

Chapter 8

Crystalizing Global Sugar Policy: Public Health Promise or Perception

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Key Points

- The prevalence of obesity is a global public health burden.
- There are global efforts to reduce the prevalence of obesity and overweight through changes in dietary guidelines and nutrition policy, to levy some form of tax on sugar-sweetened beverages (SSBs), and to ban or restrict access to these products.
- Assessment of dietary intake patterns indicates that SSBs are not major contributors to caloric intake and subsequent obesity or overweight.
- These policies and taxation efforts directed to SSB have produced inconsistent results relative to changes in BMI and obesity in targeted populations.

Keywords Global sugar policy • Domestic guidelines • Dietary guidelines • Nutrition policies • Sugar-sweetened beverages • Added sugar

Introduction

The promotion of public health policies through dietary guidelines is global, regardless of culture and tradition. One of several key elements of these policies and guidelines focuses on improved weight management in an era of universal increased body weight. Efforts to encourage the maintenance of a healthy weight and to curb globesity include an array of dietary, behavioral, and economic interventions that have been implemented and proposed in many countries [1, 2]. Many confounding factors that complicate efforts and policies to reduce the global preponderance of obesity include those that affect the other end of the health spectrum, such as basic sanitation, clean water, nutrient inadequacies, and malnutrition [3].

For more than 30 years, the United States' dietary guidelines advocated the reduction of dietary sugar. The initial recommendation in 1980 intended to reduce the risk of developing dental caries [4]. More recent dietary recommendations examined sugar-sweetened beverage (SSB) relative to energy

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intake and body weight [5]. None of these recommendations indicated that added sugar differed from other dietary components that contribute energy. Despite the inconsistencies of added sugar and weight gain associations in published research, many countries, such as Mexico, Canada, throughout Europe and South America, South Korea, and Singapore, and international public health organizations, including WHO, either recommended or quantified “added sugar” limits in efforts to curb the incidence and reduce the prevalence of obesity. Yet, many countries, such as South Africa, China, and the Philippines, have not adopted food-base dietary guidelines with any mention of added sugar.

Several countries (e.g., the United States, Canada, Belgium, Denmark, France, Brazil, Chile, Mexico, and Australia), states (e.g., California, Washington, Vermont, and New York), and cities (e.g., Los Angeles, Chicago, and San Jose) advocate legislation that levies a “sugar tax” directed to consumers and producers of “added sugar” products. The movement to ban added sugar products in schools, intended to reduce the consumption of these products and reduce the prevalence of overweight children, has produced inconsistent results.

Domestic Guidelines and Policies

The 2005 Dietary Guidelines for Americans indicated that the positive association between SSBs and obesity among children was fair (grade II) [6]. Among 13 studies reviewed on this topic, none indicated a consistent relationship between sweetened beverage consumption and overweight status. On the other hand, the same report provided 17 studies that indicated some relationship between the intake of sweetened beverages and overweight status. The dietary guidelines advisory committee noted that the primary weaknesses in this relationship included the following: small sample size among studies, study participants were within specific regions and not nationally represented, responses were biased due to low return of beverage diaries, involved a single 24-h recall, and confounding of multicollinearity in the diet. In addition, relative to overweight and eating patterns, SSBs represented only 1 % of the diet, about 4 % of overweight could be represented by other eating patterns, and, particularly important, the remainder of the overweight (~95 %) was attributed to unexplained eating patterns. Similar results were reported in a review of 100 % fruit juice consumption and weight in children and adolescents [7–9].

Five years later, the question of the SSBs and obesity among adults was addressed by the 2010 Dietary Guidelines Advisory Committee. Upon examination of four systematic reviews and three prospective observational studies, the experts concluded that the evidence to support this relationship was limited, and when there is isocaloric substitution of SSB, the likelihood of weight gain did not differ from any other food source of energy [5].

Contrary to these extensive reviews of the scientific literature by dietary guidelines experts in the United States, there is a central call for limiting added sugar intake in an effort to limit consumption of excess energy, thereby reducing the prevalence of obesity. These reviews did not isolate SSB per se, yet there is an extensive history of dietary recommendations directed to limiting added sugar intake. A recent meta-analysis of 32 studies indicated that SSBs contribute to weight gain in children and adults [10]. Yet, many in the global public health community indicate that the most significant impact of sugars, in general, is dental caries [11].

International Guidelines and Policies

Approximately 60 countries among seven global geographic regions recommend consumers limit intake of added sugar (Table 8.1). Some of these recommendations are qualitative, while others specify quantities based on percent total energy. These recommendations are promoted to reduce dental

Table 8.1 Global dietary guidelines and sugar consumption recommendations

Authoritative sources for food and nutrition guidelines	Recommendations for sugar consumption
<i>Africa</i>	
Kenya, National Nutrition Action Plan (2012–2017)	Improve prevention, management, and control of diet-related noncommunicable diseases ... states sugar is a factor
Nigeria (2001)	Limit the intake of ... sugar
South Africa, South African Guidelines For Healthy Eating (2004)	Use food and drinks containing sugar sparingly and not between meals
<i>Arab Gulf Countries</i>	
Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (2011)	No specific recommendations relative to sugar intake
<i>Asia and the Pacific</i>	
Australia, The Australian Guide to Healthy Eating (2013)	<ul style="list-style-type: none"> • Consume only moderate amounts of sugars and foods containing added sugars • Within each food group choose mainly foods with little or no added sugar • Choose foods containing added sugars less often. This includes foods like fruit juice drinks, sweetened breakfast cereals, fruit canned in syrup, flavored milks, and flavored yoghurts • Limit those foods which contain high levels of sugar including cordial, soft drink, flavored mineral water, lollies, jam, honey, cakes, and biscuits • Use only a moderate amount of sugar if sweetening drinks and foods • Use packaged foods which state that they are reduced sugar, low sugar, free of sugar, unsweetened, lower sugar, low in sugar, no sugar, less sugar, sugar free, or no added sugar • When choosing sweetened foods, where possible choose the lower sugar alternative • Drink plain unsweetened water to quench thirst
China, Chinese Nutrition Society (2007)	No sugar recommendation for adults; children and adolescents, the consumption of sugar should be limited because of the risk of causing dental caries
India, Dietary Guidelines For Indians—A Manual (1998)	Sugar should be used sparingly
Japan, The Japan Dietetic Society (2010)	No sugar recommendation; enjoy confection sparingly (Spinning Top, 2005)
Malaysia, Nutrition Society of Malaysia (2010)	Consumer foods and beverages low in sugar
Nepal, National Nutrition Policy and Strategy (2004)	Avoid giving drinks with low nutrient value such as tea, coffee, and sugary drinks
New Zealand, Ministry of Health (2013)	Prepare foods, beverages, and snacks with little added sugar; limit the intake of high-sugar foods
The Philippines, Department of Science and Technology (2012)	Limit the intake of ... sugar-rich foods ...
Singapore, Health Promotion Board (2011)	Reduce the intake of refined and processed sugar to less than 10 %en
Taiwan, Department of Health (2008)	Eat less sugar (less than 10 %en, 1984; eat less sugar, 1995)
Thailand, Ministry of Public Health (2001)	Avoid (added sugar) sweet foods (not explicit to sugar)
Vietnam, National Strategies of Nutrition (2011)	Consume less sugar (2005); part of Food-Based Dietary Guidelines where “sugar” is not specified

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Table 8.1 (continued)

Authoritative sources for food and nutrition guidelines	Recommendations for sugar consumption
<i>Europe</i>	
Albania, Ministry of Health, Ministry of Agriculture Food and Consumer Protection, and Ministry of Education and Science (2009)	Minimize sweets (no specific sugar recommendations)
Austria, adopted German Nutrition Society recommendations (2011)	Only occasionally consume sugar and food or beverages containing various kinds of sugar
Bulgaria, Ministry of Health National Center of Public Health Protection (2006)	Limit the consumption of sugar; avoid sugar-containing soft drinks
The Czech Republic, WHO Nutrition and Food Security Programme (2003)	Limit sugar intake <15 g/day (1–3 teaspoons)
Denmark, Ministry of Food, Agriculture and Fisheries (2012)	Limit the intake of sugar—particularly from soft drinks, sweets, and cakes
European Food Safety Authority, Panel on Dietetic Products, Nutrition and Allergies (2010)	Evidence suggests that high intake of sugars in the form of sugar-sweetened beverages, such as carbonated soft drinks, might contribute to weight gain Although high frequency of intake of sugar-containing foods can increase the risk of dental caries, there are insufficient data to set an upper limit for (added) sugar intake
Finland, National Nutrition Council (2005)	Decrease the intake of refined sugars
France, French Ministry of Health and the National Institute for Prevention and Health Education (2012)	Limit sweet products
Germany, German Nutrition Society (2011)	Only occasionally consume sugar and food or beverages containing various kinds of sugar
Greece, Ministry of Health and Welfare (1999)	Reduce sugar intake
Holland, Directives of Food Choice (2011)	Recommend sugar intake less than 10 %en, generally less than 13 %en
Hungary, Ministry of Health of Hungary (2001)	Avoid the frequent consumption of foods or drinks rich in added sugar
Ireland, Food Safety Authority (2011)	Limit foods rich in ... sugar
Italy, WHO Nutrition and Food Security Programme (2003)	15 % of daily energy intake, but obscure guideline: does not distinguish between added refined sugars and intrinsic simple carbohydrates; only generic invitation to control sugary food intake
Norway, Nordic Council of Ministers (2012)	Limit sweet bakery products or confectionary; consume less sugar (2009)
Poland, FAO/EUFIC Workshop on Food-Based Dietary Guidelines (2009)	Moderate in intake of sugar and sweets
Portugal, National Council for Food and Nutrition (2006)	Reduce consumption of sugar and sugary products; avoid beverages that contain (added) sugar
Spain, Spanish Ministry of Agriculture, Food and the Environment (2012)	Less than 2 % sweets (from 2001); less than four occasions/day
Sweden, Swedish National Food Agency (2012)	Leeway foods (sweets, savory snacks); less than 13–14 %en (from 2005)
Switzerland, adopted German Nutrition Society recommendations (2011)	Only occasionally consume sugar and food or beverages containing various kinds of sugar
The United Kingdom, FSA Nutrient and Food Based Guidelines for UK Institutions (2006)	Consume less than 11 %en from extrinsic sugars

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Table 8.1 (continued)

Authoritative sources for food and nutrition guidelines	Recommendations for sugar consumption
<i>Latin America and the Caribbean</i>	
Argentina, Argentina Association of Dietitians and Nutritionists Dietitians (2003)	Decrease the consumption of sugar
Belize, Ministry of Health (2012)	Limit your intake of ... sugar
Bolivia, Ministry of Health and Sports (2000)	Avoid excessive consumption of sugar, sweets, and drinks
Brazil, Ministry of Health (2006)	Simple sugars should account for a maximum of 10 % of total energy intake (one portion/day)
Chile, Ministry of Health (2005)	Eat less sugar (2005); launched mandatory (high) sugar warning labels on food products (2012); high = 18 g sugar/serving (including naturally occurring sugars) and 8 g/serving of added sugar
Republic of Columbia, Ministry of Social Protection (1999)	Control excess consumption of ... sweets
Costa Rica, Ministry of Health (1997)	Limit sugar consumption
Cuba, Institute of Nutrition and Food Hygiene (2008)	Consume sugar in moderation (1996); cut down on sugar
Commonwealth of Dominica, Ministry of Health and Social Security (2007)	Choose less sweet foods and drinks
Dominican Republic, Secretary of State for Public Health and Welfare, Department of Nutrition (1998)	Use sugar in moderation
Ecuador, Ministry of Public Health Nutrition (1999)	No specific reference to sugar; little data on nutritional and health status (1994)
Grenada, Grenada Food and Nutrition Council (2006); FAO (2007)	Choose to use less sweet foods and drinks
Mexico, Department of Nutrition and Health Promotion (2002)	Eat the least possible ... sugar
Saint Lucia, Ministry of Health, Human Services and Family Affairs (2007)	Choose less beverages and packaged foods with added sugar
Saint Vincent (Grenadines), FAO (2007)	Reduce the intake of sugar: Use less sugar, sweet food, and drinks
Uruguay, Ministry of Public Health, Department of Nutrition (2004)	Decrease the intake of sweets, sweetened drinks, sugar, desserts, sweets, and pastries
Venezuela, National Institute of Nutrition (2003)	Consumer sugar in moderation
<i>Near East</i>	
Afghanistan (2010)	Nutrition policy focuses on food security and reversal of nutrient inadequacies; no comments on obesity or overweight; no comments on sugar consumption
Iran, Community Nutrition Department of the Ministry of Health and Medical Education and the Iranian Nutrition Society (2007)	Reduce sugar intake (Group 8 of Food-Based Dietary Guidelines)
Iraq, University of Bahrain and Arab Center for Nutrition (2012)	Nutrition policy focuses on food security and reversal of nutrient inadequacies; the intake of food and drink rich in sugar, especially between meals, should be minimized as far as possible
Israel, Ministry of Health (2011)	Sugary foods at pyramid apex (minimize consumption)
Jordan, University of Bahrain and Arab Center for Nutrition (2012)	Nutrition policy focuses on food security and reversal of nutrient inadequacies; the intake of food and drink rich in sugar, especially between meals, should be minimized as far as possible
Lebanon, American University of Beirut (2013)	Food-based Dietary Guidelines (unavailable to the public as of July 25, 2013); focus on reducing noncommunicable diseases including prevalence of obesity and overweight
Oman, Department of Nutrition, Ministry of Health (2009)	Free sugars should not exceed 10 % of the total calories in the diet

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Table 8.1 (continued)

Authoritative sources for food and nutrition guidelines	Recommendations for sugar consumption
Turkey, The Ministry of Health of Turkey and Hacettepe University (2004)	Avoid taking much ... sugar. Consumption of foods containing high level ... of sugar content should be limited (relative to weight management)
<i>North America</i>	
Canada, Health Canada (2007)	Limit intake of ... added sugars Reduce the intake of calories from ... added sugars Reduce the intake of sugar-sweetened beverages
The United States, Dietary Guidelines for Americans, USDA (2010)	Reduce the intake of calories from solid fats and added sugars
American Heart Association (2010)	Added sugar intake be limited to 100 cal (25 g, or 6 teaspoons) per day for women and to 150 cal (about 37 g, or 9 teaspoons) per day for men

caries, cardiovascular disease, and prevalence of obesity while promoting more healthful lifestyles and affordable food choices. Many other dietary recommendations focus on sanitation, clean water, adequate culturally appropriate foods, and breastfeeding.

In African countries Kenya, Nigeria, and South Africa [12] public health initiatives include messages that attempt to limit sugar intake, such as through sugary snacks, by stating its association with noncommunicable diseases [13, 14]. Among the Arab Gulf countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates), the emphasis within food-based dietary guidelines (FBDG) is on the management of nutrition-related, dietary-associated health issues, without any specific focus on sugar [15]. These recommendations are intended to provide simple, practical approaches to minimize nutrition-related disorders while providing messages that are sensitive to sociocultural diversity in the region.

Asian and Pacific countries, including Australia [16], New Zealand, India, Vietnam [17], China, and Singapore, recommend sparing use of sugar. Taiwan, on the other hand, advocates consumers limit their sugar intake to 10 % of total energy. In the European arena, which includes approximately 50 countries, 28 of which are part of the European Union, there is a plethora of different recommendations that collectively encourage consumers to limit sugar intake. Some recommendations are specific (limit sugar 10–15 %en), while others are more general in reducing sugar intake. The most common message is the advisement to limit the consumption of SSB.

The primary nutrition-related issues in Latin America and the Caribbean (St Lucia, Grenada, St Vincent), the Grenadines, and Dominica include the emergence of obesity, physical inactivity, food security and accessibility, nutrient deficiencies, and a myriad of health problems, including low birth weight, alcoholism, protein–energy malnutrition, as well as chronic noncommunicable diseases [18]. Within these public health challenges, the major dietary recommendations are for the multi-sectorial population to avoid excessive consumption of sugar, fat, and salt [19].

Health officials in Guatemala, Panama, and Mexico provide ten key dietary guidance messages, while malnutrition and poverty dominate these countries. Even in the face of overweight and obesity that affect nearly 100 % of adults, particularly in Guatemala and Panama, the primary dietary messages encourage increased consumption of affordable fruit and vegetables and culturally appropriate foods while promoting daily exercise.

Within the Near East countries, including Afghanistan, Iran, Iraq, Israel, Lebanon, Omar, and Turkey, emerging food-based dietary guidelines address the intersection of frank poverty and nutrient insufficiencies, such as those prevalent in Latin America and the Caribbean, and obesity. A common thread in dietary policies in this region is the reduction of obesity through the decreased consumption of foods and beverages high in sugar [20].

Taxation on SSB

One approach to increase funding directed to public health initiatives, particularly those intended to decrease SSB consumption under the guise of global obesity reduction and promotion of weight loss and improved health, is taxation [21, 22]. Policymakers in many countries favor such an intervention, yet several challenges include the determination of consumption threshold that taxation is appropriate and potentially effective and the population dynamics, including current financial burdens or fiscal health and tax rates, and the prevalence of obesity within a community or a geographical region.

A recent national survey on this issue pointed to an apparent lack of public support in the United States [23]. This web-based survey among 50,000 participants indicated a lack of political trust (58 %) and considerable opposition (52.5 %) and that a tax of a penny per ounce, which could raise about \$150 million, was rejected (41.1 %). Factors influencing this position included a majority opinion that such a tax would hurt the poor (51.2 %) and upset the economy (48.9 %). Importantly, the additional financial burden may not impact those of greatest risk of overweight and obesity. It may be too early with limited data to accurately assess or predict desirable outcomes, including improved individual health [24].

The potential impact of SSB consumption tax was assessed using NHANES data (1989–2006) and other statistics. Unlike results from consumption surveys among middle schools (see below), limited data suggest that this approach may yield only a moderate reduction of SSB consumption among children and adolescents [25]. This study indicated a daily 6–8 kcal reduction associated with a soft drink tax and a concomitant increase, albeit slight, in consumption of juices and whole milk, which may be more nutritious alternatives. Changes in population BMI, obesity, and overweight were not statistically significant.

Other investigations among adolescents reported weak economic impact and no significant changes in BMI following implementation of vending machine soda taxes (~4.51 %) or grocery store soda taxes (~4.25 %) at the state level [26]. Despite these findings, several states and communities continue to advocate or legislate a tax on SSB. For example, as of June 2010, 21 states posed a soda tax at the grocery store level; eight states implemented a tax on SSB sold in vending machines, and three states initiated an excise tax on these products [27]. In 2010, the state of Washington promoted and passed an excise tax of 2 cents on 12 oz of soda to fund an array of education and underfunded programs in the state. However, the voters successfully launched an initiative to repeal the tax on grounds of business discrimination. Similar soda taxation bills in Mississippi, New York, New Mexico, and Kansas failed to gain sufficient momentum to reach to respective governor's desk. On the other hand, in March 2010, Colorado lawmakers successfully implemented a 2.9 % sales tax directed to soft drinks sold at retail outlets and in vending machines while removing tax exemptions for these beverages and candy. A year later, many legislators advocated repeal on soda tax in order to reduce Coloradoan family expenses despite the potential loss of \$12.3 million in state coffers.

Meanwhile, a statewide soda tax in California gained momentum during Senate Committee on Health and Senate Committee on Governance and Finance meetings in May 2013. The democrat-dominant legislators, on behalf of SB 622, support a penny-per-ounce tax on SSB sold in the state. Interestingly, in November 2012, similar initiatives in two California cities, El Monte and Richmond, were rejected by approximately 77 and 67 % of the voters, respectively. Despite these soda taxation defeats and the absence of direct evidence that SSB taxation leads to the reduction of BMI and obesity, particularly among children and adolescents, many other cities in California, such as San Francisco, Berkeley, Alameda County, Vallejo, and El Cerrito, vowed to place on the 2014 ballot similar SSB taxation measures. Other regions in California, such as San Jose and Santa Clara County, recently launched extensive measures to ban soda-pop products in city- or county-funded events. Similar restrictions in Chicago do not seem to reduce SSB consumption, at least among adolescents [42].

The argument that a tax on SSB, a form of consumption tax, may benefit public health outcomes is complicated by personal and political issues [28]. One aspect is that without some form of transitional relief for those with discretionary income and even those with limited revenue, such as the rapidly growing population segment of those considered older (>13 % of the US population), the consumption tax could be considered as a form of income tax. This, of course, may be considered an unintended consequence, even though nearly 32 % of this population of more than 40 million is overweight or obese [29]. From a fiscal perspective, nearly 20 % of seniors (≥ 65 years of age) have an annual income of only \$10,000 or less, and just under 40 % declared an annual income greater than \$25,000 in 2010 [30].

Some suggest that policies directed to changes in food pricing structure, such as discounts applied to more healthful foods and taxing foods that may be less nourishing, could increase consumer awareness, contribute to their improved food choices, and influence more desirable health outcomes. A recent study assessed this hypothesis among 117 Dutch-speaking adults within a lower socioeconomic status [31]. Thirty-eight categories of foods were considered healthy based on WHO criteria and global front-of-package (FOP) labeling from dietary guidelines of 20 countries and food composition data from 12 European countries [32]. An earlier investigation suggested that FOP labeling encourages consumers to make more healthful food purchases and prompted the development of food products consistent with dietary guidelines [33, 34]. Importantly, food discounts of 25 and 50 % may prompt the purchase of more fruits and vegetables, yet these same incentives also lead to the purchase of more total energy as compared to no discount. Taxation did not influence the purchase of several product categories, including soda. This study did not differentiate between SSBs and those sweetened with non-nutritive sweeteners.

The consumer purchase behaviors reported by Waterlander et al. [31] were also noted by others [35–37]. Food tax forms, such as value-added tax (VAT) in Europe or the general service tax (GST) in Australia, direct taxed on food categories or specific food items. While these taxes were intended to encourage consumers to make more healthful food choices and to adopt better food consumption patterns, there do not appear to be clear health advantages, such as significant changes in BMI or prevalence of obesity, as a result of these financial encumbrances. However, a small Internet supermarket study among 306 adult consumers in the Netherlands indicated that a tax on high-energy dense foods (50 % tax or price increase) may lead to a reduction in energy, mostly from carbohydrates [38]. These investigators suggested that modifications in advertising practices, commercial content, product availability, and size may contribute further to public health efforts to reduce the purchase of excess calories.

Some form of SSB taxation has gained popularity in the international public health community since proposed several years ago [39]. Despite the potential public health implications, particularly among at-risk environments, it is incumbent to consider demographics that may be unique to a given country [21]. Estimates of changes in BMI and obesity as a result of even 20–40 % (about 0.5–1.0 cent/oz) taxation on SSBs suggest that the impact on BMI would be marginal [37]. Mathematical models suggest that this level of taxation could reduce energy intake by 34–47 kcal/day among adults, which may translate to significant weight loss over a 1–5 years [40]. Results from other statistical estimates of energy consumption and potential concomitant weight reduction due to SSB taxation suggest that only consumers who purchase the greatest amounts of these products may be favorably impacted [41]. However, at best, these desired outcomes are not supported by numerous studies among various populations.

Banning SSB in Schools

Public health concerns associated with obesity and overweight children and their consumption patterns that include SSB of many types have contributed to the establishment of policies that regulate the availability of these products in schools [42]. A recent review indicates that 34 states adopted an

array of policies and positions that reduced the availability of SSB on school campuses as part of the federal National School Lunch Program [43]. Some of the tactics that limit exposure to SSB include restrictions on beverage types and portions, new marketing provisions, and increased access to water [44]. SSB restrictions among public schools in Washington, California, and Texas decreased on-campus exposure of these products to middle school students and indicated that students often sought competitive products [45–47]. Among 6,900 fifth-grade students attending schools without an SSB policy ($n=2,890$), banned sugar-sweetened sodas on campus ($n=2,840$) and banned all SSBs ($n=1,170$) indicated that while state policies may limit SSB exposure on campuses, the middle school students often explored alternative environments to purchase SSB-type products.

A follow-up survey among more than 6,100 fifth and eighth graders, their parents, teachers, and school administrators assessed the anticipated effectiveness of reduced availability of SSBs on school campuses [48]. This assessment indicated that limited availability of SSBs on middle school campuses did not impact purchasing (~80 % at least one SSB/week), consumption (~84 % at least once/week), or body weight (BMI z-scores $\sim 0.7 \pm 0.03$ [SE]) among these students.

Conclusion

Efforts to reduce obesity and overweight reflect global public health concern. One of the approaches is to reform dietary guidelines and nutrition policies that encourage the reduced consumption of SSBs and those food products that contain added sugar. The regulatory impact that focuses on a single dietary component is not without significant challenge. In addition, future food products to meet consumer expectations and emerging regulatory statutes pose technical hurdles. Organizations that target added sugar (sucrose) suggest that a single resolution of a personal and global public health burden often fails to consider the potential impact on enforcement, general dietary policies including food assistance, personal choices, and complexities of health issues [49]. In the realm of food science and product development, the functions of sugar extend beyond texture and flavor enhancement or sweetness. Some of those functions include leavening of and gluten stabilization in bread through its use by yeast, stabilization of egg foams, minimization of ice crystallization in ice cream, and prevention of spoilage of jams and jellies [50]. Some economic projections suggest that, in the presence of international sugar commodity price protection, tariffs, subsidies, and even duty-free access, the price of sugar could significantly decrease, which in turn could lead to an increased market of SSB and potential increase in their consumption [51, 52]. However, there is a global impetus to implement major public health policies, local regulations, and taxation initiatives directed to reduce access to SSB in an effort to reduce the prevalence of obesity across all geographic and demographic sectors [53, 54]. The potential public and personal health effects of these efforts and possible unintended consequences remain speculative. Considering the current level of evidence and the inconsistency of that evidence, the popular case on obesity that focuses on SSB, per se, is in fact not defensible.

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