the Philadelphia soda tax campaign, the beverage industry had promised swift legal action to challenge the tax in court if it passed. Similar pledges were made against Measure HH and Prop V, and time will reveal if similar legal efforts to block soda tax implementation are filed in San Francisco, Oakland, Albany, Boulder, or Cook County. The outcomes of both the soda warning label litigation currently in the 9th District Court of Appeals, and the soda tax litigation headed to the Philadelphia Supreme Court will likely guide the next steps by the beverage industry in the courtroom. If an increasing number of cities nationally pass soda taxes through the ballot box, the ability of the industry to challenge each in local courts may be strained; a likely alternative strategy will be to file a challenge directly with the U.S. Supreme Court.

Thus far, the legal actions by the beverage industry have followed the early tobacco industry playbook, using the legal system to protect their interests or oppose control legislation in the role of plaintiff. But the tables turned for the tobacco industry following the disclosure of cigarette industry documents revealing that the tobacco companies were aware of the addictive properties of tobacco.

The tipping point for Big Tobacco came with the Tobacco Master Settlement of 1998, after the Attorneys General of 46 states successfully sued the largest cigarette manufacturers for tobacco-related health-care costs and the adverse impact on Medicaid. In early 2017, the Center for Science in the Public Interest and the Praxis Project jointly filed a lawsuit in federal court alleging that Coca-Cola and the ABA had misled the public about the health hazards of sugary drinks (Rodionova 2017). The case was later dropped by the plaintiffs, but it signaled a new era of litigation where the beverage industry was placed in the role of defendant.

Future Policy Initiatives

Soda tax advocacy efforts nationally should continue as a multi-pronged effort that includes warning labels on sugary drinks, changing to milk and water as the default options for kids' meals in restaurants, and reforms to procurement policies to reduce the amount of processed foods and sugar-sweetened beverages in government cafeterias, vending machines, and in schools. A major victory for public health that came during the 2016 soda tax campaigns was the announcement from the FDA and the Obama Administration that an "added sugar" label for packaged foods would be required by July of 2018. This new label would allow consumers to compare foods and make more informed choices about their intake to promote health, but the implementation of the new rule was placed on hold by the Trump Administration in 2017. In 2014, Congresswoman Rosa DeLauro (D, Connecticut) introduced the Sugar-Sweetened Beverages Tax Act (the SWEET Act), and efforts at the federal level to tax sugary drinks merit careful consideration. Another area of further discussion at the federal level is the removal of sugary drinks from purchasing in the SNAP program, as the billions of dollars spent nationally on soda represents an estimated $4 billion annual subsidy to the soda industry (Nestle 2015). Any changes to the SNAP program should be undertaken without creating an undue economic burden or stigma on low-income consumers. The special area of focus remains low-income consumers and communities of color, where policy leaders will need to intervene to help decrease consumption of soda and sugary beverages. Their neighborhoods are aggressively marketed to, and many times a bottle of soda is less expensive than a bottle of water at a corner store. Ultimately, a deeper understanding of the business model of the beverage industry, their sources of federal and state support, and drivers of their profitability may enable the creation of a new mechanism to tax sugary drinks that cannot be passed on to consumers.

In the aftermath of these advocacy successes, AHA CEO Nancy Brown reflected that the soda tax victories have demonstrated that cities and residents have the power to initiate positive change. After the victory in Philadelphia, she remarked, "What really excites me is the chance this is the beginning of a trend. Simply put, it's a movement that prioritizes heart-healthy habits over beverage in-

dustry profits" (Brown 2016). Summarizing the keys to success, Brown concluded: "We've been there all along—representing all Americans—with our science, education, and advocacy."

The Future from the Surgeon's Perspective

Over the ensuing decades, millions of lives and precious health-care resources will be saved by these national efforts to tax sugary drinks. As a general surgeon, I have witnessed firsthand the epidemic of obesity and diabetes that has ravaged the United States over the past decades, and it was in an effort to reverse these national trends that I first became involved with Prop E in 2014. The passage of Prop V will help greatly in the larger goal. Lives will be saved, and quality of life will be improved for diabetics who no longer suffer falls after losing their eyesight from diabetic retinopathy, suffer complications from dialysis after suffering kidney failure, sustain heart attacks from coronary arterial disease, or struggle with disability after an amputation. Obese patients will experience fewer cases of osteoarthritis leading to joint replacements, sleep apnea and respiratory disease, gallstone formation leading to episodes of pancreatitis and acute inflammation, and fatty liver disease leading to liver transplant. Healthier patients will suffer fewer episodes of depression or bullying in school over their weight, and will experience longer and more productive and satisfying lives. The funds from the tax will help improve nutrition, physical activity, and water access for children, and the health of the public will be promoted as these children return home to educate their parents, siblings, grandparents, and friends about healthier lifestyles and beverage choices. Medical students in the future will read in their physiology textbooks about the enormous impact of Prop V and soda taxes in improving patient health across organ systems.

Conclusion

Given the current and projected severity of the obesity and diabetes epidemics among children and adults, a coordinated strategy is necessary to assist individuals in achieving and maintaining healthy weight. If we do nothing to address this health crisis, one in three children today will develop type 2 diabetes in their lifetime; for children of color, the risk is one in two. The consequences of obesity and diabetes are many and severe, including health concerns and economic costs. The decade-long movement to tax soda has likely reached an inflection point that signals the start of a movement to adopt healthy and viable taxes on sugar. Ultimately, the larger purpose of the soda tax effort is to raise awareness among the general public of the high sugar content in sugary drinks and to empower them to make healthier decisions for their own nutrition and health. Most importantly, the soda industry is now presented with the opportunity to change, and to not follow the path of the tobacco industry. By crafting healthier beverages with lower sugar and calorie content, it can be a win-win for the United States.

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