

The UN Convention on the Rights of the Child states that parties should act appropriately to combat disease and all forms of malnutrition (1). Every child has the right to adequate nutrition. Yet today, the need to protect, promote and support good nutrition has never been greater.

Millions of children worldwide are consuming too many ultra-processed foods and non-alcoholic beverages that are high in saturated fats, transfatty acids, free sugars, or salt, with devastating consequences for their health and development (2-4). Today, unhealthy diets are a leading cause of death and disability globally, while overweight and obesity are on the rise.

The food environment, including how foods are marketed, plays a critical role in influencing children's diets. Widespread changes in children's food environments are combining with poverty and inequality to undermine children's nutrition and health. In their daily lives, children face significant financial and physical barriers accessing nutritious foods, and are bombarded with cheap and unhealthy foods. The prices of foods and beverages affect daily food purchasing decisions. This policy brief explains how an effective tax on sugar-sweetened beverages can be a powerful tool to reduce the consumption of these unhealthy beverages and safeguard children's right to a healthier future.

1. Childhood overweight and obesity and diet-related diseases are on the rise

The prevalence of overweight amongst children and adolescents, from infancy to the age of 19, is on the increase almost everywhere (2-4). In 2020, an estimated 39 million children under the age of 5 years were affected by overweight or obesity, and over 340 million children and adolescents aged 5-19 were affected by overweight or obesity in 2016 (4). Further, the prevalence of overweight and obesity amongst children and adolescents is increasing rapidly, rising from 4% in 1975 to just over 18% in 2016 (4). Once considered a problem of high-income countries, overweight and obesity are now on the rise amongst both children and adults in low- and middle-income countries (LMICs), particularly in urban settings.

Childhood obesity and diets high in ultra-processed foods have lifelong health consequences, with increased risks of non-communicable diseases (NCDs) including heart disease, diabetes, and some cancers which may increase morbidity and mortality (5, 6). Children living with overweight and obesity may also experience psychological and psychosocial impacts, such as weight stigma, social isolation, depression, low self-esteem, and poor educational attainment (6, 7). As the world has seen during the COVID-19 pandemic, children and adults living with overweight and obesity can also be more susceptible to infectious diseases with disastrous consequences (8, 9).

The economic cost of obesity is extremely high. In 2019, the global healthcare costs attributed to obesity were estimated at more than USD 990 billion per year (10). A recent study of eight countries found that the economic impact of inaction on obesity is projected to double to an average of 3.6% of GDP by 2060 (11). These economic consequences can be reduced if prevention policies are implemented.

2. Unhealthy food environments undermine children's rights

It is becoming harder and harder for children around the world to access affordable and appealing healthy diets. Fuelled by the actions of a powerful food and beverage (F&B) industry, the globalisation of food systems is driving a transition towards unhealthy food environments where ultra processed foods and beverages, that are high in saturated fats, trans-fatty acids, free sugars, and/or salt, are easily available, convenient, cheap, and widely promoted (12-14). This transition has precipitated a global shift towards unhealthy diets which are the major cause of overweight, obesity and diet-related NCDs (15-21).

To curb this shift towards unhealthy diets, the World Health Organization (WHO) has urged its member states to implement a comprehensive suite of food environment regulations and policies. Evidencebased policies include the implementation of food and beverage taxes, marketing restrictions on unhealthy foods and beverages and a governmentled, mandatory front-of-pack nutrition labelling system for packaged foods and beverages (15, 22).

3. Sugar-sweetened beverages contribute to unhealthy diets and poor health in children

One major component of unhealthy diets in childhood is the excess consumption of sugar-sweetened beverages (SSBs), which across the life course contribute to weight gain, an increase in the risk of type 2 diabetes, heart disease, and other chronic diseases, as well as dental caries (23-26). Many SSBs are considered 'empty calories' as they offer no nutritional benefit but considerable health risks. SSBs are consumed at very high rates globally, particularly in high-income countries (27, 28). However, the consumption of SSBs across upper-middle and lowermiddle income countries is growing rapidly, at a rate of 2.2% and 6.6% per year respectively (27).

What's driving this high and growing rate of SSB consumption around the world? In addition to increasing evidence that consumption of SSBs can be addictive (29), SSBs are widely available and heavily promoted. But above all, they are cheap (30-34). Economic studies reveal that as the price of SSBs decreases, purchase and consumption of these unhealthy beverages increases (35-37). Currently, the prices of SSBs do not reflect the external costs to society. Taxation is a means by which governments can recoup the direct and indirect costs that arise from excessive consumption of unhealthy SSBs.

Box 1. Food enviornments

Food environments are spaces where children and their families interact or engage with food. Depending on how they are structured, they may either help or harm children's nutrition.

External environment



Personal environment

An unhealthy food environment is a food environment with low availability, accessibility, desirability and affordability of healthy foods; and high availability, affordability and promotion or marketing of unhealthy foods. Unhealthy food environments lead to increased consumption of unhealthy foods and beverages. It is increasingly recognized that unhealthy food environments violate multiple child rights.

Children deserve to live, learn and play in spaces where nutritious and affordable food is available for all.

They should be protected from promotion of unhealthy foods and beverages. Families and caregivers should be supported to provide healthy diets. The F&B industry should be incentivised and regulated to act in the best interest of children.

4. Why are SSB taxes important?

Internationally, food and beverage taxes have been recommended as a key part of a comprehensive approach to addressing childhood overweight and obesity and preventing diet-related NCDs. Taxing SSBs has been coined as a 'best buy' policy by the WHO (38) and the Commission on Ending Childhood Obesity (39), and has been reccommended by UNICEF for the prevention of childhood overweight and obesity (40).

The objectives of SSB taxes are five-fold:

- i. To increase the retail price of SSBs and reduce their purchase and consumption.
- ii. To encourage a shift to consumption of safe drinking water.
- iii. To shift societal norms by sending a powerful message that regular consumption of SSBs are not part of a healthy and nutritious diet.
- iv. To reduce free sugar intake in the population, particularly in children.
- v. To generate significant government revenue, which may be reinvested into societal health and wellbeing.

More than 40 jurisdictions around the world have already implemented SSB taxes (41). Consistent evidence across multiple countries and contexts show that SSB taxes reduce purchase and consumption of sugary drinks, reduce sugar intake in the population, and have a greater impact on lower income households who, in many, contexts have the highest consumption of SSBs (42, 43).

5. How do SSB taxes work?

Figure 1 shows the pathway by which SSB taxes influence consumption of SSBs and subsequently population health and economic outcomes.

Figure 1. How do SSB taxes work?





6. How do SSB taxes benefit children?

The table below describes the evidence for the impact that SSB taxes have on the price of SSBs, SSB consumption, energy intake, overweight and obesity, health outcomes, and economic outcomes.

SSB tax impact	Supporting evidence
Impact on consumption	A 10% tax levied against SSBs has been shown to lead to an 8 - 10% reduction in purchase and consumption (31, 42). Children are some of the greatest beneficiaries of SSB taxes. In response to the SSB tax in Mexico, declines in SSB consumption were greater for households with children (48). There was also an increase in drinking water purchases that was higher in low- and middle-income households and in urban areas. When an SSB tax was implemented in Thailand, the greatest decrease in SSB consumption was in children aged 6 – 14 years (49).
Impact on overweight and obesity	A 20% tax on SSBs has been demonstrated to reduce the prevalence of overweight by 1-3% and the prevalence of obesity by 1-4% (44-46, 50). As children experience some of the largest reductions in SSB purchase and consumption in response to a tax, it is logical to assume that they will experience the most impact on overweight and obesity. Modelling has shown this to be the case in Thailand (46).
Impact on health outcomes	SSB taxes can significantly reduce the incidence of type-2 diabetes, heart disease, stroke, and premature mortality (45, 47, 51). While children are less likely to see immediate reductions in NCDs from SSB taxes, childhood overweight and obesity increases the risk of overweight, obesity and NCDs later in life. Therefore, reductions in childhood SSB consumption due to a SSB tax will have substantial health benefits as children grow older.
Impact on economic outcomes	SSB taxes have resulted in substantial increases in government revenue (54-57). In best-practice scenarios, these funds are earmarked for public health and social programs. Such programs should benefit children.



7. What are the key considerations for the design of SSB taxes?

It is critical that governments choose the most effective and suitable type of SSB tax to guarantee maximum health and economic benefits. When choosing the type of SSB tax, consideration must be given to the products to tax, the rate of tax, and the tax base of the tax.

Products

SSB taxes may be levied on either a) all products of a certain type (i.e. all non-alcoholic beverages containing free sugars and artificial sweeteners), or b) products based on nutrient content criteria (e.g. products with ≥5g of added sugar per 100ml) (59). It is recommended that all beverages containing free sugars are taxed, including carbonated or noncarbonated soft drinks, fruit/vegetable juices and drinks, liquid and powder concentrates, flavored water, energy and sports drinks, ready-to-drink tea, ready-to-drink coffee, and flavored milk drinks. Nosugar or artificially sweetened beverages should also be considered in scope for taxation as there is evidence that these beverages increase the risk of adverse health outcomes and to avoid product substitution to these beverages (60).

Rate

To effectively protect the health of children, the magnitude or rate of SSB taxes must be large enough to elicit a change in consumption. There is a general consensus that the rate of a tax levied on SSBs should be at least 20% to successfully change consumer behaviour (61-63).

Tax base

SSB taxes may be charged as either a) an ad valorem tax, applied according to the value of a food or beverage product, or b) a specific tiered tax applied by volume or nutrient content of a food or beverage product (64, 65). A specific tiered tax, with rates tied to the volume of sugar in a beverage, is increasingly popular option as it penalises the beverages with the highest sugar content (41).

Best-practice for the design and implementation of SSB taxes includes provisions for monitoring, evaluation and enforcement mechanisms.

8. How should SSB taxes be implemented?

Key strategies to ensure that the implementation of SSB taxes is both efficient and successful include:

Policy design considerations

- Ensure that the objectives of the policy are clear: Clear policy objectives ensure that the policy is well designed, promotes transparency, and facilitates monitoring and evaluation to determine policy success. Baseline data to support monitoring and evaluation against the policy objectives needs to be collected.
- Clearly define targeted products: This helps to avoid confusion about which products are taxed and to identify potential substitutes for taxed products.
- **Consider international implications:** To avoid trade disputes, SSB taxes should not be seen to favor domestic over international products. For this reason, excise taxes are often recommended over import taxes. Any exemptions or exclusions for certain products need a strong public health justification.
- Ensure complementary policies to enable access to free, safe drinking water: The alternative to SSBs should be free and safe drinking water that is accessible to all. In certain settings it may require parallel investments/earmarking of funds to support water access - such as through provision of safe drinking water fountains in schools and public spaces.

Policy consultation process

- Consult with a broad range of stakeholders: Consultations with stakeholders are important for ensuring the transparency of the policy development process. It is, however, essential that there are safeguards to avoid conflicts of interest and undue industry influence in the policy-making process.
- Communicate to increase awareness: Proactive and frequent communication can increase public awareness of the positive health impact of SSB taxes. This in turn can increase support for policy implementation and reduce the likelihood of public mistrust. The messages need to be tailored to the local cultural context.

Policy support

- Foster cooperation across sectors: It is helpful to identify policy 'champions' (both individuals and organisations) at the start of the policy development process in order to build support and awareness. Cooperation between public health and tax or treasury sectors, backed by strong political leadership, is particularly important.
- Highlight evidence of positive economic impacts: Industry arguments against the implementation of SSB taxes can be addressed with evidence from studies showing net economic benefits from such policies.
- Earmark tax revenue: Earmarking or undertaking to use tax revenue and/or healthcare savings for expenditure on public health and social programs can increase public support for a measure.

Policy enforcement

Define enforcement procedures: An enforcement mechanism, and the ability to impose sanctions for non-compliance with SSB taxes, is essential. Enforcement procedures in place for existing taxes, such as those on tobacco and alcohol, may provide suitable frameworks

Policy monitoring and evaluation

Establish monitoring and evaluation mechanisms: Monitoring and evaluation of SSB taxes is essential for determining policy success and refining policy design where necessary. The government body that is responsible for monitoring should be identified early and the appropriate powers established through a legal instrument. Baseline monitoring should be conducted prior to implementation.

9. What can advocates do to support the implementation of a SSB tax?

To support the development and implementation of SSB taxes, academia, civil society and other advocates can help foster enabling environments for such policies. Actions to achieve this include:

Provide evidence in support of SSB taxes: It is helpful to present the evidence to policy

makers on the beneficial impact of SSB taxes in a clear and timely manner. This includes the impact on prices and consumption of SSBs as well as population health and economic outcomes. Such evidence can be based on global evidence including real-world examples from other countries.

- Support economic modelling studies: Country-specific economic modelling studies can provide estimates of the likely health and economic benefits of a SSB tax within the context of the country where a SSB tax is being considered.
- Support advocacy and education **campaigns:** Public support for a SSB tax is crucial for successful implementation. Education campaigns can increase public awareness of the harms of excess sugar intake, the misleading marketing tactics of the F&B industry, and the benefits of SSB taxes. Such social mobilisation can build support for the tax and minimise the negative influence of industry.
- Highlight revenue opportunities: The potential revenue implications of SSB taxes are a big selling point. Public health and children's advocates can highlight both the potential revenue raising opportunities presented by SSB taxes, and the potential for this revenue to support other health promotion and social programs.
- Form coalitions in support of SSB taxes: United voices are more likely to raise awareness of and support for SSB taxes. Public health and children's advocates should reach out to government agencies, civil society organisations, and academic institutions to ensure that consistent messaging is used when campaigning for SSB taxes.
- Minimise industry influence: The food and beverage industry will work to counter any SSB tax proposal. Public health and children's advocates should ensure that conflicts of interest are declared throughout the consultation and policy development process as well as preparing arguments ready to counter the statements made by industry.
- Provide support for monitoring and evaluation: There is a risk that independent monitoring and evaluation of SSB taxes may be neglected. Public health and children's advocates can provide support. Collaboration with academic institutions is one avenue for ensuring accurate evaluation of the impact of SSB taxes.

10. What are the arguments used by the food industry to counter SSB taxes?

"SSB taxes are regressive and will cause low-income groups to spend money they don't have"

Evidence for the impact of SSB taxes by differing income groups varies. In general, those with the greatest potential to benefit are those groups that consume the most SSBs. In Spain (66) and Chile (67), SSB taxes were found to have a larger impact on consumption of higher income groups, whilst in Hungary (55) and Mexico (68) SSB taxes were found to a have a greater impact on consumption in lower income groups because they had the highest levels of consumption at baseline. Whilst lower income households may notice the price impact the most – especially if they are high consumers, modelling studies show that they respond as intended and the health benefits and healthcare savings are also greater for lower income households (52). It is likely that the only thing that SSB taxes hurt are corporate profits.

"SSB consumption and health are individual choices and responsibilities"

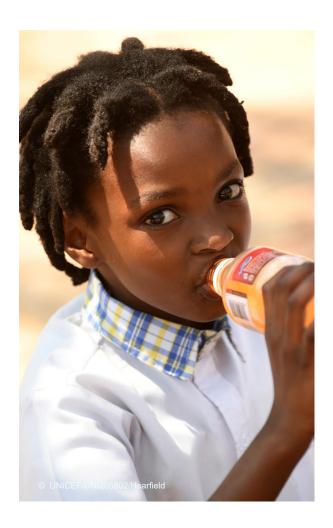
The predominance of unhealthy foods in the diet contrasts directly with the recommended diet for children. Today's food environment where unhealthy foods are cheap and heavily promoted conveys a profoundly distorted picture of what foods should appeal to, and be consumed by, children. The widespread availability of cheap SSBs directly undermines the efforts of parents and other caregivers to encourage healthy eating, with significant health and economic costs to individuals and society. The global healthcare costs attributed to obesity were estimated at more than USD 990 billion per year (10). These costs are disproportionally borne by the government and subsequently taxpayers and broader society, not just individuals.

"SSB taxes will reduce employment"

There is no evidence that SSB taxes lead to job losses as jobs are created in other sectors when consumption patterns change. No evidence of negative impact on employment was found in response to SSB taxes implemented in Chile (69), Mexico (70), and certain US cities (71).

"Overweight, obesity and unhealthy diets are complex problems that require complex solutions"

A suite of policy solutions is required to address unhealthy diets, childhood overweight and obesity. SSB taxes are a common and highly recommended component of a broad approach to addressing this issue (38).



11. Examples of successful SSB taxes from around the world

There is strong international evidence to support SSBs taxes. Key studies of successful SSBs include Mexico (37, 62, 68, 70, 72) and the United Kingdom (UK) (73, 74). Appendix 2 describes the impact of SSB taxes in countries where real-world evaluations of such policies have been conducted.



Mexico

The Mexican government introduced an excise tax of one peso per litre for all SSBs in January 2014 (37, 54, 58, 62, 68, 70, 72, 75, 76). At the time that the tax was introduced, this represented an excise tax of approximately 10%. The introduction of this tax was preceded by social mobilisation campaigns, highlighting the high sugar content of soda and linking consumption of sugar to risk of obesity and diabetes. The campaigns combined awareness raising with a call for a tax on sugary beverages. These education campaigns, as well as framing the tax as a revenue generating measure, were important for overcoming the opposition of industry and other key actors to the tax and generating public and government support for the policy.

The introduction of the tax resulted in a rise in SSB prices in Mexico of approximately one peso (around 11%). In other words, the tax was almost fully passed on to consumers. Following the introduction of the SSB tax, sales of SSBs in Mexico declined by an average 6% to 8% over 2014, relative to pretax levels, and this trend continued in the following years. Conversely, purchases of untaxed beverages increased by 4% to 6% over 2014, primarily driven by increased sales of plain water. Evidence suggests that the education campaigns released in advance of the tax were a contributing factor to the observed reduction in SSB purchasing. The impact of the tax on SSB purchases were greater for those households of a lower socioeconomic position, households located in urban areas, and households with children, all of whom were traditionally high-consumers of SSBs prior to the implementation of the tax.

According to the Mexican government, the SSB tax generated approximately USD1.2 billion over its first year (2014). There was an undertaking to earmark the revenue from the tax for programs to address diabetes and investment in water fountains in schools. but it was not included in the actual law. In the years following the tax there has been no significant change in employment in Mexico, either overall of within the beverage industry.

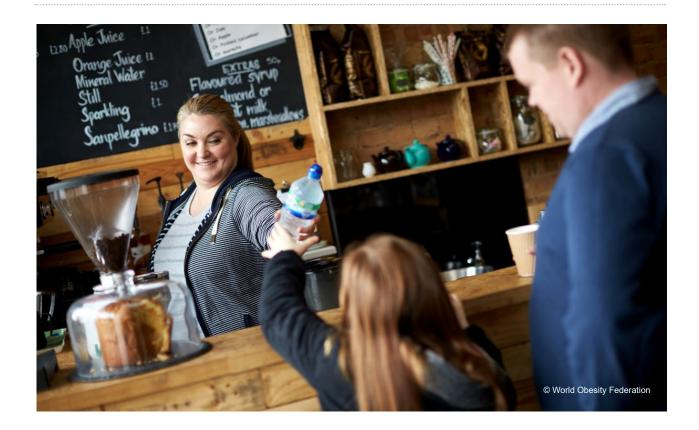


United Kingdom

In 2018, the UK introduced a 'Soft Drinks Levy': a specific tax on SSBs of 18p/L for SSBs with 5-8g added sugar per 100ml of product, and 24p per 100ml for SSBs with >8g added sugar per 100ml of product (73, 74, 77, 78). The UK Soft Drinks Levy was one of the first SSB taxes that was specifically designed to encourage product reformulation by offering a tiered tax system, with lower-sugar beverages receiving a lower tax rate. The tax was announced in 2016, two years prior to its implementation, to encourage SSB manufacturers to reduce the sugar content of their products over this time period.

The UK Soft Drinks Levy had a mixed impact on the price of beverages. The prices of high-sugar beverages increased by 7.5p on average, a tax pass-through rate of 31%. Meanwhile there were smaller impacts on the prices of low-sugar and nosugar beverages. There was a large reduction in the proportion of SSBs that were subject to the levy due to large reductions in the sugar content of these products.

In response to the UK Soft Drinks Levy, the volume of purchased SSBs that were subject to the levy (i.e. containing >5g of sugar per 100ml) decreased by 50%, with greater reductions seen for beverages that were subject to a higher levy rate (i.e. higher-sugar beverages). This resulted in substantive reductions in the quantity of sugar sold through taxed beverages in the UK. Purchasing of confectionery and alcoholic drinks did not change in response to the UK Soft Drinks Levy, indicating that consumers did not appear to substitute SSBs for other unhealthy food and beverage products.



Appendix 1: Glossary of key terms

Free sugars: Free sugars are sugars that are added to foods and beverages by the manufacturer, cook or consumer, plus the sugars that are naturally present in honey, syrups and fruit juices. The WHO recommends that no more than 10% of total energy intake come from free sugars (approximately 12 teaspoons), and preferably less than 5% of total energy intake (approximately 6 teaspoons) (79).

Sugar-sweetened beverages: Sugar-sweetened beverages (SSBs) are non-alcoholic beverages that contain free sugars. These include carbonated or non-carbonated soft drinks, fruit/vegetable juices and drinks, liquid and powder concentrates, flavored water, energy and sports drinks, ready-to-drink tea and coffee, and flavored milk (80). On average, a single can (355mL) of a SSB contains approximately 10 teaspoons of free sugars, and SSBs are a major source of excess sugar intake in children's diets around the world (80).

Ultra-processed foods and beverages: Ultra-processed foods and beverages are formulations of ingredients and food additives created by a series of industrial techniques and processes (81). They are typically high in saturated fats, trans-fatty acids, free sugars, and/or salt, and include fast-foods, sweet and salty snacks, readymade meals, many meat products, and SSBs.

Appendix 2: Evaluated SSB taxes around the world

Jurisdiction and year of policy implementation	Taxed products	Tax rate	Tax base	Impact on prices of taxed products	Impact of tax on consumption (overall)	Impact of tax on consumption (by subgroup)	Impact on consumer welfare and health	Tax revenue
Barbados (2015) (82)	Local and imported beverages with added sugar	10%	Ad Valorem	5.9% increase	Decrease in average weekly sales of: • All SSBs • 'Expensive' SSBs			
					Increase in average weekly sales of: 'Mid-range' priced SSBs Non-SSBs Bottled water			
Catalonia, Spain (2017) (66)	Pre- packaged beverages with added sugar	€0.08/L for SSBs with 5-8g sugar/100ml; €0.12/L for SSBs with >8g sugar/100ml	Specific	10-20% increase (expected)	Decrease in sales of taxed beverages in one major supermarket chain.	Greater impacts in high-income regions.		
Chile (2015) (83) (31, 67)	Beverages with added sugar	10-18% with concurrent 3% reduction in existing taxes on low and non- SSBs	Ad Valorem	1.6-1.9% increase	Decrease in monthly per capita purchase volume of high-sugar beverages. Mixed impacts on monthly per capita purchase volume of low-sugar or untaxed beverages.	Greater impacts for high-income households.	Greater welfare cost on low- income households	
Hungary (2011) (55)	Broad range of food and drinks containing salt, sugar and/or caffeine	Variable across products	Specific		Decrease in consumed quantities of processed foods No impact on consumed quantities of unprocessed foods	Greater impacts for households in the lowest income quartile.		HUF 61.3 billion (€200 million)
Mexico (2014) (37, 54, 62, 68, 70, 72)	SSBs	1 peso/L (approx. 10%)	Specific	Prices increased by the amount of the tax for all SSB and more than 1 peso for carbonated beverages	Decrease in per capita sales of:	Greater impacts for low-income (compared to high-income) households, urban (compared to rural) areas, high-purchasing (compared to low-purchasing) SSB households, and households with children (compared to households with no or fewer children)	No decrease in employment	Approximately USD1.2 billion over its first year
Norway (2018) (84)	Non- alcoholic beverages (including SSBs and artificially sweetened beverages)	Increase of €0.14/L	Specific	8% increase in SSB prices	No impact on mean weekly SSB sales.			
Saudi Arabia (2017) (35)	Carbonated SSBs Energy drinks	50% 100%	Ad valorem	Tax pass- through was 96% (48% price increase)	Decrease in sales of:			
Thailand (2017) (49)	SSBs	Differing tax rates for beverages containing 6–8g, 8–10g, 10–14g, 14–18g and >18g of sugar per 100ml.	Specific		Decrease in consumption of taxed beverages	Greatest reduction in SSB consumption seen for those aged 6 – 14 years		

Tonga (2013) (57)	Sweetened beverages and fruit juices	T\$0.50/ L containing >5g/100 ml to <20g/100 ml of sugar. T\$4/L for high- sugar beverages containing >20g/100ml of sugar.	Specific	Significant increase in the prices of taxed beverages	Imports of taxed beverages decreased. Value of bottled water and domestic soft drink manufacturing increased		SSB tax revenue totalled T\$8.4 million in 2017/18
United Kingdom (2018) (73, 74)	SSBs	18p/L for SSBs with 5-8g added sugar/100ml; 24p/L for SSBs with >8g added sugar/100ml	Specific	Variable impacts on price	For levied beverages: Decrease in mean weekly purchased household volume. Decrease in mean weekly purchased household sugar. For non-levy beverages: No impact on mean weekly purchased household volume Increase in mean weekly purchased household sugar. For all soft drinks combined: No impact on mean weekly purchased household sugar. For all soft drinks combined: No impact on mean weekly purchased household volume. Decrease in mean weekly purchased household sugar.		
United States, Berkeley (85)	Beverages with added sugar	\$0.01/oz	Specific	Price increase of 1.07-2.20c/oz in supermarkets and convenience stores	Decrease in SSB sales. Increase in sales of: Untaxed beverages Bottled water	67% of SSB revenue in the US was invested in social programs (56)	Average SSB tax revenue in the US (across 7 cities) was USD 133.9 million per city (56)
United States, Cook County (July 2017 and repealed in October 2017) (86)	Sweetened beverages (with sugar or artificial sweeteners)	\$0.01/oz	Specific	Prices pre- implementation: 3.51c/ox Prices post- implementation: 4.66c/oz Prices post- repeal: 3.55c/oz	Decrease in sales of taxed beverages	67% of SSB revenue in the US was invested in social programs (56)	Average SSB tax revenue in the US (across 7 cities) was USD 133.9 million per city (56)
United States, Oakland (2017) (87)	Beverages with added caloric sweeteners	\$0.01/oz	Specific	Prices of taxed beverages increased by 1.00 cent per ounce on average. Net increase was 0.66c/oz (comparison stores increased by 0.33c/oz)	No change in self- reported SSB intake	67% of SSB revenue in the US was invested in social programs (56)	Average SSB tax revenue in the US (across 7 cities) was USD 133.9 million per city (56)
United States, Philadelphia (2017) (88)	Sweetened beverages (with sugar or artificial sweeteners)	\$0.015/oz	Specific	Increases in price-per-ounce of 0.65c at supermarkets, 0.87c by at mass merchandise stores, and 1.56c at pharmacies.	Decrease in sales of taxed beverages	67% of SSB revenue in the US was invested in social programs (56)	Average SSB tax revenue in the US (across 7 cities) was USD 133.9 million per city (56)
United States, Seattle (89)	Sweetened beverages (with sugar or artificial sweeteners)	\$0.0175/oz or \$0.01/oz	Specific	Increase of 1.15c per oz.	Decrease in sales of taxed beverages	67% of SSB revenue in the US was invested in social programs (56)	Average SSB tax revenue in the US (across 7 cities) was USD 133.9 million per city (56)

References

- Convention on the Rights of the Child. New York; 1989.
- 2. Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. International journal of pediatric obesity: IJPO: an official journal of the International Association for the Study of Obesity. 2006;1(1):11-25.
- Yang L, Bovet P, Ma C, Zhao M, Liang Y, Xi B. Prevalence of 3 underweight and overweight among young adolescents aged 12-15 years in 58 low-income and middle-income countries. Pediatric obesity. 2019;14(3):e12468.
- World Health Organization. Obesity and overweight. Geneva;
- 5. Daniels SR. Complications of obesity in children and adolescents. International journal of obesity (2005). 2009;33 Suppl 1:S60-5.
- 6. Nguyen PV, Hong TK, Hoang T, Nguyen DT, Robert AR. High prevalence of overweight among adolescents in Ho Chi Minh City, Vietnam. BMC Public Health. 2013;13:141.
- World Health Organization. World Obesity Day: Understanding the social consequences of obesity Geneva: World Health Organization,; 2017 [Available from: https:// www.euro.who.int/en/health-topics/noncommunicablediseases/obesity/news/news/2017/10/world-obesity-dayunderstanding-the-social-consequences-of-obesity.
- 8. Soeroto AY, Soetedjo NN, Purwiga A, Santoso P, Kulsum ID, Suryadinata H, et al. Effect of increased BMI and obesity on the outcome of COVID-19 adult patients: A systematic review and meta-analysis. Diabetes & metabolic syndrome. 2020;14(6):1897-904.
- 9. Yang J, Hu J, Zhu C. Obesity aggravates COVID-19: A systematic review and meta-analysis. Journal of medical virology. 2021;93(1):257-61.
- World Obesity Federation. Calculating the costs of the consequences of obesity 2019 [3 September 2021]. Available from: https://www.worldobesity.org/resources/resourcelibrary/calculating-the-costs-of-the-consequences-of-obesity.
- Okunogbe A, Nugent R, Spencer G, Ralston J, Wilding J. Economic impacts of overweight and obesity: current and future estimates for eight countries. BMJ Global Health. 2021:6(10):e006351.
- Osei-Assibey G, Dick S, Macdiarmid J, Semple S, Reilly JJ, Ellaway A, et al. The influence of the food environment on overweight and obesity in young children: a systematic review. BMJ Open. 2012;2(6):e001538.
- 13. Hirvonen K, Bai Y, Headey D, Masters WA. Affordability of the EAT-Lancet reference diet: a global analysis. The Lancet Global Health. 2020;8(1):e59-e66.
- de Brauw A, Van den berg M, Brouwer ID, Snoek H, Vignola R, Melesse MB, et al. Food system innovations for healthier diets in low and middle-income countries. IFPRI Discussion Paper 1816. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/ p15738coll2.133156. 2019.
- Afshin A, Sur PJ, Fay KA, Cornaby L, Ferrara G, Salama JS, et al. Health effects of dietary risks in 195 countries, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet. 2019;393(10184):1958-72.
- Swinburn BA, Jolley D, Kremer PJ, Salbe AD, Ravussin E. 16. Estimating the effects of energy imbalance on changes in

- body weight in children. Am J Clin Nutr. 2006;83(4):859-63.
- 17. Chen X, Zhang Z, Yang H, Qiu P, Wang H, Wang F, et al. Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies. Nutrition Journal, 2020:19(1):86.
- Elizabeth L, Machado P, Zinöcker M, Baker P, Lawrence M. Ultra-Processed Foods and Health Outcomes: A Narrative Review. Nutrients. 2020;12(7).
- 19. Lane MM, Davis JA, Beattie S, Gómez-Donoso C, Loughman A, O'Neil A, et al. Ultraprocessed food and chronic noncommunicable diseases: A systematic review and meta-analysis of 43 observational studies. Obes Rev. 2021:22(3):e13146.
- 20. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. Am J Clin Nutr. 2006:84(2):274-88.
- Pagliai G, Dinu M, Madarena MP, Bonaccio M, Iacoviello L, Sofi F. Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. The British journal of nutrition. 2021;125(3):308-18.
- Report of the Commission on Ending Childhood Obesity . 22. Implementation plan: executive summary. Geneva; 2017.
- 23. Malik VS, Pan A, Willett WC, Hu FB. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. Am J Clin Nutr. 2013;98(4):1084-102.
- Bleich SN, Vercammen KA. The negative impact of sugarsweetened beverages on children's health: an update of the literature. BMC Obesity. 2018;5(1):6.
- Malik VS, Hu FB. Sugar-sweetened beverages and 25. health: where does the evidence stand? Am J Clin Nutr. 2011;94(5):1161-2.
- 26. Marshall TA. Preventing dental caries associated with sugarsweetened beverages. The Journal of the American Dental Association. 2013;144(10):1148-52.
- Baker P, Machado P, Santos T, Sievert K, Backholer K, Hadjikakou M, et al. Ultra-processed foods and the nutrition transition: Global, regional and national trends, food systems transformations and political economy drivers. Obesity Reviews. 2020;21(12):e13126.
- Singh GM, Micha R, Khatibzadeh S, Shi P, Lim S, Andrews KG, et al. Global, Regional, and National Consumption of Sugar-Sweetened Beverages, Fruit Juices, and Milk: A Systematic Assessment of Beverage Intake in 187 Countries. PLOS ONE. 2015;10(8):e0124845.
- Falbe J, Thompson HR, Patel A, Madsen KA. Potentially addictive properties of sugar-sweetened beverages among adolescents. Appetite. 2019;133:130-7.
- 30. Backholer K, Sarink D, Beauchamp A, Keating C, Loh V, Ball K, et al. The impact of a tax on sugar-sweetened beverages according to socio-economic position: a systematic review of the evidence. Public Health Nutrition. 2016;19(17):3070-
- Andreyeva T, Long MW, Brownell KD. The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food. American journal of public health. 2010;100(2):216-22.

- Thow AM, Downs S, Jan S. A systematic review of the effectiveness of food taxes and subsidies to improve diets: understanding the recent evidence. Nutrition reviews. 2014;72(9):551-65.
- Epstein LH, Jankowiak N, Nederkoorn C, Raynor HA, French 33. SA, Finkelstein E. Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review. Am J Clin Nutr. 2012;95(4):789-809.
- 34. Niebylski ML, Redburn KA, Duhaney T, Campbell NR. Healthy food subsidies and unhealthy food taxation: A systematic review of the evidence. Nutrition (Burbank, Los Angeles County, Calif). 2015;31(6):787-95.
- 35. Alsukait R, Wilde P, Bleich SN, Singh G, Folta SC. Evaluating Saudi Arabia's 50% carbonated drink excise tax: Changes in prices and volume sales. Economics and human biology. 2020:38:100868
- Smed S, Scarborough P, Rayner M, Jensen JD. The effects of 36. the Danish saturated fat tax on food and nutrient intake and modelled health outcomes: an econometric and comparative risk assessment evaluation. European journal of clinical nutrition. 2016;70(6):681-6.
- 37 Colchero MA, Salgado JC, Unar-Munguía M, Molina M, Ng S, Rivera-Dommarco JA. Changes in Prices After an Excise Tax to Sweetened Sugar Beverages Was Implemented in Mexico: Evidence from Urban Areas. PloS one. 2015:10(12):e0144408.
- 38. World Health Organization. Tackling NCDs. Geneva, Switzerland; 2017.
- 39. World Health Organization. Report of the Commission on Ending Childhood Obesity. Geneva; 2016.
- 40. UNICEF. Prevention of Overweight and Obesity in Children and Adolescents: UNICEF Advocacy Strategy and Guidance. New York; 2020.
- World Bank Group. Taxes on Sugar Sweetened Beverages: 41 International Evidence and Experiences. Washington DC; 2020
- 42 Teng AM, Jones AC, Mizdrak A, Signal L, Genç M, Wilson N. Impact of sugar-sweetened beverage taxes on purchases and dietary intake: Systematic review and meta-analysis. Obesity Reviews. 2019;20(9):1187-204.
- Wright A, Smith KE, Hellowell M. Policy lessons from health 43. taxes: a systematic review of empirical studies. BMC Public Health. 2017;17(1):583.
- Briggs ADM, Mytton OT, Kehlbacher A, Tiffin R, Rayner 44. M, Scarborough P. Overall and income specific effect on prevalence of overweight and obesity of 20% sugar sweetened drink tax in UK: econometric and comparative risk assessment modelling study. BMJ: British Medical Journal, 2013:347:f6189.
- 45 Veerman JL, Sacks G, Antonopoulos N, Martin J. The Impact of a Tax on Sugar-Sweetened Beverages on Health and Health Care Costs: A Modelling Study. PLOS ONE. 2016;11(4):e0151460.
- Phonsuk P, Vongmongkol V, Ponguttha S, Suphanchaimat 46 R, Rojroongwasinkul N, Swinburn BA. Impacts of a sugar sweetened beverage tax on body mass index and obesity in Thailand: A modelling study. PLOS ONE. 2021;16(4):e0250841.
- 47 Hangoma P, Bulawayo M, Chewe M, Stacey N, Downey L, Chalkidou K, et al. The potential health and revenue effects of a tax on sugar sweetened beverages in Zambia. BMJ Global Health. 2020;5(4):e001968.
- 48. Colchero MA, Molina M, Guerrero-López CM. After Mexico Implemented a Tax, Purchases of Sugar-Sweetened Beverages Decreased and Water Increased: Difference by Place of Residence, Household Composition, and Income Level. J Nutr. 2017;147(8):1552-7.

- Phulkerd S, Thongcharoenchupong N, Chamratrithirong A, Soottipong Gray R, Prasertsom P. Changes in Population-Level Consumption of Taxed and Non-Taxed Sugar-Sweetened Beverages (SSB) after Implementation of SSB Excise Tax in Thailand: A Prospective Cohort Study. Nutrients. 2020;12(11).
- 50. Schwendicke F, Stolpe M. Taxing sugar-sweetened beverages: impact on overweight and obesity in Germany. BMC Public Health. 2017;17(1):88.
- 51. Wilde P, Huang Y, Sy S, Abrahams-Gessel S, Jardim TV, Paarlberg R, et al. Cost-Effectiveness of a US National Sugar-Sweetened Beverage Tax With a Multistakeholder Approach: Who Pays and Who Benefits. American journal of public health. 2019;109(2):276-84.
- Lal A, Mantilla-Herrera AM, Veerman L, Backholer K, Sacks G Moodie M et al Modelled health benefits of a sugarsweetened beverage tax across different socioeconomic groups in Australia: A cost-effectiveness and equity analysis. PLOS Medicine. 2017;14(6):e1002326.
- 53. Long MW, Gortmaker SL, Ward ZJ, Resch SC, Moodie ML, Sacks G, et al. Cost Effectiveness of a Sugar-Sweetened Beverage Excise Tax in the U.S. American Journal of Preventive Medicine. 2015;49(1):112-23.
- Carriedo A, Koon AD, Encarnación LM, Lee K, Smith R, Walls H. The political economy of sugar-sweetened beverage taxation in Latin America: lessons from Mexico, Chile and Colombia. Globalization and Health. 2021;17(1):5.
- 55. Bíró A. Did the junk food tax make the Hungarians eat healthier? Food Policy. 2015;54:107-15.
- 56. Krieger J, Magee K, Hennings T, Schoof J, Madsen KA. How sugar-sweetened beverage tax revenues are being used in the United States. Preventive Medicine Reports. 2021;23:101388.
- 57. Teng A, Puloka V, Genç M, Filimoehala O, Latu C, Lolomana'ia M, et al. Sweetened beverage taxes and changes in beverage price, imports and manufacturing: interrupted time series analysis in a middle-income country. International Journal of Behavioral Nutrition and Physical Activity. 2020;17(1):90.
- Sánchez-Romero LM, Penko J, Coxson PG, Fernández A, 58. Mason A, Moran AE, et al. Projected Impact of Mexico's Sugar-Sweetened Beverage Tax Policy on Diabetes and Cardiovascular Disease: A Modeling Study. PLOS Medicine. 2016:13(11):e1002158.
- 59 Harding M, Lovenheim M. The effect of prices on nutrition: Comparing the impact of product- and nutrient-specific taxes. Journal of Health Economics. 2017;53:53-71.
- 60. Russell C, Grimes C, Baker P, Sievert K, Lawrence MA. The drivers, trends and dietary impacts of non-nutritive sweeteners in the food supply: a narrative review. Nutr Res Rev. 2020:1-67.
- Afshin A, Peñalvo JL, Del Gobbo L, Silva J, Michaelson M, O'Flaherty M, et al. The prospective impact of food pricing on improving dietary consumption: A systematic review and meta-analysis. PloS one. 2017;12(3):e0172277.
- 62. Colchero M, Popkin B, Rivera J, Ng SW. Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: Observational study. BMJ. 2016:352:h6704.
- Waterlander WE, Jiang Y, Nghiem N, Eyles H, Wilson N, 63 Cleghorn C, et al. The effect of food price changes on consumer purchases: a randomised experiment. The Lancet Public Health. 2019;4(8):e394-e405.
- World Cancer Research Fund. Building momentum: lessons on implementing a robust sugar sweetened beverage tax. UK; 2018.

- World Health Organization. Fisal policies for diet and prevention of noncommunicable diseases. Geneva Switzerland: 2015.
- 66. Vall Castelló J, Lopez Casasnovas G. Impact of SSB taxes on sales. Economics and human biology. 2020;36:100821.
- 67 Caro JC, Corvalán C, Reyes M, Silva A, Popkin B, Taillie LS. Chile's 2014 sugar-sweetened beverage tax and changes in prices and purchases of sugar-sweetened beverages: An observational study in an urban environment. PLOS Medicine. 2018;15(7):e1002597.
- 68 Colchero MA, Rivera-Dommarco J, Popkin BM, Ng SW. In Mexico, Evidence Of Sustained Consumer Response Two Years After Implementing A Sugar-Sweetened Beverage Tax. Health Affairs. 2017;36(3):564-71.
- 69. Paraje G, Colchero A, Wlasiuk J, Sota A, Popkin B. The effects of the Chilean food policy package on aggregate employment and real wages. Food Policy. 2021;100:102016.
- 70. Guerrero-López CM, Molina M, Colchero MA. Employment changes associated with the introduction of taxes on sugarsweetened beverages and nonessential energy-dense food in Mexico. Preventive Medicine. 2017;105:S43-S9.
- 71. Powell LM, Wada R, Persky JJ, Chaloupka FJ. Employment impact of sugar-sweetened beverage taxes. Am J Public Health. 2014;104(4):672-7.
- 72. Colchero MA, Guerrero-López CM, Molina M, Rivera JA. Beverages Sales in Mexico before and after Implementation of a Sugar Sweetened Beverage Tax. PloS one. 2016;11(9):e0163463.
- Public Health England. Sugar Reduction: Report on Progress 73. between 2015 and 2019. . UK; 2019.
- 74. Pell D, Mytton O, Penney TL, Briggs A, Cummins S, Penn-Jones C, et al. Changes in soft drinks purchased by British households associated with the UK soft drinks industry levy: controlled interrupted time series analysis, BMJ. 2021;372:n254.
- James E, Lajous M, Reich MR. The Politics of Taxes for 75 Health: An Analysis of the Passage of the Sugar-Sweetened Beverage Tax in Mexico. Health Systems & Reform. 2020;6(1):e1669122.
- 76. Álvarez-Sánchez C, Contento I, Jiménez-Aguilar A, Koch P, Gray HL, Guerra LA, et al. Does the Mexican sugarsweetened beverage tax have a signaling effect? ENSANUT 2016. PloS one. 2018;13(8):e0199337-e.
- Bandy LK, Scarborough P, Harrington RA, Rayner M, Jebb 77 $\ensuremath{\mathsf{SA}}.$ Reductions in sugar sales from soft drinks in the UK from 2015 to 2018. BMC Medicine. 2020;18(1):20.
- 78. Scarborough P, Adhikari V, Harrington RA, Elhussein A, Briggs A, Rayner M, et al. Impact of the announcement and implementation of the UK Soft Drinks Industry Levy on sugar content, price, product size and number of available soft drinks in the UK, 2015-19: A controlled interrupted time series analysis. PLoS medicine. 2020;17(2):e1003025-e.
- 79. Guideline: Sugars intake for adults and children. Geneva; 2015
- 80 Taxes on sugary drinks: Why do it? Geneva; 2017.
- Petrus RR, do Amaral Sobral PJ, Tadini CC, Gonçalves CB. The NOVA classification system: A critical perspective in food science. Trends in Food Science & Technology. 2021:116:603-8.
- 82 Alvarado M, Unwin N, Sharp SJ, Hambleton I, Murphy MM, Samuels TA, et al. Assessing the impact of the Barbados sugar-sweetened beverage tax on beverage sales: an observational study. International Journal of Behavioral Nutrition and Physical Activity. 2019;16(1):13.
- Nakamura R, Mirelman AJ, Cuadrado C, Silva-Illanes N, 83. Dunstan J, Suhrcke M. Evaluating the 2014 sugar-sweetened

- beverage tax in Chile: An observational study in urban areas. PLOS Medicine 2018:15(7):e1002596
- 84 Øvrebø B, Halkjelsvik TB, Meisfjord JR, Bere E, Hart RK. The effects of an abrupt increase in taxes on candy and soda in Norway: an observational study of retail sales. International Journal of Behavioral Nutrition and Physical Activity. 2020:17(1):115.
- 85. Silver LD, Ng SW, Ryan-Ibarra S, Taillie LS, Induni M, Miles DR, et al. Changes in prices, sales, consumer spending, and beverage consumption one year after a tax on sugarsweetened beverages in Berkeley, California, US: A beforeand-after study. PLoS medicine. 2017;14(4):e1002283-e.
- 86. Powell LM, Leider J. Evaluation of Changes in Beverage Prices and Volume Sold Following the Implementation and Repeal of a Sweetened Beverage Tax in Cook County, Illinois. JAMA Network Open. 2020;3(12):e2031083-e.
- Cawley J, Frisvold D, Hill A, Jones D. Oakland's sugar-87. sweetened beverage tax: Impacts on prices, purchases and consumption by adults and children. Economics & Human Biology. 2020;37:100865.
- 88 Roberto CA, Lawman HG, LeVasseur MT, Mitra N, Peterhans A, Herring B, et al. Association of a Beverage Tax on Sugar-Sweetened and Artificially Sweetened Beverages With Changes in Beverage Prices and Sales at Chain Retailers in a Large Urban Setting. Jama. 2019;321(18):1799-810.
- Powell L, Leider J. The Impact of Seattle's Sweetened 89. Beverage Tax on Beverage Prices and Volume Sold. Economics & Human Biology. 2020;37:100856.