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Food policies and population health

Earmarked soda tax revenues: How governments use soda tax revenues

LUKAS ROTH - 50938

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Abstract

Obesity is a global problem with serious health and economic consequences, including diabetes and other NCD. Governments should employ obesity-fighting policies with proven effectiveness, like soda taxes and FOP labelling. Statistical evidence supports the association between beverage taxes and health outcomes, while the significance of FOP remains uncertain. Instead of general funds, governments must allocate beverage tax revenues to obesity prevention initiatives. Due to reformulations, global beverage tax revenues have been less than anticipated, with parts still unaccounted for. Education is also crucial in the fight against obesity, and policymakers must establish incentives for businesses to make healthier dietary choices.

Keywords

SSB Tax, Soft Drinks, Obesity, Diabetes, Sugar-Sweetened Beverages, FOPs, Food Labels, Food Label Policies, Soda Tax Revenues, SDIL, Earmarked Revenues

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List of Abbreviations

BMI Body Mass Index

CDC Centers for Disease Control and Prevention

FDA Food and Drug Administration

FOP Front-of-pack

GBD Global Burden of Disease

GDP Gross Domestic Product

IHME Institute for Health Metrics and Evaluation

LDL Low-density lipoprotein

NCD Non-communicable diseases

PE Physical education

SDIL Soft Drinks Industry Levy (tiered soft drink tax in the UK)

SSB Sugar-Sweetened Beverages

WHO World Health Organization

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General introduction

In recent years, the global rise in obesity has become a critical public health concern, with serious consequences for both individuals and society at large. Obesity is linked to a variety of chronic diseases, including type 2 diabetes, cardiovascular diseases, and certain types of cancer (WHO 2021a). Exacerbated by the increased availability and marketing of energy-dense, nutrient-poor foods, the challenge of addressing obesity has given rise to a multitude of policy interventions, such as taxation and food labelling requirements. The primary aim of this thesis is to investigate the relationship between different food policies and obesity, focusing on identifying the policies most effective at reducing rates of obesity in various populations.

We start with a general overview of food policies to combat obesity. Based on desk research, we identify the various policies that governments across the world have implemented, map where key policies are in place —namely, soda taxes and Front-of-Package (FOP) labelling requirements—, and summarize their main impacts as documented in the literature.

Using statistical analysis, Part A of this thesis investigates the effects of soda taxes and FOP labelling requirements on population health. We combined information on if and when each country introduced a soda tax of FOP labelling requirements with data on the prevalence of overweight and obesity, type 2 diabetes, and other population health indicators, to create a panel of countries observed over 10 years. We apply panel data regression with country-fixed effects and control for several time-varying variables like GDP and health expenditure.

Part B explores the uses of government revenues from soda taxes, focusing on the UK. We compare and analyze the intended and actual utilization of soda tax revenues, by investigating government reports and academic papers. The aim is to determine whether soda tax revenue spending was in accordance with government commitments and WHO recommendations. Despite the UK's focus, other countries with a soda tax are also considered. A summary of results and their implications for policy and future research conclude this thesis.

Part 0: Policy options to combat obesity

(Group part)

1. Background

According to WHO, adults with a body mass index (BMI) of 25 or above are considered overweight, and those with a BMI of 30 or higher are classified as obese. Obesity and overweight can be caused by an imbalance between the amounts of energy ingested and energy expended. Obesity can be genetically predisposed, while social and cultural factors also play a significant role in its development (Locke et al. 2015). Additionally, environments that discourage or make healthy dietary and physical activity choices more difficult are obesogenic (e.g., neighborhoods that lack green spaces for outdoor activities or where a majority of dining options are fast food restaurants; Mackenbach et al. 2014). Obesogenic environments are predominantly low-income areas, which may contribute to inequalities in nutrition-related health outcomes (Atanasova et al. 2022).

There has been a global shift in average energy intake/energy expended, with individuals consuming more energy-dense meals and participating in substantially less physical exercise (Popkin, Adair, and Ng 2012). Research suggests that wealthier nations have a higher prevalence of obesity and that a 1% increase in gross domestic product (GDP) correlates with a similar increase in the prevalence of obesity (Talukdar et al. 2020). This is partly related to the abundance of (processed) food, rich in sugar, fat, and salt, and an increase in the proportion of sedentary jobs (Popkin, Adair, and Ng 2012).

Since 1975, worldwide obesity has nearly tripled, and in 2016, over 1.9 billion adults were overweight, with over 650 million being obese. Additionally, in 2020, nearly 400 million children and adolescents aged <19 were also affected by overweight or obesity, emphasizing the need for effective prevention strategies (WHO 2021b). Obesity is a well-established risk factor for many noncommunicable diseases (NCD), including cardiovascular disorders,

cancers, and especially, type 2 diabetes, as it correlates with other risk factors for NCD like high systolic blood pressure and high low-density lipoprotein (LDL) cholesterol (Institute for Health Metrics and Evaluation 2019). According to the International Diabetes Federation (2019), around 463 million persons suffered from diabetes in 2019. By 2045, this number is anticipated to increase to 700 million. Such health developments illustrate the need for political intervention, in the form of legislation and policies, to combat obesity and mitigate its adverse health impacts.

2. Methods

In this study, we identified the food-related policies implemented across the world through desk research. We searched the UNC-Chapel Hill Global Food Research Program database (https://www.globalfoodresearchprogram.org) and the NOURISH and MOVING policy databases (https://policydatabase.wcrf.org) in order to obtain information on 1) policy options and 2) where and when policies were implemented. We completed and corroborated that information using additional sources and conducted a literature search to identify the effects of the policies.

3. Results

3.1. Policies and measures against obesity

Some nations have implemented mandatory and voluntary food policies to encourage healthier diets through four main mechanisms: providing an environment favorable to healthy preferences, reducing barriers to living a healthy lifestyle, encouraging individuals to review their unhealthy shopping choices, and promoting food system reactions (Hawkes et al. 2015).

Indeed, food policies can have a direct or indirect effect on the supply and prices of goods, the information consumers receive, and consumer behavior.

3.2. Soda taxes

As a significant source of added sugar in the diets of many individuals, and a significant contributor to obesity and type 2 diabetes, sugar-sweetened beverages (SSB), such as soda, have been a subject of particular concern. The WHO (2017b) recommends that countries tax soda to help reduce its consumption and prevent obesity, by increasing the prices of the drinks and encouraging producers to reformulate. Taxation is also an effective way to raise revenues to pay, for example, for rising healthcare costs associated with the growing burden of NCD (further discussed in Part B).

According to WHO (2022), more than 85 countries have implemented some kind of SSB tax. SSB taxes can take different forms but mostly consist of an excise tax on the production or sale of SSB. SSB taxes are generally volume-based, meaning that the amount of the tax varies according to can/ bottle size. Most countries still impose a flat or single-tier tax on sugary beverages (e.g., one peso per liter in Mexico), whereas more recently, countries began to tax soda depending on sugar content, by imposing a greater tax on beverages with higher sugar content (i.e., multi-tier tax, e.g., 18 pence per liter for drinks with 5-8 grams of sugar per 100mL, 24 pence per liter for drinks with more than 8 grams of sugar per 100mL in the UK; Chriqui et al. 2013). The maps in Figure 1 show the global trend in the implementation of soda taxes between 2010 and 2019. They show that more countries have introduced either single-tier SSB taxes (1) or multi-tier taxes (2) over that period.

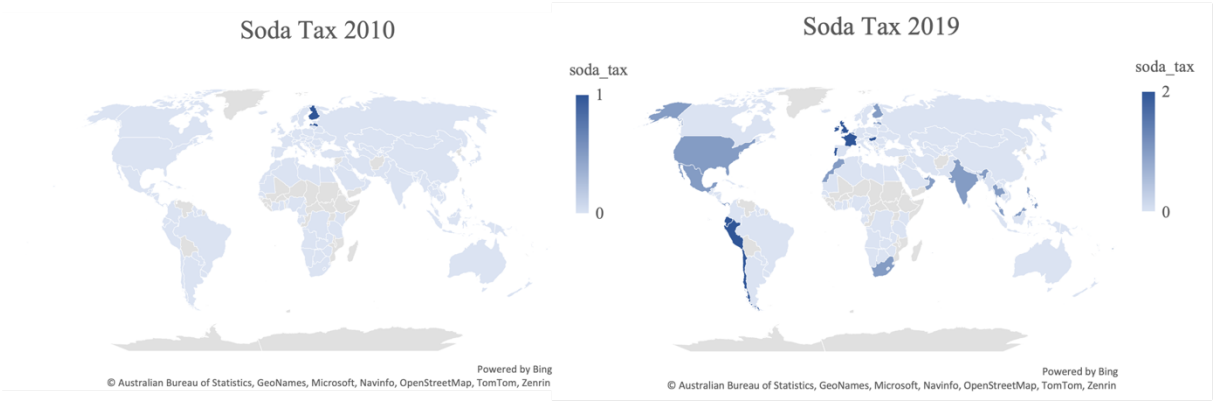


Figure 1: Soda taxes across the world, 2010 vs. 2019

Note: In the US, there isn't a national soda tax. Rather, there are several cities that have introduced soda taxes, namely Boulder (Colorado), Philadelphia (Pennsylvania), Seattle (Washington), and four California cities: Albany, Berkeley, Oakland, and San Francisco (UNC-Chapel Hill 2023).

In 2014, Mexico was one of the first nations to introduce a sugar tax, which applied to sugary foods as well as beverages with added sugars and caloric content exceeding 5kcal/100mL. The levy was set at one peso per liter and was projected to raise the price of sugary drinks by 12% (Colchero et al. 2016). A study discovered a 5.5% decrease in sugary drink consumption among adults one year after the tariff was enacted (Barrientos-Gutierrez et al. 2018). Research conducted two years after the adoption of the tax revealed a 7.6% decrease in sugary drink purchases (Colchero et al. 2017). Considered a success, the Mexican sugar tax has served as a model for other nations implementing similar measures.

Obesity rates are particularly high in Latin America, with 24 countries recording a proportion of obese people equal to or greater than 20% of the population. This has led to these nations being early adopters of sugar taxes as a public health intervention (Pan American Health Organization and Food and Agriculture Organization of the United Nations 2017; Duran et al. 2021). To tackle increasing rates of obesity, Chile increased its levy on beverages with added sugars and caloric content above 6.25kcal/100mL from 13% to 18% in 2014 (Caro et al. 2018). Through the tax increase, studies revealed a 21.6% decrease in sugary beverage purchases, with

the highest decrease seen in low-income households (Nakamura et al. 2018). A study in Argentina, where there isn't yet a soda tax, used household microdata to analyze the price elasticity of SSB and estimate the impacts of implementing a hypothetical soda tax. The results were values ranging between -1.10 and -1.15, meaning that if prices would increase by 10%, the number of sugary beverages consumed would drop by between 11.0 and 11.5% (Maceira et al. 2023).

In the US, soda taxes have been implemented at the city level, rather than the state or national level. For example, according to a study conducted in Berkeley, California, the taxation of SSB, by 1 cent per ounce, led to a 21% reduction in sugary drink consumption (Falbe et al. 2016).

In 2018, the UK imposed a soda tax on beverages with added sugars. The tax was set at 18 pence per liter for beverages with a sugar level between 5 and 8 grams per 100mL, and 24 pence per liter for beverages with a sugar content of more than 8g/100mL (Forde et al. 2022). Research conducted one year after the adoption of the levy revealed a 28.8% decrease in the sugar content of beverages subject to the SDIL (Public Health England 2019). Many popular soft drinks have been reformulated in response to the UK's soda tax, which has been deemed a success. Reformulation incentives arise because of the multi-tier design, as manufacturers can pay a lower tax by decreasing sugar content below the 8 grams per 100mL threshold (Allais et al. 2023). A study also estimated that the UK soda tax could result in 144,000 fewer adults with obesity and 19,000 fewer cases of type 2 diabetes (Briggs et al. 2017). According to the World Cancer Research Fund International, the levy led to a reduction of over 5,000 cases of obesity among girls aged 10 and 11 years old in the sixth year (O'Mara and Vlad 2023). A (multi-tier) soda tax can incentivize multiple responses from manufacturers. For example, following the Irish soda tax, implemented in 2018, Coca-Cola Ireland reformulated drinks and started to offer more drinks with no or less sugar. They have allegedly passed on the sugar tax completely to

retailers. Additionally, the sizes have changed, e.g., they have adjusted the size of the original Coca-Cola, whose sugar content was not adjusted in order not to change the original recipe appreciated by many customers (now only 1.5L instead of 1.75L bottles are available for purchase). In contrast, the sizes of Coke Zero Sugar or Diet Coke were increased from 1.75L to 2L (Coca-Cola Company n.d.).

Overall, although not every study has found a significant impact of soda taxes on consumption, the majority has, and according to Andreyeva (2022), a meta-analysis of 33 articles, covering 16 SSB taxes, estimates a 9%-20% reduction in SSB sales (95% confidence interval). Therefore, soda taxation could result in an improvement in public health (Andreyeva et al. 2022). A 20% levy on sugary drinks might lower obesity rates by 3.5%, resulting in major health benefits (Teng et al. 2019). Introducing soda taxes can also create revenue for public services and goods such as healthcare, education, and infrastructure (Part B).

However, the effectiveness of soda taxes may vary, depending on variables such as the targeted population and tax rate. Despite evidence of their efficacy, many nations have not yet implemented such levies (Backholer et al. 2016). In fact, new taxes are highly unpopular with voters. Besides, the introduction of soda taxes is often criticized for being regressive because soda taxes disproportionately affect households with lower incomes (Edmondson et al. 2022), as soda taxes are mostly passed on to the consumers (Seiler, Tuchman, and Yao 2020). In addition, a soda tax focuses solely on sugar as an ingredient. It may affect the intake of sugary soft drinks, but it does not eliminate the underlying cause of obesity. Obesity has to do with energy balance (see Background), which must not be neglected, and if calories are consumed from other unhealthy foods and drinks, in alternative to sugary beverages, then a tax on soft drinks tackles only a portion of a much larger problem (Griffith, O'Connell, and Dubois 2018). Lastly, the fact that the soda industry has been known to oppose soda taxes using lobbying and advertising to manipulate public opinion is a further reason why soda taxes may not be adopted.

In 2018, the soda industry spent millions to defeat soda tax plans in California (Silver et al. 2017). Despite limitations, soda taxes seem to be an effective policy against sugar overconsumption and can generate revenues for complementary public health measures (Part B).

3.3. Front-of-package labelling requirements

Another very common policy are front-of-package (FOP) labelling requirements. FOP labelling involves warning or instructional labels to educate consumers about healthier options or to draw attention to potentially harmful ingredients (Roberto et al. 2021). FOP labelling has been implemented primarily to assist consumers to make informed and healthier choices (Champagne et al. 2020) but can also encourage the industry to reformulate products in the direction of healthier alternatives. Since 1989, FOP labels have been designed to influence nutrition and to prevent obesity and diabetes (Muzzioli et al. 2022). Organizations such as the International Heart Federation advocate for the implementation of mandatory FOP labels. Presently, just the declaration of ingredients, nutritional information, and allergens on food labels are mandatory in Europe (Engelhardt et al. 2023). Yet, some countries have already introduced additional voluntary FOP labelling policies, which are more visible than the existing back-of-package information, to provide consumers with more information. The maps in Figure 2 show which countries had voluntary (1) or mandatory (2) FOP labelling requirements in 2010 and 2019. A rise in popularity for such labels can be seen globally.

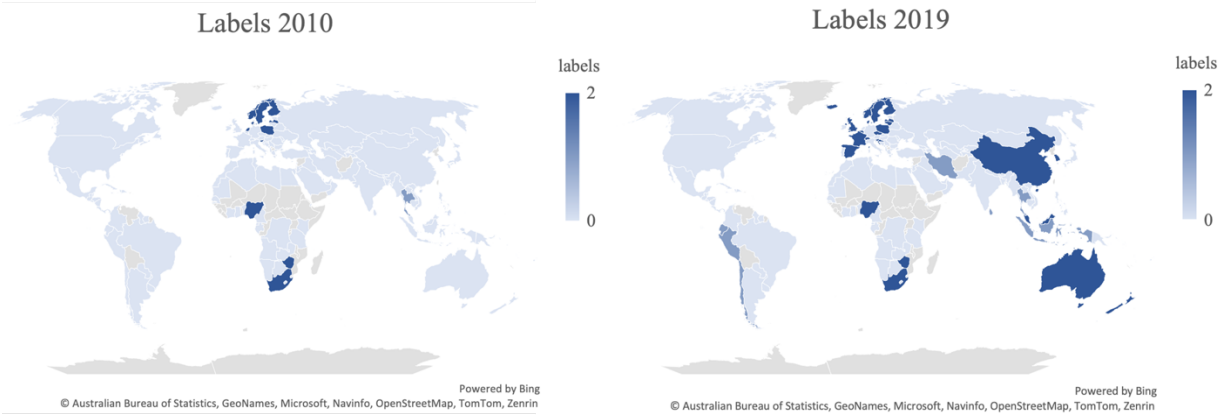
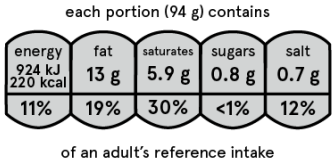


Figure 2: FOP labelling requirements across the world, 2010 vs. 2019

There is substantial variety in FOP nutrition labelling schemes across the globe. Labels may vary e.g., in size, shape, or color (Kanter, Vanderlee, and Vandevijvere 2018). As recommended by the Institute of Medicine of the National Academies, the most prevalent schemes include values for sodium, fats (saturated, trans), and total sugars (McGuire 2012). Table 1 provides an overview of voluntary FOP labelling initiatives implemented during 2010-2019.

Table 1: Overview of FOP labels

Label	Name and Description	Implemented in
NUTRI-SCORE A B C D E	**Nutri-Score:** Classifies food products into five categories based on nutritional quality, from A (dark green, high nutritional quality) to E (red, poor nutritional quality).	France (2017) and adopted by several other European countries (European Food Information Council 2022).
Each serving (150g) contains Energy 1046kJ 250kcal: 13% Fat 3.0g LOW: 4% Saturates 1.3g LOW: 7% Sugars 34g HIGH: 38% Salt 0.9g MED: 15% of an adult's reference intake Typical values (as sold) per 100g: 697kJ/ 167kcal	**UK traffic light scheme:** Combines the percentage reference intake label with a color-coding system to indicate the nutritional value of food products.	UK (2013) (BBC 2016; (Food Standards Agency 2020).
HEALTHY CHOICE ® BASED ON INTERNATIONAL DIETARY GUIDELINES	**The Choices logo:** An endorsement program that allows food products with healthier nutritional profiles within a product category to display this seal.	Poland, Czech Republic (previously in the Netherlands, withdrawn in 2017; Storcksdieck et al. 2020).

	**Reference Intake Label:** Indicates the amount of energy and nutrients (fat, saturates, sugars, and salt) in a portion of food and what percentage of the daily reference intake (2000 kcal/day) that portion represents.	Developed in 2006 and updated in 2011, introduced in Europe, with color-coded versions in Portugal and Spain (FOODDRINKEUROPE 2014).
	**The Keyhole Symbol:** Represents healthy options within 32 food groups, meeting specific standards for fat, sugar, salt, wholegrain, and fruits and vegetables.	Sweden, Denmark, and Norway in 2009 (World Cancer Research Fund International 2016).

Depending on the design, FOP labels can be more or less effective. A study found that traffic light styles are easier to compare and interpret and are thus more effective in promoting healthier food choices, compared to the nutrition table format or the recommended daily amounts (Siegrist, Leins-Hess, and Keller 2015). Traffic light systems can help children and people especially focused on reducing intake of one main ingredient, like sugar, fat, or salt. Other easily visible symbols, such as the Choices logo and the Keyhole Symbol, help consumers find healthier food options when shopping. Regarding the reference intake label, which contains solely numbers, buyers with low levels of education may have difficulties understanding it. In addition, the references are based on the healthy weight and average activity level of adults, making it less useful for consumers such as children, pregnant women, and the elderly (Tarabella and Voinea 2013). Overall, the use and comprehension of FOP labels are also influenced by differences in interest in healthy eating, nutrition knowledge, and socioeconomic status (Grunert et al. 2010).

Limitations of FOP labels are first, that they mainly emphasize poor nutrients, and it can be difficult to evaluate foods of the same category that may also include rich nutrients. Another limitation is that FOP labels are blind to quantity or frequency of consumption, and

some consumers may indulge in green-labeled products in a manner that eventually has a detrimental impact on their nutritional intake (Tarabella and Voinea 2013).

Evidence suggests that the adoption of FOP labels has been mildly beneficial. After the implementation of FOP labelling in Chile in 2016 (labelling system including warnings for high-sugar, high-sodium, and high-saturated fat items), the purchase of sugary beverages decreased by 23.7% (Taillie et al. 2020). However, this only amounts to daily savings of 23mL per individual, or 9 calories (Geldart 2023). Another study revealed that after the introduction of the Choices label in the Netherlands, sales of products with the label increased, which could indicate that customers are making better food choices (Smed, Edenbrandt, and Jansen 2019).

In conclusion, while FOP labels can be beneficial in promoting healthy eating habits and boosting transparency in the food sector, they can also be costly to implement and may not necessarily address all health problems successfully. The existing FOP labels show advantages but there is still room for improvement. Nevertheless, in 2019, one million Europeans signed a petition to make the Nutri-Score mandatory across Europe (Connexion journalist 2019), and the International Agency for Research on Cancer, which is part of the WHO, urged the EU Commission to establish the Nutri-Score on a mandatory basis throughout Europe. However, national legal obligations preclude labelling from becoming required under European law (WHO 2021b). In 2020, the European Commission endorsed the Farm to Fork Strategy, which also involves developing a system to provide consumers with more and clearer information so they can make better and healthier decisions via standardization of the required FOP nutrition labels (European Commission n.d.).

3.4. Additional measures to combat obesity

Besides soda taxes and FOP labelling policies, governments have implemented a range of other measures to combat obesity. *Reformulation agreements* involve working with food

manufacturers to reduce the sugar, fat, and salt content of their products. For example, the UK government has successfully launched a sugar reduction program that involves reformulation agreements with the food industry. This approach has resulted in significant sugar content reductions in numerous goods. Lithuania is a further illustration of this type of action, where the government agreed to put the implementation of a sugar tax on hold if food makers significantly cut the salt and sugar content of their products (News Desk 2018). The feasibility and social acceptability of this measure are relatively high, as food manufacturers are often willing to cooperate in exchange for incentives such as tax breaks or positive public relations (Public Health England 2017). However, despite the success of reformulation regarding sugar content reduction in SSB, it can be seen in the UK that consumers ate more high-sugar foods in 2019 and 2020 that had not been reformulated (e.g., chocolate) and fewer foods with the greatest sugar reductions (e.g., cereal and yogurt; Geldart 2023), decreasing the positive effect of sugar reduction.

Several nations have implemented *menu labelling regulations* to address obesity by providing consumers with calorie and nutritional information when making meal selections (Bleich, Economos, et al. 2017). The Food and Drug Administration (FDA) enacted countrywide menu labelling laws in the US in 2018, mandating that chain restaurants with 20 or more locations show calorie information on menus (Food and Drug Administration (FDA) 2019). The requirements are intended to help customers make educated food consumption decisions and to promote healthier eating habits. Some research suggests that providing customers with calorie information can result in minor decreases in their calorie intake (VanEpps et al. 2016).

Another approach that can be useful in promoting healthy eating habits is *public procurement of nutritious foods*. Governments can utilize their purchasing power to stimulate demand for healthier foods and encourage the food industry to offer healthier alternatives. In

relation to the EU's Farm to Fork Strategy, which aims to increase the availability and affordability of sustainable foods, actions include determining the most effective methods for establishing minimum mandatory criteria for sustainable food procurement in order to promote healthy and sustainable diets, including the consumption of organic products, in schools and public institutions (European Commission, n.d.).

Restrictions on general marketing, particularly advertisements that target children, can also be useful in reducing the intake of harmful foods. WHO has suggested that governments prohibit the marketing of harmful foods to children, citing evidence that such marketing promotes children's consumption of unhealthy foods. Concerns regarding freedom of expression and the potential economic impact on the food sector frequently limit the practicability of this approach (WHO 2010). A study found that exposure to harmful food advertising on television and the internet contributes to childhood obesity (Coleman et al. 2022).

Much attention has been paid to *workplace wellness programs* as a feasible method to promote employee health and well-being, particularly in combating the obesity epidemic. Generally, these programs try to encourage healthy habits, stimulate physical activity, and enhance nutritional choices among employees (Sutliffe et al. 2018). Research indicates that well-designed workplace wellness programs can enhance the body weight, overall health outcomes, and satisfaction of employees (Song and Baicker 2019). Effective programs frequently include components such as health risk assessments, individualized feedback, goal setting, and self-monitoring tools (Goetzel et al. 2014). In addition, these programs may involve environmental improvements in the workplace, such as providing healthier food options in cafeterias, designing areas for physical activity, and encouraging employees to take breaks for physical activity (Benedict and Arterburn 2008). Some companies also contribute to the cost of Gym memberships (Heinen and Darling 2009). The usefulness of workplace wellness programs

is supported by a growing body of evidence. For example, a systematic review by Hutchinson and Wilson (2011) discovered that workplace interventions concentrating on food and physical activity can result in a slight reduction in body weight among employees, which is also supported by the results of a study by Schroer, Haupt, and Pieper (2013). Google's adoption of the "HealthWorks" program is one best-practice example of a successful workplace wellness program, offering an extensive array of interventions (Sullivan and Lachman 2017). The HealthWorks program has shown significant gains in employee health behaviors, with participants experiencing decreases in BMI, improvements in exercise levels, and increases in fruit and vegetable consumption (Sullivan and Lachman 2017). Although this is considered an example of best practice, it must be noted that it only targets a subset of individuals who have already achieved a higher socioeconomic status and therefore does not help to reduce inequality.

Active transportation policies, which encourage walking, bicycling, and the use of public transportation, are now recognized as excellent methods for boosting physical activity and avoiding obesity. Governments may play an important role in the implementation and promotion of these policies by investing in infrastructure, providing safe settings, and developing community activities that support active transportation (Sallis et al. 2016). The city of Copenhagen, for instance, has implemented a comprehensive active transportation policy that includes the development of a vast bicycle infrastructure and pedestrian-friendly urban planning, promoting active commuting. Thus, more than 60% of the city's residents commute by bicycle, contributing to higher levels of physical activity and lower obesity rates than places with less developed active transportation initiatives (City of Copenhagen 2019).

Obesity prevention and management involve *healthcare provider training and engagement*. By understanding obesity, healthcare providers may assist patients with weight management, and provide guidance and education about nutrition and exercise (Butsch et al. 2020). Governments and professional organizations generate and disseminate advice and tools

for the prevention and treatment of obesity based on scientific data. The Centers for Disease Control and Prevention (CDC) of the US developed the "Preventing Pediatric Obesity in Primary Care" toolkit to assist healthcare professionals in effectively managing pediatric obesity (CDC 2019).

Schools play an essential role in developing the food habits of children and fostering a healthy lifestyle. Providing *school-based interventions* focusing on nutrition education, physical exercise, and access to healthy meals can be an effective strategy for preventing obesity (Bleich et al. 2018). The WHO suggests that schools develop a comprehensive approach that combines health-promoting activities throughout the curriculum, environment, and regulations (WHO 2017a). Several studies have demonstrated that multi-component school-based interventions can improve the eating habits, physical activity levels, and body weight of children (Wang et al. 2015; Wolfenden et al. 2014).

Public awareness initiatives, which have emerged as a significant approach for combatting the obesity epidemic by educating the population about healthy eating, physical activity, and the importance of maintaining a healthy weight, is another pertinent government action. Governments have a significant role in designing, sponsoring, and spreading these efforts to achieve maximum reach and impact (Lakshminarayanan 2011). A significant example is the UK's "Change4Life" campaign, launched by the Department of Health in 2009. This national public health campaign uses multiple communication channels, including television advertisements, print materials, and digital platforms, to encourage families to adopt healthier lifestyles, such as eating more fruits and vegetables, reducing their sugar intake, and engaging in more physical activity (Public Health England 2019). Evaluations of the Change4Life initiative have revealed that participants' awareness of healthy behaviors and dietary adjustments has grown significantly over the following ten years (Vohra et al. 2015).

Such *community-based interventions* to prevent obesity by involving individuals, families, and local organizations in healthier lifestyles have gained popularity. These projects address obesity determinants such as physical activity, diet, and the built environment through multisectoral collaboration between governments, non-governmental organizations, and community members (Economos and Hammond 2017).

Overall, education and awareness are essential mediators of the effectiveness of all of these policies. Education can assist individuals in making informed food choices and adopting healthier lifestyles. At least three factors are likely to determine the positive effect of education on obesity: greater access to health-related information and improved ability to process such information, a clearer perception of the risks associated with lifestyle choices, and improved self-control and consistency of preferences over time (Devaux et al. 2011). Policies such as soda taxes and FOP labelling can be difficult for individuals with low levels of education to understand. From the consumer's perspective, a soda tax can be perceived as a form of punishment due to the resulting increase in prices. Similarly, while not affecting the cost of the product, food labels may be difficult to understand, particularly if they are comprised solely of numerical values, such as the reference intake label (Tarabella and Voinea 2013). Conversely, if individuals comprehend the advantages of healthy eating, they are more likely to support policies such as soda taxes and food labelling, as well as demand healthier food options and adopt healthy eating practices. Thus, by investing in education as part of obesity prevention initiatives, governments and other stakeholders can help to address the root causes of obesity and improve population health outcomes.

4. Discussion

Obesity is a serious global issue that not only poses a significant health and wellbeing burden but also results in excessive health care costs. Governments play a vital role in combating

obesity and employ a variety of measures to combat the disease. The most common are soda taxes and FOP labels and the bulk of the literature focuses on these, suggesting that soda taxes and FOP labels may be effective in preventing obesity and related NCD. However, their effectiveness may depend on factors such as the population targeted, the level of education, and the context of implementation.

The literature also has a few gaps. First, the majority of past research on soda taxes and FOP labels was conducted in a single nation, such as the US or Mexico, which may restrict the generalizability of the conclusions. Second, the majority of research focuses on a single policy, rather than investigating the effectiveness of multiple interventions in combination. Additional study is required to comprehend the efficacy of the policies in various contexts and combinations. Potentially, effectiveness would be maximized by implementing different, complementary policies simultaneously. Third, while the literature is able to show the effectiveness of some food policies in reducing the consumption of unhealthy foods and drinks, there is much less evidence of the outcome of the key interest, which is health. This is in part because health impacts take time to materialize, and attributing effects to the policies is challenging. Generally, studies do not use real-world data but instead rely on statistical modeling to estimate potential health impacts. Overall, the effectiveness of food policies on population health remains a promising area of study. Further research is needed on the long-term consequences of food policies, particularly their implications for chronic disease prevalence, as well as the interaction between different policy approaches and results.

According to Swinburn et al. (2019) and Hawkes et al. (2017), the need for effective food policies will increase as we continue to face challenges relating to health disparities, environmental sustainability, and food security. These include a larger emphasis on encouraging healthy as well as sustainable diets, a stronger focus on the role of food systems in combating climate change, and an ongoing emphasis on the need for equal access to good food.

Addressing access to healthy foods, research should investigate how policies might be formulated and implemented to alleviate health disparities and promote health equity. In contrast to, for example, workplace wellness programs, which are beneficial and effective in their (typically high-income) context, there must be initiatives from which a greater number of people from disadvantaged socioeconomic backgrounds can benefit. In addition, there is a need for research on the efficacy of food policies in low- and middle-income nations, where the incidence of food-related illnesses is frequently the highest (Hawkes et al. 2017). The potential health effects of future food technologies, such as lab-grown meat and plant-based alternatives, are also anticipated to receive increased attention. In addition to that, further research is necessary to explore lifestyle trends that mainly affect the population's mindset and food preferences despite implemented food policies.

With the implementation of food policies, such as soda taxes and FOP labelling requirements, population awareness, mindset, and consequently health can be improved. Despite the mentioned disadvantages and the controversy surrounding both policies and their effectiveness, the advantages outweigh the disadvantages, and governments should prioritize the effective implementation and combination of food policies in order to enhance population health.

The research questions addressed in the next two parts contribute to some of the identified research gaps in the following ways. First, we examine the relationship between both soda taxes and FOP labelling policies, and population health. Second, we investigate how governments utilize soda tax revenues for obesity prevention, informing about potential ways to enhance the benefits of soda taxes, while making soda taxes more progressive and more viable, politically.

Earmarked soda tax revenues: How governments use soda tax revenues

(Lukas Roth)

1. Introduction

In Part 0, we documented the popularity of soda taxes and their effectiveness in curbing sugar intake from soda, with potential benefits for population health. Another advantage of soda taxes is that they generate revenues, which governments can use to fund additional interventions to combat the obesity pandemic. WHO recommends that beverage tax revenues should be used to fund initiatives aimed at preventing obesity (WHO 2016), although there is little agreement regarding the most effective strategies for utilizing such funds. The research question investigated in this part is: *How do governments use soda tax revenues?,* that we attempt to answer using a desk research approach and using the UK soda tax as a case study to analyze if the government is using its full potential to combat (childhood) obesity.

2. Methodology

We conducted desk research whereby we searched the web for academic papers, policy documents, government reports, and news articles using combinations of keywords such as *soda tax, sugar-sweetened beverage tax, revenue, obesity prevention, policy, implementation, and government*. We aimed to obtain information on a) planned uses of soda tax revenues, b) planned and actual soda tax revenues and their relation to total tax revenues, and c) actual uses of soda tax revenues. As it became evident that most information available, at least in English, was from the UK, we decided to focus on the UK as a case study. We document our more scattered findings for other countries in a separate section.

3. UK Case Study

3.1. The UK soda tax and the government's intended use for its revenues

The first measure to combat obesity in the UK was the "U.K. traffic light scheme", introduced in 2013 (BBC 2016; see Part 0). Obesity rates continued to increase (Geldart 2023) and new measures were required to fight this trend. The UK government implemented its soda tax, called the Soft Drinks Industry Levy (SDIL), in April 2018, with the primary objective to reduce sugar consumption from sugar-sweetened beverages, especially among children (HM Revenue & Customs 2016). The levy is multi-tiered, i.e., drinks are taxed differently depending on their total sugar content, with a base rate of 18 pence per liter for beverages containing more than 5 grams of sugar per 100mL, and a higher rate of 24 pence per liter for beverages containing more than 8 grams of sugar per 100mL (HM Treasury 2018). Juices without added sugar and milk-based beverages with added sugar are not covered by the SDIL (Public Health England 2020).

As an argument to make the tax more palatable to voters and the general public, revenues were to be reinvested into initiatives to combat childhood obesity, enhance children's health, and support health-promoting initiatives in schools (Geldart 2023). In fact, the Exchequer Secretary to the Treasury Robert Jenrick stated: "*Every penny of England's share of the spending raised by the levy will go towards improving children's health...*" (Sustain, 2020). In particular, tax revenues were expected £520m revenue in the first year and were aimed at promoting physical education (PE) and balanced diets in schools, including doubling the primary school PE and sport premium from £160 million to £320 million per year from September 2017, providing up to £285 million a year to enable 25% of secondary schools to extend their school day and offer a wider range of activities, and allocating £10 million a year to expand breakfast clubs in up to 1,600 schools (HM Treasury 2016).

3.2. Industry responses to SDIL and other impacts of the tax

In the UK, the term "Soft Drinks Industry Levy" conveys that the levy is placed on the industry and that the primary purpose is to encourage supply-side changes. This means that the evaluation design should likewise prioritize careful monitoring of industry responses (Ng, Colchero, and White 2021). Due to opposition from soft drink manufacturers, there was a two-year delay between the announcement and the implementation of the tax. After the implementation of the SDIL, businesses adjusted in a number of ways attempting to maintain profits. They pursued recipe reformulations, in order to decrease tax burden by bringing sugar content below the 5 or 8g per 100mL thresholds, as well as other strategies, such as portfolio diversification (e.g., developing or acquiring new drinks; Law et al. 2020; Penney et al. 2023). From 2015 to 2019, the proportion of beverages with sugar content above 5g/100mL decreased from 49% to 15%, despite minimal changes in product size or availability. This demonstrates that the SDIL has effectively induced manufacturers to reduce the sugar content of beverages (Scarborough et al. 2020). This equates to a decrease in free sugars of approximately 4.6g per capita per day, as the amount of sugars sold from soft drinks per capita per day decreased by 30% between 2015 and 2018. In total, six of the top ten soft drink manufacturers reformulated more than half of the products in their portfolio until 2018 (Bandy et al. 2020).

After the implementation of the SDIL, branded drinks passed on approximately half of the levy on higher levy tier drinks (that is, the price increase on these drinks was half of the levy rate), whereas the prices of lower levy tier drinks decreased (Scarborough et al. 2020). In general, the two largest soft drink manufacturers increased their prices by 15.5% on average (Statista Search Department 2018).

The SDIL had little effect on the product size of branded beverages. However, supermarkets and private-label beverages altered the quantities of their private-label beverages in the higher and lower levy tiers significantly. The average product size decreased for

beverages taxed at a lower rate and increased for beverages taxed at a higher rate. About 30% of the price increase per volume for private-label beverages in the lower levy tiers can be attributed to product size reductions There was little evidence that the SDIL reduced the number of beverages available in supermarkets; generally, discontinued products were substituted with new versions (Scarborough et al. 2020).

According to Public Health England's "Sugar reduction Report on progress between 2015 and 2019", the total soda market grew by 15% between 2015 and 2019, with the largest increase (54%) occurring in beverages with less than 5g of sugar per 100mL. As a consequence of manufacturers' reformulation, Table 7 shows that the number of sales in beverages with a sugar content of >5g per 100mL has decreased significantly (-60%). Accordingly, also the proportion of sales of drinks subject to the SDIL changed, increasing drinks with sugar contents less than 5g per 100mL from 66% to 88%, while drinks with sugar contents of >5g per 100mL decreased from 34% to 12% (Public Health England 2020). The numbers in Table 7 demonstrate that the SDIL has effectively led to reformulations and product development with lower sugar content, benefiting public health without harming the industry as the overall market for soft drinks expanded.

Table 2: Change in soda sales between 2015 and 2019

	2015	2019	%-change	Proportion 2015	Proportion 2019
Overall	3,542,574	4,070,902	14.91%		
Less than 5g	2,327,806	3,588,853	54.17%	65.7%	88.2%
Between 5g and 8g	275,797	57,701	-79.08%	7.8%	1.4%
8g or more	938,971	424,347	-54.81%	26.5%	10.4%
Total amount of soda sales 5g or more 2015			1,214,768		
Total amount of soda sales 5g or more 2019			482,048		
%-Change			-60.32%		

Note: Sales (thousand liters); Source: Public Health England 2020

In general, the SDIL was accompanied by a substantial decrease in the proportion of soft drinks (especially branded soft drinks) subject to the levy, as the sugar content of these beverages was drastically reduced. However, in many instances, sugar is replaced with artificial sweeteners, with health impacts still largely unknown (Escobar Gil and Laverde Gil 2023). There was no evidence of comparable reductions in beverages exempt from the SDIL, indicating that the SDIL prompted this change. One study found that the tax was not passed on directly to consumers by increasing the prices of affected beverages, but manufacturers and retailers appear to have taken advantage of the opportunity to revise their entire soft drink product lines.

This can be seen as an example of "shrinkflation", meaning that retailers try to pass on inflation to consumers, offering smaller sizes for the same or higher prices (CFI 2022). The number of soft beverages available to consumers did not change as a result of SDIL. This indicates that the SDIL has reduced the amount of sugar in soft beverages due to reformulation and the substitution of drinks containing less sugar. Incentives for these changes likely include both supply and demand factors. Manufacturers may have been influenced to reduce sugar content in order to avoid the tax and may have been prompted by a shift in consumer demand for lower-sugar soft drinks following the announcement of the tax (Scarborough et al. 2020).

Overall, combining reformulation activity and the drop in consumption of sodas subject to SDIL, tax revenues did not reach the anticipated £500 million, but only £337 million for the financial year 2019/2020, and only £299 million instead of £455 million in 2020/2021 (Table 8; HM Revenue & Customs 2022).

Table 3: Anticipated and actual tax revenue from the SDIL

Fiscal year	Anticipated revenue	Actual revenue
2018/2019	£520m	n.a.
2019/2020	£500m	£337m
2020/2021	£455m	£299m
2021/2022	n.a.	£334m

n.a. = no data available; Source: HM Revenue & Customs 2022

In comparison to the total tax revenue of roughly £700b in 2018-2020, the SDIL revenue only accounts for less than 0.05% (Organisation for Economic Co-operation and Development 2023; HM Revenue & Customs 2023), which was insufficient for the planned investments in the promised childhood obesity preventions.

3.3. Actual use of SDIL revenues

Some funds raised through the SDIL have supposedly been allocated to the Healthy Pupils Capital Fund, which supports various projects designed to enhance the health and well-being of children in schools, e.g., new sports facilities and playground equipment (HM Revenue & Customs, HM Treasury, and The Rt Hon Robert Jenrick MP 2018). Launched in 2019, the School Sport and Activity Action Plan intended to provide more opportunities for children to engage in 60 minutes of daily physical activity, with a particular emphasis on increasing participation among girls and students from disadvantaged backgrounds (Department for Education et al. 2019). Furthermore, the National School Breakfast Programme, which is funded by soda tax revenues, has expanded to provide free, nutritious breakfasts to thousands of children in over 1,770 schools (Department for Education 2022; Family Action n.d.).

On the other hand, regarding the money allocated to the Healthy Pupils Capital Fund, there have been major discrepancies. At the time of the announcement, the Secretary of State for Education, Justine Greening, stated that the government had "pledged to ensure that the amount schools receive will not fall below £415 million regardless of the funds generated by the levy" (Department for Education and The Rt Hon Justine Greening 2017). This solemn

promise lasted less than a year as the fund was cut by more than three-quarters, to only £100 million for the first year of introduction (School Food Matters 2017). The Government desperately attempted to fill the gap in the main schools' budget, by raiding the money that was supposed to be set aside for children's health. Additionally, according to the report "Refreshing Investment in Children's Health" from Sustain, an alliance of organizations aiming to improve the food system, the Department for Education has not yet fully accounted for £165 million of the funds raised in 2019/20, which accounts for around 50% of the overall SDIL revenue of that year and refuses to state where it spent parts of the money (Sustain 2020). Besides, revenues have been controversially subsumed into the general tax pot since the first year of the introduction (O'Mara and Vlad 2023). Some local authorities do not have records on what the funds were spent on, while others used funds to renovate classrooms, install fences and fridges, and even housing for animals (Dixon, 2022). Despite the WHO's recommendation to earmark soda tax revenues to health care systems and the promotion of healthier diets and physical activity (WHO 2016), the UK failed to stick to its promises. The admission by the new Chancellor, Sajid Javid, that taxes collected through the soft drinks levy were pocketed by the Treasury rather than used to support children's health, is a clear indication of the government's failure to prioritize public health issues (Quinn 2019). The Treasury has reneged on previous commitments to use soda tax revenues to combat childhood obesity in schools, casting doubt on the soda tax's ability to improve the health of children. While the government has promised an additional £13.4 billion in public expenditure for 2020/2021 and pledged to end austerity, the failure to use soda tax revenue for its intended purpose demonstrates a lack of political will to combat the obesity epidemic in the UK (Quinn 2019).

Overall, it can be said that only half of the SDIL's revenues have been invested in health-related initiatives for children. The majority of generated revenues were not allocated as pledged, resulting in initiatives receiving less funding than promised. Major discrepancies exist

between the intended and actual use of revenue, and the government's original intentions are inconsistent.

Generally, the financing of schools in the UK is a complex process involving grants from the central government and allocations from local authorities (Roberts 2022). The Department of Education funds English institutions through a variety of grants. In addition, schools receive targeted assistance designed to meet the requirements of disadvantaged students (Department for Education 2020). Tracking and ensuring the appropriate allocation of funds, such as revenue from the SDIL, can be difficult with multiple sources and layers of funding, necessitating transparency, accountability, and effective monitoring mechanisms at both the central and local government levels (Roberts 2022; Department for Education 2020).

3.4. Implications and lessons learned

The implementation of the SDIL in the UK had a number of significant consequences and provides valuable lessons for future policy in the UK and elsewhere. First, the generated tax revenues were lower than anticipated (Table 8; HM Revenue & Customs 2022). This shortfall has been attributed primarily to companies reformulating their products in order to avoid or pay a lower tax (Bandy et al. 2020), but also to a decrease in sales of sodas containing more than 5g sugar per 100mL (Public Health England 2020). This result suggests that the SDIL has been effective in promoting healthier beverage options, but also demonstrates the need for policymakers to accurately project tax revenues and carefully consider potential industry responses when designing new policies.

4. Other countries

It is difficult to determine which country uses its soda tax revenues most wisely, given that various nations have different priorities and approaches for the allocation of funds. In Mexico

in 2015, 886 million pesos were pledged for the prevention and control of obesity and the promotion of healthier lifestyles, according to the American Beverage Association. This amount represents only 3% of the beverage tax's actual revenue. In addition, 1.3 billion pesos were to be invested in the construction of school drinking fixtures. There is no record of the installation of these fountains to date (American Beverage Association n.d.). All in all, it can be said that also in Mexico the revenues generated by the soda tax go to the general revenue pool. Only a small portion is allocated to provide access to drinking water in schools and public places and for obesity prevention (Healthy Food America 2016; Colchero et al. 2016).

In France, a soda tax was first implemented in 2012 as a single-tier tax on all sugar-sweetened beverages, which was adapted in 2018 to a tiered tax based on the sugar content of beverages (Geldart, 2023), similar to the UK SDIL. The tax revenue was allocated to social security, with an emphasis on supporting health-related initiatives. However, it is still not entirely apparent to what specific programs and initiatives the revenues have actually been allocated (Bodo et al. 2022). In addition, when the French soda tax was extended to artificially sweetened drinks, the revenues were earmarked for the farming sector in order to help producers that face high labor costs. The allocation of funds to farmers suggests that the new tax is intended more to close a budget gap than to cover costs associated with the burden of NCD caused by SSB consumption, which may undermine the public's acceptability. In general, information regarding the allocation of soda tax revenue remains limited, making it difficult to determine if the funds have been used for their intended purposes in full or if there are discrepancies in the allocation process (Bodo et al. 2022). Failing the WHO's recommendations (WHO 2016), the French government allocated the revenues to the social security budget and the general budget (Bodo et al. 2022).

Portugal seems to be a best practice example. According to The Lancet Public Health, the 80 million Euros that have been generated in the first year of implementation of the soda

tax, have been fully allocated towards the National Health Service (Goiana-da-Silva et al. 2018).

Overall, based on our secondary analysis, it is extremely difficult to obtain credible information about the actual use of soda tax revenues, and there are numerous organizations attempting to raise awareness that money may not have been spent wisely after all.

5. Discussion

The formulation of effective fiscal policy to enhance nutrition requires collaboration between finance and health policymakers. Finance policymakers are concerned with the tax type, administration efficiency, and the tax's effect on government revenue, employment, industry, and livelihoods, and may generally prefer to designate soda tax revenues as unrestricted general revenue. Health policymakers, on the other hand, prioritize the policy's efficacy in promoting population health through dietary adjustments and generally prefer to invest tax revenues in additional health promotion activities. Concerns about the impact of the tax and the distribution of the resulting revenue may be shared by both groups and can be seen in several countries (Thow et al. 2018).

Allocating soda tax revenues to programs and initiatives that promote healthier behaviours may enhance population health benefits beyond the gains from implementing a soda tax alone. Investing in health education and awareness campaigns that enlighten the public on the dangers of excessive sugar consumption and the advantages of healthy nutrition and exercise is an effective strategy. Investing in healthcare and public health infrastructure for the prevention and treatment of diet-related diseases, such as diabetes and cardiovascular disease, can help resolve the underlying causes of these health issues and promote the long-term health and wellness of all individuals. By prioritizing these initiatives, soda tax revenues can be spent more judiciously and effectively to promote healthier lifestyles and lessen the burden of diet-

related diseases on individuals, families, and communities. The way soda tax revenues are used is also important because depending on who is targeted to benefit from nutrition, health, or other social programs funded by those revenues, it may turn a regressive tax into a progressive one. The literature suggests that the benefits of SSB taxes are likely to be flat across the income distribution, or possibly the highest for the lowest-income consumers, once tax revenue allocation is considered, at least in the US (Allcott et al., 2019).

Second, soda tax revenue management must be efficient and effective. This requires a transparent and accountable system for monitoring revenue and expenditures, as well as periodic audits to ensure compliance with applicable laws and regulations. To ensure that the soda tax revenues are utilized in a manner that maximizes their impact and benefits society as a whole, it is essential to solicit input from stakeholders, such as consumers, businesses, and health experts.

While some governments are concerned that the public will not approve of such a tax, a study of the public acceptability in terms of support for and perceived effectiveness of the UK SDIL between four months prior to implementation, eight and twenty months after implementation, found that the population has a high level of support for this levy, which has not changed over time (Statista Search Department 2018; Adams et al. 2021). Overall, the UK's experience with the soda tax highlights the significance of careful policy design, accurate revenue projections, and strategic funding allocation to maximize the benefits of the tax (HM Revenue & Customs 2016; Public Health England 2019).

Given the revenues generated by the SDIL in the UK, it is essential to evaluate the government's use of these funds. The SDIL revenues represent a negligible portion of the overall government budget. Since the government has committed to reinvesting all SDIL earnings into childhood obesity prevention initiatives, it raises questions about the allocation of some of these funds to the general tax pool and the government's commitment to combating

childhood obesity. One may argue that redirecting these funds to their intended purpose would have minimal or no impact on the government's overall budget but could potentially make a substantial impact in the fight against childhood obesity (Beeson 2022). In this instance, health policymakers should have more influence in the use of soda tax revenues than finance policymakers, because the issue at hand focuses on the population's health and not issues regarding general tax pools. In light of these facts, it is essential to examine the government's decision-making process and determine whether the importance of public health, specifically the prevention of childhood obesity, is accurately reflected in the allocation of SDIL revenues. In total, SDIL falls short of its appellation. In light of the current cost-of-living crisis, the Prime Minister is considering repealing the tax (Beeson 2022).

In conclusion, governments play a crucial role in reducing the prevalence of obesity by investing in programs that promote nutritional literacy and healthy lifestyles. Unfortunately, many governments have missed the opportunity to enhance the benefits of beverage taxes by redirecting revenues to the general budget instead of obesity prevention. This demonstrates the need for increased expenditure transparency and accountability. However, future research and government transparency is necessary to successfully analyze and recommend appropriate revenue spendings. In the future governments must commit to investing beverage tax revenue in education programs for obesity prevention. By doing so, significant steps can be taken to reduce the prevalence of obesity and promote healthy lifestyles for all.

General conclusion

The ever-increasing prevalence of obesity brings numerous hazards and complications. The growing number of affected people creates pressure for change. The first section of this thesis explains the background and related risks of the obesity epidemic and how governments are intervening to address the issue. The benefits and drawbacks of the policies are examined, with particular emphasis on soda taxes and FOPs. We have discovered that both policies have numerous benefits but are not yet completely successful. However, they both contribute to two central goals: awareness and reformulation.

The relationship between soda taxes, FOPs, and population health is analyzed in Part A of the thesis from a global perspective. As a measure of population health, the rates of obesity, diabetes, high blood pressure, and elevated cholesterol are considered. Despite important limitations that preclude causal interpretations, our results illustrate the heterogeneity of food policies and of their potential effects across nations.

Part B of the thesis discusses the UK government's use of SDIL revenues, in particular, that commitments to invest in school programs to combat childhood obesity were violated, to the detriment of population health and the credibility of the government. The section also demonstrates that many other countries do not fulfill their commitment to allocate soda tax revenues to health-related initiatives. There is a disparity of interest between finance- and health-focused policymakers within countries, and both intend to invest the money in different initiatives.

Overall, we conclude that policies are required to assist society in addressing the issue of obesity. Depending on their application, policies can be more or less beneficial. There is much work to do, by both researchers and policymakers, to enhance the design, combination, and implementation of food policies to maximize their health benefits.

Bibliography

Adams, Jean, David Pell, Tarra L Penney, David Hammond, Lana Vanderlee, and Martin White. 2021. "Public Acceptability of the UK Soft Drinks Industry Levy: Repeat Cross-Sectional Analysis of the International Food Policy Study (2017–2019)." *BMJ Open* 11 (9): e051677. https://doi.org/10.1136/bmjopen-2021-051677.

Allais, Olivier, Géraldine Enderli, Franco Sassi, and Louis-Georges Soler. 2023. "Effective Policies to Promote Sugar Reduction in Soft Drinks: Lessons from a Comparison of Six European Countries." Papers.ssrn.com. Rochester, NY. February 24, 2023. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4364868.

Allcott, Hunt, Benjamin B Lockwood, and Dmitry Taubinsky. 2019. "Regressive Sin Taxes, with an Application to the Optimal Soda Tax*." *The Quarterly Journal of Economics* 134 (3): 1557–1626. https://doi.org/10.1093/qje/qjz017.

American Beverage Association. n.d. "Effects from a Sugary Beverage Excise Tax in Mexico." Accessed April 20, 2023. https://www.ameribev.org/files/resources/effects-of-the-mexican-soda-tax.pdf.

American Diabetes Association. 2018. "Economic Costs of Diabetes in the U.S. In 2017." *Diabetes Care* 41 (5): 917–28. https://doi.org/10.2337/dci18-0007.

Andreeva, Valentina A., Manon Egnell, Mathilde Touvier, Pilar Galan, Chantal Julia, and Serge Hercberg. 2021. "International Evidence for the Effectiveness of the Front-of-Package Nutrition Label Called Nutri-Score." *Central European Journal of Public Health* 29 (1): 76–79. https://doi.org/10.21101/cejph.a6239.

Andreyeva, Tatiana, Keith Marple, Samantha Marinello, Timothy E. Moore, and Lisa M. Powell. 2022. "Outcomes Following Taxation of Sugar-Sweetened Beverages." *JAMA Network Open* 5 (6): e2215276. https://doi.org/10.1001/jamanetworkopen.2022.15276.

Atanasova, Petya, Dian Kusuma, Elisa Pineda, Gary Frost, Franco Sassi, and Marisa Miraldo. 2022. "The Impact of the Consumer and Neighbourhood Food Environment on Dietary Intake and Obesity-Related Outcomes: A Systematic Review of Causal Impact Studies." *Social Science & Medicine* 299 (April): 114879. https://doi.org/10.1016/j.socscimed.2022.114879.

Backholer, Kathryn, Danja Sarink, Alison Beauchamp, Catherine Keating, Venurs Loh, Kylie Ball, Jane Martin, and Anna Peeters. 2016. "The Impact of a Tax on Sugar-Sweetened Beverages according to Socio-Economic Position: A Systematic Review of the

Evidence." *Public Health Nutrition* 19 (17): 3070–84. https://doi.org/10.1017/s136898001600104x.

Bandy, L. K., P. Scarborough, R. A. Harrington, M. Rayner, and S. A. Jebb. 2020. "Reductions in Sugar Sales from Soft Drinks in the UK from 2015 to 2018." *BMC Medicine* 18 (1): 20. https://doi.org/10.1186/s12916-019-1477-4.

Barrientos-Gutierrez, Tonatiuh, Rodrigo Zepeda-Tello, Eliane R. Rodrigues, M. Arantxa Colchero, Rosalba Rojas-Martínez, Eduardo Lazcano-Ponce, Mauricio Hernández-Ávila, Juan Rivera-Dommarco, and Rafael Meza. 2018. "Correction: Expected Population Weight and Diabetes Impact of the 1-Peso-Per-Litre Tax to Sugar Sweetened Beverages in Mexico." *PLOS ONE* 13 (1): e0191383. https://doi.org/10.1371/journal.pone.0191383.

BBC. 2016. "Food 'Traffic Light' Labelling Should Be Mandatory, Councils Say." *BBC News*, September 17, 2016, sec. Health. https://www.bbc.com/news/health-37389804.

Beeson, James. 2022. "UK 'Considering Scrapping Soft Drinks Sugar Tax.'" Just Drinks. September 15, 2022. https://www.just-drinks.com/news/uk-considering-scrapping-soft-drinks-sugar-tax/.

Benedict, Michael A., and David Arterburn. 2008. "Worksite-Based Weight Loss Programs: A Systematic Review of Recent Literature." *American Journal of Health Promotion* 22 (6): 408–15. https://doi.org/10.4278/ajhp.22.6.408.

Bleich, Sara N, Kelsey A Vercammen, Laura Y Zatz, Johannah M Frelier, Cara B Ebbeling, and Anna Peeters. 2018. "Interventions to Prevent Global Childhood Overweight and Obesity: A Systematic Review." *The Lancet Diabetes & Endocrinology* 6 (4): 332–46. https://doi.org/10.1016/s2213-8587(17)30358-3.

Bleich, Sara N., Christina D. Economos, Marie L. Spiker, Kelsey A. Vercammen, Eric M. VanEpps, Jason P. Block, Brian Elbel, Mary Story, and Christina A. Roberto. 2017. "A Systematic Review of Calorie Labeling and Modified Calorie Labeling Interventions: Impact on Consumer and Restaurant Behavior." *Obesity* 25 (12): 2018–44. https://doi.org/10.1002/oby.21940.

Bloom, David E, Somnath Chatterji, Paul Kowal, Peter Lloyd-Sherlock, Martin McKee, Bernd Rechel, Larry Rosenberg, and James P Smith. 2015. "Macroeconomic Implications of Population Ageing and Selected Policy Responses." *The Lancet* 385 (9968): 649–57. https://doi.org/10.1016/s0140-6736(14)61464-1.

Bodo, Yann Le, Fabrice Etilé, Chantal Julia, Marine Friant-Perrot, Eric Breton, Sébastien Lecocq, Christine Boizot-Szantai, Céline Bergeran, and Françoise Jabot. 2022. "Public

Health Lessons from the French 2012 Soda Tax and Insights on the Modifications Enacted in 2018." *Health Policy* 126 (7). https://doi.org/10.1016/j.healthpol.2022.04.012.

Briggs, Adam D M, Oliver T Mytton, Ariane Kehlbacher, Richard Tiffin, Ahmed Elhussein, Mike Rayner, Susan A Jebb, Tony Blakely, and Peter Scarborough. 2017. "Health Impact Assessment of the UK Soft Drinks Industry Levy: A Comparative Risk Assessment Modelling Study." *The Lancet Public Health* 2 (1): e15–22. https://doi.org/10.1016/s2468-2667(16)30037-8.

Butsch, W. Scott, Robert F. Kushner, Susan Alford, and B. Gabriel Smolarz. 2020. "Low Priority of Obesity Education Leads to Lack of Medical Students' Preparedness to Effectively Treat Patients with Obesity: Results from the U.S. Medical School Obesity Education Curriculum Benchmark Study." *BMC Medical Education* 20 (1). https://doi.org/10.1186/s12909-020-1925-z.

Caro, Juan Carlos, Camila Corvalán, Marcela Reyes, Andres Silva, Barry Popkin, and Lindsey Smith Taillie. 2018. "Chile's 2014 Sugar-Sweetened Beverage Tax and Changes in Prices and Purchases of Sugar-Sweetened Beverages: An Observational Study in an Urban Environment." Edited by Claudia Langenberg. *PLOS Medicine* 15 (7): e1002597. https://doi.org/10.1371/journal.pmed.1002597.

Cawley, John, and Chad Meyerhoefer. 2012. "The Medical Care Costs of Obesity: An Instrumental Variables Approach." *Journal of Health Economics* 31 (1): 219–30. https://doi.org/10.1016/j.jhealeco.2011.10.003.

CDC. 2019. "Childhood Obesity Healthcare ." Centers for Disease Control and Prevention. October 23, 2019. https://www.cdc.gov/obesity/strategies/healthcare/index.html.

CFI. 2022. "Shrinkflation." Corporate Finance Institute. December 21, 2022. https://corporatefinanceinstitute.com/resources/economics/shrinkflation/.

Champagne, Beatriz, Monika Arora, Ahmed ElSayed, Susanne Løgstrup, Pamela Naidoo, Trevor Shilton, Diana Vaca McGhie, et al. 2020. "World Heart Federation Policy Brief: Front-Of-Pack Labelling." *Global Heart* 15 (1). https://doi.org/10.5334/gh.935.

Chriqui, Jamie F, Frank J Chaloupka, Lisa M Powell, and Shelby S Eidson. 2013. "A Typology of Beverage Taxation: Multiple Approaches for Obesity Prevention and Obesity Prevention-Related Revenue Generation." *Journal of Public Health Policy* 34 (3): 403–23. https://doi.org/10.1057/jphp.2013.17.

City of Copenhagen. 2019. “Cycle Superhighways: The Greater Copenhagen Network of Cycle SuperhighwaysCycle Superhighways Capital Region of Denmark.” https://supercykelstier.dk/wp-content/uploads/2019/07/UK-Haefte-2019.pdf.

Coca-Cola Company. n.d. “Soft Drinks Tax: All the Facts | Ingredients, Sugar and Caffeine | Coca-Cola IE.” Www.coca-Cola.ie. Accessed March 19, 2023. https://www.coca-cola.ie/ingredients/reducing-sugar/sugar-tax/lets-talk-about-the-government-tax-on-sugar-sweetened-drinks.

Colchero, M Arantxa, Barry M Popkin, Juan A Rivera, and Shu Wen Ng. 2016. “Beverage Purchases from Stores in Mexico under the Excise Tax on Sugar Sweetened Beverages: Observational Study.” *BMJ*, January, h6704. https://doi.org/10.1136/bmj.h6704.

Colchero, M, Juan Rivera-Dommarco, Barry Popkin, and Shu Ng. 2017. “Web First.” *Health Affairs* 36 (3). https://doi.org/10.1377/hlthaff.2016.1231.

Coleman, Paul C., Petra Hanson, Thijs van Rens, and Oyinlola Oyebode. 2022. “A Rapid Review of the Evidence for Children’s TV and Online Advertisement Restrictions to Fight Obesity.” *Preventive Medicine Reports* 26 (April): 101717. https://doi.org/10.1016/j.pmedr.2022.101717.

Connexion journalist. 2019. “Petition on European Food Labels Seeks 1m Signatures.” Https://Www.connexionfrance.com. May 21, 2019. https://www.connexionfrance.com/article/French-news/Pro-Nutri-Score-petition-on-European-food-labels-seeks-1m-signatures.

Croker, H., J. Packer, Simon J. Russell, C. Stansfield, and R. M. Viner. 2020. “Front of Pack Nutritional Labelling Schemes: A Systematic Review and Meta-Analysis of Recent Evidence Relating to Objectively Measured Consumption and Purchasing.” *Journal of Human Nutrition and Dietetics* 33 (4). https://doi.org/10.1111/jhn.12758.

Department for Education. 2020. “Schools Revenue Funding 2021 to 2022 Operational Guide.” https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945784/Schools_Operational_guide_2021_to_2022_V4_.pdf.

———. 2022. “National School Breakfast Club Programme.” GOV.UK. November 24, 2022. https://www.gov.uk/guidance/national-school-breakfast-club-programme.

Department for Education, Department for Culture, Media and Sport, Department of Health and Social Care, and Department for Digital, Culture, Media & Sport. 2019. “School

Sport and Activity Action Plan." GOV.UK. July 15, 2019. https://www.gov.uk/government/publications/school-sport-and-activity-action-plan.

Department for Education, and The Rt Hon Justine Greening. 2017. "New Funding to Boost Schools Facilities and Healthy Lifestyles." GOV.UK. February 28, 2017. https://www.gov.uk/government/news/new-funding-to-boost-schools-facilities-and-healthy-lifestyles.

Devaux, Marion, Franco Sassi, Michele Cecchini, Francesca Borgonovi, and Jody Church. 2011. "Exploring the Relationship between Education and Obesity." *OECD Journal: Economic Studies* 2011 (1): 1–40. https://doi.org/10.1787/eco_studies-2011-5kg5825v1k23.

Dixon, Hayley. 2022. "Bitter Row as Sugar Tax Millions Diverted Away from Fighting Childhood Obesity." *The Telegraph*, January 3, 2022. https://www.telegraph.co.uk/news/2022/01/03/bitter-row-sugar-tax-millions-diverted-away-fighting-childhood/.

Duran, Ana Clara, Melissa Mialon, Eric Crosbie, Melissa Lorena Jensen, Jennifer L. Harris, Carolina Batis, Camila Corvalán, and Lindsey Smith Taillie. 2021. "Food Environment Solutions for Childhood Obesity in Latin America and among Latinos Living in the United States." *Obesity Reviews* 22 (S3). https://doi.org/10.1111/obr.13237.

Economos, Christina D., and Ross A. Hammond. 2017. "Designing Effective and Sustainable Multifaceted Interventions for Obesity Prevention and Healthy Communities." *Obesity* 25 (7): 1155–56. https://doi.org/10.1002/oby.21893.

Edmondson, Emma K., Judy A. Shea, Emily F. Gregory, Christina A. Roberto, Stephanie M. Garcia, Jeemin Kwon, and Senbagam Virudachalam. 2022. "Low-Income Parents' Perceptions of a Sweetened Beverage Tax in Philadelphia." *Journal of Nutritional Science* 11 (August): e67. https://doi.org/10.1017/jns.2022.64.

Engelhardt, Katrin, Chizuru Nishida, Jenny Reid, and Bridget Kelly. 2023. "Nutrition Labelling for NCD Prevention and Control." In *Noncommunicable Diseases*. London. https://www.taylorfrancis.com/books/oa-edit/10.4324/9781003306689/noncommunicable-diseases-nick-banatvala-pascal-bovet?refId=25ed5f9c-a58e-4e42-af30-357fa007cd47&context=ubx.

Escobar Gil, Tomas, and Juanita Laverde Gil. 2023. "Artificially Sweetened Beverages beyond the Metabolic Risks: A Systematic Review of the Literature." *Cureus*, January. https://doi.org/10.7759/cureus.33231.

European Commission. n.d. “Proposal Revision Regulation of FIC.” Food.ec.europa.eu. Accessed April 12, 2023. https://food.ec.europa.eu/safety/labelling-and-nutrition/food-information-consumers-legislation/proposal-revision-regulation-fic_en.

European Food Information Council. 2022. “Front-of-Pack Nutrition Labelling.” Www.eufic.org. July 8, 2022. https://www.eufic.org/en/healthy-living/article/front-of-pack-nutrition-labelling?gclid=Cj0KCQiAxbefBhDfARIsAL4XLRqk5VLmFaGX-2YWkDrEsRqCVQQBex3IljAKaGkii_ECqjMcDbWkbXIaAt7GEALw_wcB.

Falbe, Jennifer, Hannah R. Thompson, Christina M. Becker, Nadia Rojas, Charles E. McCulloch, and Kristine A. Madsen. 2016. “Impact of the Berkeley Excise Tax on Sugar-Sweetened Beverage Consumption.” *American Journal of Public Health* 106 (10): 1865–71. https://doi.org/10.2105/ajph.2016.303362.

Family Action. n.d. “National School Breakfast Programme - Family Action.” Family Action. Accessed April 13, 2023. https://www.family-action.org.uk/what-we-do/children-families/breakfast/.

Ferguson, Kate. 2022. “Europe’s Controversial Nutri-Score – DW – 08/26/2022.” Dw.com. August 26, 2022. https://www.dw.com/en/opinion-why-europe-should-abandon-the-nutri-score/a-62922313#:~:text=In%20a%20letter%20to%20the.

Ferretti, Fabrizio, and Michele Mariani. 2019. “Sugar-Sweetened Beverage Affordability and the Prevalence of Overweight and Obesity in a Cross Section of Countries.” *Globalization and Health* 15 (1). https://doi.org/10.1186/s12992-019-0474-x.

Flegal, Katherine M., Margaret D. Carroll, Brian K. Kit, and Cynthia L. Ogden. 2012. “Prevalence of Obesity and Trends in the Distribution of Body Mass Index among US Adults, 1999-2010.” *JAMA* 307 (5): 491. https://doi.org/10.1001/jama.2012.39.

Food and Drug Administration (FDA). 2019. “Menu Labeling Requirements.” U.S. Food and Drug Administration. 2019. https://www.fda.gov/food/food-labeling-nutrition/menu-labeling-requirements.

Food Standards Agency. 2020. “Check the Label.” Food Standards Agency. January 23, 2020. https://www.food.gov.uk/safety-hygiene/check-the-label#:~:text=The%20traffic%20light%20label%20is%20colour%20coded%20and%20shows%20that.

FOODDRINKEUROPE. 2014. “Learn about Food Nutrition Labelling.” Referenceintakes.eu. 2014. https://referenceintakes.eu/about.html.

Forde, Hannah, Tarra L. Penney, Martin White, Louis Levy, Felix Greaves, and Jean Adams. 2022. “Understanding Marketing Responses to a Tax on Sugary Drinks: A Qualitative

Interview Study in the United Kingdom, 2019." *International Journal of Health Policy and Management* 11 (11). https://doi.org/10.34172/ijhpm.2022.5465.

Geldart, Stephen. 2023. "Do Sugar Taxes Work?" Czapp. February 27, 2023. https://www.czapp.com/analyst-insights/do-sugar-taxes-work/.

Giles-Corti, Billie, Anne Vernez-Moudon, Rodrigo Reis, Gavin Turrell, Andrew L Dannenberg, Hannah Badland, Sarah Foster, et al. 2016. "City Planning and Population Health: A Global Challenge." *The Lancet* 388 (10062): 2912–24. https://doi.org/10.1016/s0140-6736(16)30066-6.

Goetzel, Ron Z., Rachel Mosher Henke, Maryam Tabrizi, Kenneth R. Pelletier, Ron Loeppke, David W. Ballard, Jessica Grossmeier, et al. 2014. "Do Workplace Health Promotion (Wellness) Programs Work?" *Journal of Occupational and Environmental Medicine* 56 (9): 927–34. https://doi.org/10.1097/JOM.0000000000000276.

Goiana-da-Silva, Francisco, David Cruz-e-Silva, Maria João Gregório, Marisa Miraldo, Ara Darzi, and Fernando Araújo. 2018. "The Future of the Sweetened Beverages Tax in Portugal." *The Lancet Public Health* 3 (12): e562. https://doi.org/10.1016/s2468-2667(18)30240-8.

Griffith, Rachel, Martin O'Connell, and Pierre Dubois. 2018. "Soda Taxes Target the Young but Not Individuals with High Sugar Diets." CEPR. January 29, 2018. https://cepr.org/voxeu/columns/soda-taxes-target-young-not-individuals-high-sugar-diets.

Grunert, Klaus G., Laura Fernández-Celemín, Josephine M. Wills, Stefan Storcksdieck genannt Bonsmann, and Liliya Nureeva. 2010. "Use and Understanding of Nutrition Information on Food Labels in Six European Countries." *Journal of Public Health* 18 (3): 261–77. https://doi.org/10.1007/s10389-009-0307-0.

Harvard T.H. Chan School of Public Health. 2016. "Philadelphia Soda Tax Could Help Prevent Diabetes, Avert Deaths." News. May 2, 2016. https://www.hsph.harvard.edu/news/hsph-in-the-news/philadelphia-soda-tax-could-help-prevent-diabetes-avert-deaths/.

Hawkes, Corinna, Alessandro R Demaio, and Francesco Branca. 2017. "Double-Duty Actions for Ending Malnutrition within a Decade." *The Lancet Global Health* 5 (8): e745–46. https://doi.org/10.1016/s2214-109x(17)30204-8.

Hawkes, Corinna, Trenton G Smith, Jo Jewell, Jane Wardle, Ross A Hammond, Sharon Friel, Anne Marie Thow, and Juliana Kain. 2015. "Smart Food Policies for Obesity

Prevention." *The Lancet* 385 (9985): 2410–21. https://doi.org/10.1016/s0140-6736(14)61745-1.

Healthy Food America. 2016. "Tax Amount, Type, Revenue." https://d3n8a8pro7vhmx.cloudfront.net/heatlhyfoodamerica/pages/137/attachments/original/1474315840/MexicoProfileSheet_vFINAL.pdf?1474315840#:~:text=Revenue%20Use.

Heinen, Luann, and Helen Darling. 2009. "Addressing Obesity in the Workplace: The Role of Employers." *Milbank Quarterly* 87 (1): 101–22. https://doi.org/10.1111/j.1468-0009.2009.00549.x.

HM Revenue & Customs. 2016. "Soft Drinks Industry Levy." GOV.UK. December 5, 2016. https://www.gov.uk/government/publications/soft-drinks-industry-levy/soft-drinks-industry-levy.

———. 2022. "Soft Drinks Industry Levy Statistics Commentary 2022." GOV.UK. September 30, 2022. https://www.gov.uk/government/statistics/soft-drinks-industry-levy-statistics/soft-drinks-industry-levy-statistics-commentary-2021#:~:text=The%20latest%20headlines%20for%20Soft.

———. 2023. "HMRC Tax Receipts and National Insurance Contributions for the UK (Annual Bulletin)." GOV.UK. April 25, 2023. https://www.gov.uk/government/statistics/hmrc-tax-and-nics-receipts-for-the-uk/hmrc-tax-receipts-and-national-insurance-contributions-for-the-uk-new-annual-bulletin#:~:text=HMRC%20provisionally%20collected%20%C2%A3786.6.

HM Revenue & Customs, HM Treasury, and The Rt Hon Robert Jenrick MP . 2018. "Sugar Tax Revenue Helps Tackle Childhood Obesity." GOV.UK. GOV.UK. November 20, 2018. https://www.gov.uk/government/news/sugar-tax-revenue-helps-tackle-childhood-obesity.

HM Treasury. 2016. "Budget 2016." London: HM Treasury. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/508193/HMT_Budget_2016_Web_Accessible.pdf.

———. 2018. "Soft Drinks Industry Levy Comes into Effect." GOV.UK. HM Treasury. April 5, 2018. https://www.gov.uk/government/news/soft-drinks-industry-levy-comes-into-effect.

Hutchinson, Amanda D., and Carlene Wilson. 2011. "Improving Nutrition and Physical Activity in the Workplace: A Meta-Analysis of Intervention Studies." *Health Promotion International* 27 (2): 238–49. https://doi.org/10.1093/heapro/dar035.

Institute for Health Metrics and Evaluation. 2019. “GBD Compare.” Healthdata.org. 2019. https://vizhub.healthdata.org/gbd-compare/.

International Diabetes Federation. 2019. “9th Edition | IDF Diabetes Atlas.” Https://Diabetesatlas.org/. 2019. https://diabetesatlas.org/atlas/ninth-edition/.

Kanter, Rebecca, Lana Vanderlee, and Stefanie Vandevijvere. 2018. “Front-of-Package Nutrition Labelling Policy: Global Progress and Future Directions.” *Public Health Nutrition* 21 (8): 1399–1408. https://doi.org/10.1017/s1368980018000010.

Lakshminarayanan, Subitha. 2011. “Role of Government in Public Health: Current Scenario in India and Future Scope.” *Journal of Family and Community Medicine* 18 (1): 26. https://doi.org/10.4103/1319-1683.78635.

Law, Cherry, Laura Cornelsen, Jean Adams, David Pell, Harry Rutter, Martin White, and Richard Smith. 2020. “TEMPORARY REMOVAL: The Impact of UK Soft Drinks Industry Levy on Manufacturers’ Domestic Turnover.” *Economics & Human Biology* 37 (February): 100866. https://doi.org/10.1016/j.ehb.2020.100866.

Locke, Adam E., Bratati Kahali, Sonja I. Berndt, Anne E. Justice, Tune H. Pers, Felix R. Day, Corey Powell, et al. 2015. “Genetic Studies of Body Mass Index Yield New Insights for Obesity Biology.” *Nature* 518 (7538): 197–206. https://doi.org/10.1038/nature14177.

Maceira, Daniel, Alfredo Palacios, Natalia Espinola, and Raúl Mejía. 2023. “Demand Price Elasticity and Taxes on the Consumption of Sugar Sweetened Beverages in Argentina.” *Working Papers*, March. https://ideas.repec.org/p/aoz/wpaper/220.html.

Mackenbach, Joreintje D, Harry Rutter, Sofie Compernolle, Ketevan Glonti, Jean-Michel Oppert, Helene Charreire, Ilse De Bourdeaudhuij, Johannes Brug, Giel Nijpels, and Jeroen Lakerveld. 2014. “Obesogenic Environments: A Systematic Review of the Association between the Physical Environment and Adult Weight Status, the SPOTLIGHT Project.” *BMC Public Health* 14 (1). https://doi.org/10.1186/1471-2458-14-233.

McGuire, Shelley. 2012. “Institute of Medicine. 2012. Front-of-Package Nutrition Rating Systems and Symbols: Promoting Healthier Choices. Washington, DC: The National Academies Press.” *Advances in Nutrition* 3 (3): 332–33. https://doi.org/10.3945/an.112.001933.

Mitchell, W. Kyle, John Williams, Philip Atherton, Mike Larvin, John Lund, and Marco Narici. 2012. “Sarcopenia, Dynapenia, and the Impact of Advancing Age on Human

Skeletal Muscle Size and Strength; a Quantitative Review." *Frontiers in Physiology* 3. https://doi.org/10.3389/fphys.2012.00260.

Murray, Christopher J L, Aleksandr Y Aravkin, Peng Zheng, Cristiana Abbafati, Kaja M Abbas, Mohsen Abbasi-Kangevari, Foad Abd-Allah, et al. 2020. "Global Burden of 87 Risk Factors in 204 Countries and Territories, 1990–2019: A Systematic Analysis for the Global Burden of Disease Study 2019." *The Lancet* 396 (10258): 1223–49. https://doi.org/10.1016/s0140-6736(20)30752-2.

Muzzioli, Luca, Claudia Penzavecchia, Lorenzo Maria Donini, and Alessandro Pinto. 2022. "Are Front-of-Pack Labels a Health Policy Tool?" *Nutrients* 14 (4): 771. https://doi.org/10.3390/nu14040771.

Nakamura, Ryota, Andrew J. Mirelman, Cristóbal Cuadrado, Nicolas Silva-Illanes, Jocelyn Dunstan, and Marc Suhrcke. 2018. "Evaluating the 2014 Sugar-Sweetened Beverage Tax in Chile: An Observational Study in Urban Areas." Edited by Claudia Langenberg. *PLOS Medicine* 15 (7): e1002596. https://doi.org/10.1371/journal.pmed.1002596.

News Desk. 2018. "Lithuania Puts Sugar Tax on Hold after Uniting with Manufacturers." FoodBev Media. January 19, 2018. https://www.foodbev.com/news/lithuania-puts-sugar-tax-hold-uniting-manufacturers/.

Ng, Shu Wen, M. Arantxa Colchero, and Martin White. 2021. "How Should We Evaluate Sweetened Beverage Tax Policies? A Review of Worldwide Experience." *BMC Public Health* 21 (1). https://doi.org/10.1186/s12889-021-11984-2.

O'Mara, Jennifer, and Ioana Vlad. 2023. "Looking Back at 5 Years of the UK Soft Drinks Industry Levy." WCRF International. WCRF International. March 30, 2023. https://www.wcrf.org/looking-back-at-5-years-of-the-uk-soft-drinks-industry-levy/.

Organisation for Economic Co-operation and Development. 2023. "Details of Tax Revenue - United Kingdom." Stats.oecd.org. May 8, 2023. https://stats.oecd.org/index.aspx?DataSetCode=REVGBR.

Pan American Health Organization, and Food and Agriculture Organization of the United Nations. 2017. "Panorama of Food and Nutrition Security in Latin America and the Caribbean." https://iris.paho.org/handle/10665.2/34500.

Penney, Tarra L., Catrin P. Jones, David Pell, Steven Cummins, Jean Adams, Hannah Forde, Oliver Mytton, Harry Rutter, Richard Smith, and Martin White. 2023. "Reactions of Industry and Associated Organisations to the Announcement of the UK Soft Drinks

Industry Levy: Longitudinal Thematic Analysis of UK Media Articles, 2016-18." *BMC Public Health* 23 (1). https://doi.org/10.1186/s12889-023-15190-0.

Popkin, Barry M, Linda S Adair, and Shu Wen Ng. 2012. "Global Nutrition Transition and the Pandemic of Obesity in Developing Countries." *Nutrition Reviews* 70 (1): 3–21. https://doi.org/10.1111/j.1753-4887.2011.00456.x.

Popkin, Barry M. 2017. "Relationship between Shifts in Food System Dynamics and Acceleration of the Global Nutrition Transition." *Nutrition Reviews* 75 (2): 73–82. https://doi.org/10.1093/nutrit/nuw064.

Public Health England. 2017. "Sugar Reduction and Wider Reformulation." GOV.UK. March 29, 2017. https://www.gov.uk/government/collections/sugar-reduction.

———. 2019. "10 Year Olds in the UK Have Consumed 18 Years' Worth of Sugar." GOV.UK. January 2, 2019. https://www.gov.uk/government/news/10-year-olds-in-the-uk-have-consumed-18-years-worth-of-sugar.

———. 2020. "Sugar Reduction: Report on Progress between 2015 and 2019." https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/984282/Sugar_reduction_progress_report_2015_to_2019-1.pdf.

Quinn, Ian. 2019. "Soft Drinks Sugar Levy Revenues Swallowed up by Treasury Review." The Grocer. September 6, 2019. https://www.thegrocer.co.uk/health/soft-drinks-sugar-levy-revenues-swallowed-up-by-treasury-review/597309.article.

Roberto, Christina A., Shu Wen Ng, Montserrat Ganderats-Fuentes, David Hammond, Simon Barquera, Alejandra Jauregui, and Lindsey Smith Taillie. 2021. "The Influence of Front-of-Package Nutrition Labeling on Consumer Behavior and Product Reformulation." *Annual Review of Nutrition* 41 (1). https://doi.org/10.1146/annurev-nutr-111120-094932.

Roberts, Nerys. 2022. "School Funding in England." House of Commons Library. UK Parliament. December 9, 2022. https://commonslibrary.parliament.uk/research-briefings/cbp-8419/.

Sallis, James F, Fiona Bull, Ricky Burdett, Lawrence D Frank, Peter Griffiths, Billie Giles-Corti, and Mark Stevenson. 2016. "Use of Science to Guide City Planning Policy and Practice: How to Achieve Healthy and Sustainable Future Cities." *The Lancet* 388 (10062): 2936–47. https://doi.org/10.1016/s0140-6736(16)30068-x.

Scarborough, Peter, Vyas Adhikari, Richard A. Harrington, Ahmed Elhussein, Adam Briggs, Mike Rayner, Jean Adams, Steven Cummins, Tarra Penney, and Martin White. 2020. "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." Edited by Barry M. Popkin. *PLOS Medicine* 17 (2): e1003025. https://doi.org/10.1371/journal.pmed.1003025.

School Food Matters. 2017. "Healthy Pupils Capital Fund." School Food Matters. November 7, 2017. https://www.schoolfoodmatters.org/news-views/news/healthy-pupils-capital-fund.

Schroer, S., J. Haupt, and C. Pieper. 2013. "Evidence-Based Lifestyle Interventions in the Workplace--an Overview." *Occupational Medicine* 64 (1): 8–12. https://doi.org/10.1093/occmed/kqt136.

Seiler, Stephan, Anna Tuchman, and Song Yao. 2020. "The Impact of Soda Taxes: Pass-Through, Tax Avoidance, and Nutritional Effects." *Journal of Marketing Research* 58 (1): 22–49. https://doi.org/10.1177/0022243720969401.

Siegrist, Michael, Rebecca Leins-Hess, and Carmen Keller. 2015. "Which Front-of-Pack Nutrition Label Is the Most Efficient One? The Results of an Eye-Tracker Study." *Food Quality and Preference* 39 (January): 183–90. https://doi.org/10.1016/j.foodqual.2014.07.010.

Silver, Lynn D, Shu Wen Ng, Suzanne Ryan-Ibarra, Lindsey Smith Taillie, Marta Induni, Donna R Miles, Jennifer M Poti, and Barry M Popkin. 2017. "Changes in Prices, Sales, Consumer Spending, and Beverage Consumption One Year after a Tax on Sugar-Sweetened Beverages in Berkeley, California, US: A Before-And-after Study." *PLoS Medicine* 14 (4): e1002283. https://doi.org/10.1371/journal.pmed.1002283.

Smed, Sinne, Anna K. Edenbrandt, and Léon Jansen. 2019. "The Effects of Voluntary Front-of-Pack Nutrition Labels on Volume Shares of Products: The Case of the Dutch Choices." *Public Health Nutrition* 22 (15): 2879. https://www.academia.edu/es/48547492/The_effects_of_voluntary_front_of_pack_nutrition_labels_on_volume_shares_of_products_the_case_of_the_Dutch_Choices.

Song, Zirui, and Katherine Baicker. 2019. "Effect of a Workplace Wellness Program on Employee Health and Economic Outcomes." *JAMA* 321 (15): 1491–1501. https://doi.org/10.1001/jama.2019.3307.

Statista Search Department. 2018. "Sugar Tax and Soft Drinks in the UK." Statista. Statista. 2018. https://www.statista.com/study/40594/sugar-tax-and-soft-drinks-in-the-uk-statista-dossier/.

Storcksdieck, Stefan, Ginevra Marandola, Emanuele Ciriolo, Rene van Bavel, and Jan Wollgast. 2020. “JRC Publications Repository.” Publications.jrc.ec.europa.eu. 2020. https://publications.jrc.ec.europa.eu/repository/handle/JRC113586.

Sullivan, Alycia N., and Margie E. Lachman. 2017. “Behavior Change with Fitness Technology in Sedentary Adults: A Review of the Evidence for Increasing Physical Activity.” *Frontiers in Public Health* 4 (289). https://doi.org/10.3389/fpubh.2016.00289.

Sustain. 2020. “Refreshing Investment in Children’s Health: Using the Sugary Drinks Tax to Improve Healthy Food Access in Schools.” Refreshing Investment in Children’s Health: Using the Sugary Drinks Tax to Improve Healthy Food Access in Schools. Sustain, The Green House. December 2020. https://www.sustainweb.org/reports/jan21-childrens-investment/.

Sutliffe, Jay T., Mary Jo Carnot, Joel H. Fuhrman, Chloe A. Sutliffe, and Julia C. Scheid. 2018. “A Worksite Nutrition Intervention Is Effective at Improving Employee Well-Being: A Pilot Study.” *Journal of Nutrition and Metabolism* 2018 (May): 1–5. https://doi.org/10.1155/2018/8187203.

Swinburn, Boyd A, Vivica I Kraak, Steven Allender, Vincent J Atkins, Phillip I Baker, Jessica R Bogard, Hannah Brinsden, et al. 2019. “The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission Report.” *The Lancet* 393 (10173): 791–846. https://doi.org/10.1016/s0140-6736(18)32822-8.

Taillie, Lindsey Smith, Marcela Reyes, M. Arantxa Colchero, Barry Popkin, and Camila Corvalán. 2020. “An Evaluation of Chile’s Law of Food Labeling and Advertising on Sugar-Sweetened Beverage Purchases from 2015 to 2017: A Before-And-after Study.” Edited by Sanjay Basu. *PLOS Medicine* 17 (2): e1003015. https://doi.org/10.1371/journal.pmed.1003015.

Talukdar, Debabrata, Satheesh Seenivasan, Adrian J. Cameron, and Gary Sacks. 2020. “The Association between National Income and Adult Obesity Prevalence: Empirical Insights into Temporal Patterns and Moderators of the Association Using 40 Years of Data across 147 Countries.” Edited by David Meyre. *PLOS ONE* 15 (5): e0232236. https://doi.org/10.1371/journal.pone.0232236.

Tarabella, Angela, and Lelia Voinea. 2013. “Advantages and Limitations of the Front-of-Package (FOP) Labeling Systems in Guiding the Consumers’ Healthy Food Choice.” *Amfiteatru Economic Journal* 15 (33): 198–209. https://www.econstor.eu/handle/10419/168785.

Teng, Andrea M., Amanda C. Jones, Anja Mizdrak, Louise Signal, Murat Genç, and Nick Wilson. 2019. “Impact of Sugar-Sweetened Beverage Taxes on Purchases and Dietary Intake: Systematic Review and Meta-Analysis.” *Obesity Reviews* 20 (9): 1187–1204. https://doi.org/10.1111/obr.12868.

Thow, Anne Marie, Shauna M Downs, Christopher Mayes, Helen Trevena, Temo Waqanivalu, and John Cawley. 2018. “Fiscal Policy to Improve Diets and Prevent Noncommunicable Diseases: From Recommendations to Action.” *Bulletin of the World Health Organization* 96 (3): 201–10. https://doi.org/10.2471/blt.17.195982.

UNC-Chapel Hill. 2023. “Front-of-Package Labeling.” Global Food Research Program. February 2023. https://www.globalfoodresearchprogram.org/resource/front-of-package-label-maps/.

VanEpps, Eric M., Christina A. Roberto, Sara Park, Christina D. Economos, and Sara N. Bleich. 2016. “Restaurant Menu Labeling Policy: Review of Evidence and Controversies.” *Current Obesity Reports* 5 (1): 72–80. https://doi.org/10.1007/s13679-016-0193-z.

Vohra, Jyotsna, Michael G Marmot, Linda Bauld, and Robert A Hiatt. 2015. “Socioeconomic Position in Childhood and Cancer in Adulthood: A Rapid-Review.” *Journal of Epidemiology and Community Health* 70 (6): 629–34. https://doi.org/10.1136/jech-2015-206274.

Wang, Y., L. Cai, Y. Wu, R. F. Wilson, C. Weston, O. Fawole, S. N. Bleich, et al. 2015. “What Childhood Obesity Prevention Programmes Work? A Systematic Review and Meta-Analysis.” *Obesity Reviews* 16 (7): 547–65. https://doi.org/10.1111/obr.12277.

WHO. 2010. “Set of Recommendations on the Marketing of Foods and Non-Alcoholic Beverages to Children.” Www.who.int. June 15, 2010. https://www.who.int/publications/i/item/9789241500210.

———. 2016. “Fiscal Policies for Diet and Prevention of Noncommunicable Diseases.” https://apps.who.int/iris/bitstream/handle/10665/250131/9789241511247-eng.pdf.

———. 2017a. “Consideration of the Evidence on Childhood Obesity for the Commission on Ending Childhood Obesity Report of the Ad Hoc Working Group on Science and Evidence for Ending Childhood Obesity.” http://apps.who.int/iris/bitstream/handle/10665/206549/9789241565332_eng.pdf.

———. 2017b. “Taxes on Sugary Drinks: Why Do It? Sugary Drinks 1 -a Major Contributor to Obesity and Diabetes.”

https://apps.who.int/iris/bitstream/handle/10665/260253/WHO-NMH-PND-16.5Rev.1-eng.pdf.

———. 2021a. “Obesity.” Who.int. World Health Organization: WHO. June 9, 2021. https://www.who.int/news-room/facts-in-pictures/detail/6-facts-on-obesity.

———. 2021b. “Obesity and Overweight.” World Health Organisation. WHO. June 9, 2021. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

———. 2022. “WHO Calls on Countries to Tax Sugar-Sweetened Beverages to Save Lives.” Www.who.int. December 13, 2022. https://www.who.int/news/item/13-12-2022-who-calls-on-countries-to-tax-sugar-sweetened-beverages-to-save-lives.

Wolfenden, Luke, Nicole Nathan, Christopher M Williams, Tessa Delaney, Kathryn L Reilly, Megan Freund, Karen Gillham, et al. 2014. “A Randomised Controlled Trial of an Intervention to Increase the Implementation of a Healthy Canteen Policy in Australian Primary Schools: Study Protocol.” *Implementation Science* 9 (1). https://doi.org/10.1186/s13012-014-0147-3.

World Cancer Research Fund International. 2016. “World Cancer Research Fund - Policy Actions.” Wcrf.org. 2016. https://policydatabase.wcrf.org/level_one?page=nourishing-level-one#step2=0#step3=309.