

SUGAR SWEETENED BEVERAGE TAX AND ITS IMPLICATIONS FOR PUBLIC HEALTH

Hari Teja Avirneni^{1*}, Anugraha John², Sinthu Sarathamani Swaminathan³

¹Assistant Professor, Department of Community Medicine, NRI Institute of Medical Sciences, Visakhapatnam, Andhra Pradesh, India.

²Assistant Professor, Department of Community Medicine, Sri Lalithambigai Medical College and Hospital, Chennai, Tamil Nadu, India.

³Assistant Professor, Department of Community Medicine, Trichy SRM Medical College Hospital and Research Centre, Trichy, Tamil Nadu, India.

Correspondence Address: Hari Teja Avirneni

Email: haritejaavirneni26@gmail.com

ABSTRACT

Introduction: Sugar Sweetened Beverages (SSBs) consumption has increased to higher levels across all corners of the world. High sugar diets in the form of SSBs lead to increased calorie intake with almost no nutritive value when compared to solid food and contributes to the increased energy intake resulting in an unhealthy weight gain, often associated with health issues such as obesity, diabetes, cardio-vascular diseases, early tooth decay and formation of cavities. It is also observed that consumption of SSBs is linked to unhealthy habits like smoking, decreased physical activity, increased intake of fast food and increased screen time. **Method:** The required information on SSB tax implementation at the global level was retrieved from the literature reviews. **Result:** Taking such detrimental effects of SSBs into consideration, many countries are putting efforts to tackle the problem of higher consumption of SSBs by adopting measures such as taxations on SSBs. However, it is also extremely important to understand how these taxes help in generating higher revenues to the government which, in turn, can be used for various community needs in the respective countries. **Conclusion:** The same revenue can also be utilised for implementation of comprehensive healthcare programmes especially in Low and Middle-Income Countries (LMIC), by providing preventive, promotive, curative, rehabilitative and palliative services as a way to progress towards Universal Health Coverage (UHC).

Keywords: Berkeley tax, Non-Communicable Diseases, Sugary drinks, Sugar Sweetened Beverage Tax, Sugar tax

INTRODUCTION

Sugar Sweetened Beverages (SSBs) consumption has increased to higher levels across all corners of the world. SSBs are high in sugars in various forms such as fructose or sucrose. This high amount of sugar contributes to increased energy density and is an indication for overall reduced quality of a diet. Also, high sugar diets in the form of SSBs lead to increased calorie intake with almost no nutritive value when compared to solid food and contributes to the increased energy intake resulting to an unhealthy weight gain (World Health Organisation, 2017). Such unhealthy weight gain is often associated with health-related issues such as obesity, diabetes, cardio-vascular diseases, early tooth decay and formation of cavities and

also affecting kidneys and liver (Bombback et al., 2010; Malik et al., 2010b; 2010a; Bernabé et al., 2014; Malik and Hu, 2015). Such weight gain leading to obesity is considered to have a strong association with Non-communicable Diseases (NCDs) mainly diabetes mellitus, cardiovascular diseases, metabolic syndrome and also cancer. Additionally, regular consumption of SSBs also has a detrimental effect on the oral health, mainly contributing to dental caries (Malik et al., 2013).

Also, such a high level of consumption of SSBs has been linked to unhealthy habits like smoking, decreased physical activity, increased intake of fast food, decreased intake of fruits and vegetables and increased screen time (Park et al., 2012) All these factors eventually become risk factors in the development of

chronic diseases in the community.

With increasing prevalence of such diseases, individuals, families, communities and the nation have had to incur higher healthcare costs in the management of such diseases for a longer duration, which can have a huge impact on the economic development of a country (Allcott, Lockwood and Taubinsky, 2019). Hence to combat such events and taking the detrimental effects of SSBs into consideration, many countries are making efforts to tackle the problem of higher consumption of SSBs by adopting measures such as taxations on SSBs (Madsen, Krieger and Morales, 2019).

This implementation of SSB tax at the policy level is seen as an important strategy, based on the economic theory, which predicts lower demand for and consumption of SSBs with increase in prices of the SSBs (Cawley et al., 2019).

But, how effective are these taxes in reducing/changing the consumption behaviours of the people and is taxation the only way to prevent/reduce the consumption of SSBs across all corners of the world? This review discusses these areas and answers the questions in terms of global evolution of these taxes.

METHODS

The required information on SSB tax implementation at the global level was retrieved from the literature reviews. The literature search was conducted in PubMed databases (including MEDLINE). The medical subject headings (MeSH) keywords used were 'sugar sweetened beverage', 'sugary drink', 'sugar tax', 'food policy', 'non-communicable disease'.

The period of reference was from the year 2011 to 2021. Based on the references, studies which met the following criteria were included: (i) Studies on SSB tax (ii) Papers focusing on evidence-based approach to tackle NCDs. (iii) Studies published in English. Out of a total 178 articles, 23 were included for the final

report. Analysis of the literature was synthesised into a narrative review, which highlighted our key findings by the following themes: Sugar Sweetened Beverages, global scenario, benefits of such taxations.

RESULTS

Sugar Sweetened Beverages

Any liquid that has added sweetener most commonly in the form of sugar is called as SSB. The various forms of added sugar include but are not limited to brown sugar, sucrose, fructose, glucose, lactose, maltose, corn syrup, etc. All such drinks, either served hot or cold with added sugars, like soda, fruit-based juices, sports and energy drinks, coffee, tea etc., are defined under the SSB category (US Department of Health and Human Services, 2015).

World Health Organisation recommendations on sugar intake

The generated evidence from extensive research across the world has led to an understanding that increased sugar intake on a continuous basis is the leading factor in increased weight which, in turn, is directly leading to higher risk of obesity and also dental caries, with children being the most affected groups. Therefore, in an effort to combat such higher risks of childhood obesity from the intake of sugars, the World Health Organisation (WHO) has formulated guidelines on intake of free sugars. WHO recommendations for sugar intake is based on the quantity of intake of sugar. In order to have health benefits, the intake of sugars is recommended to be less than 5-10% of total calorie intake in both children and adult populations (World Health Organisation, 2017).

Rationale behind taxation on SSBs

Since 1975, there has been a continuous rise in prevalence of obesity around the world, with almost a threefold increase. More alarmingly, the estimated number of children and adolescents

suffering from obesity rose by nearly more than tenfold in the span of four decades (NCD Risk Factor Collaboration, 2017). Also, the number of adults who fall under overweight and obese categories is 39% and 13%, respectively (World Health Organisation, 2014). Obesity, which is the most strongly associated risk factor for diabetes, also is associated with cardiovascular problems and cancers. Also, in an observation between the development of obesity in SSB consumers when compared to that of SSB non-consumers, the latter had a 26% less risk of developing obesity (Malik et al., 2010a). Such higher levels of obesity leading to higher prevalence of diabetes have been causing a heavy economic burden to countries in the form of accelerated and increased healthcare costs for treatment and management of diabetes. Therefore, in order to prevent and reduce such impacts on the health of the individuals and on healthcare systems, taxation on SSBs is being seen as a feasible strategy that can be easily adopted at policy level globally. Also, the money raised from such taxes is being utilised for implementation of various social activities. Hence, taxations on SSBs is seen as a necessary measure to confront one of the most important modifiable risk-factor for obesity; diet. Taxation on SSBs can help lower sugar consumption in a way similar to how taxation on tobacco products was implemented to bring a significant reduction in tobacco usage (Madsen, Krieger and Morales, 2019).

Global Scenario

The global approach towards discouraging the usage of products that have potential detrimental effects on individuals and societies has been to impose taxes on such products. These taxes are popularly known as ‘Sin Taxes’. These were mainly imposed on tobacco products and alcohol products. However, with the unprecedented levels of rise in the global prevalence of obesity, diabetes and other

non-communicable diseases, one of the major causes in the form of sugary drinks have been identified and since then has been increasingly associated with sin taxes. This newer form of tax category is popularly known as ‘Sugar Tax’. This has been thought to have a potential effect on the consumption of SSBs, which have a major role in the chronic non-communicable diseases. Hence, based on the experiences from other countries and by adopting global recommendations, more than 50 countries along with smaller jurisdictions have adopted/formulated/implemented such taxations in their respective states in order to combat the increasing rise of non-communicable diseases, mainly obesity and diabetes (University of North Carolina, 2021).

Chile

Since 1960, an additional tax known as ‘Impuesto Adicional a las Bebidas Analcoholicas’ has been implemented in Chile as an additional tax on non-alcoholic products. This tax was in proportion to the estimated value of the respective product and was fixed at 13%. Although such taxation was in implementation for nearly four decades, there was no evidence suggestive of its impact on the consumption of sugary drinks. However, this tax structure went through major modification in the year 2014 by taking into consideration the amount of sugar added to the beverage rather than the previously existing fixed tax in proportion to the value of the product. The limit for the value for amount of sugar added to 100 mL of the drink was set at 6.25 grams. Therefore, effective from then, the tax on those drinks having added sugar of more than 6.25 grams has been increased to 18%. Whereas in those drinks having added sugar of less than 6.25 grams, the tax has been reduced to 10%. This has led to the creation of two categories of beverages with the threshold level of sugar added as the differentiation factor for the implementation of SSB tax.

Nakamura et al. (2018) have evaluated the impact of such a tax on SSB consumption at the household levels. They have utilised the household level data on grocery purchases and analysed it for seeing the trends in buying the sugar drinks pre and post to the implementation of sugar tax. They have reported that a downward trend was seen, especially in the people from higher socioeconomic strata, in the purchase of drinks which are high in sugars. They concluded that, although the changes in tax structure was effective, there is a definite need for evaluating the influence of such tax on the SSB consumption patterns among the individuals and also on their health behaviour (Nakamura et al., 2018).

France

In the year 2012, France became the first country to have introduced the taxation reforms on both natural and artificial sweeteners. This led to the implementation of a beverage tax of nearly 7-euro cents per every litre of sugary beverages irrespective of the category of sugar added or artificially sweetened. Following this, in 2018, the Government of France formulated a newer strategy in the form of banded taxation, effectively increasing the price of sugary drinks in a progressive manner to the maximum cap on tax of 20-euro cents per litre (Silva et al., 2013).

In a study which has utilised the household level scanner data to assess the impact of beverage tax on the overall sales of sugary drinks, only 2% reduction in the purchases of soft drinks was reported. Also, observed was that the sale of fruit juices had increased post the introduction of taxation reforms in the country. Also, only a 39% pass through rate was observed for sugary drinks while sodas had 100% pass-through rates (Berardi et al., 2016).

Mexico

The SSB taxation reforms were introduced in Mexico in 2014. An excise tax was introduced which imposed one

Mexican Peso for every litre of such drink at the production level, thereby increasing the cost of SSB at the consumer level by 10%. In a study conducted to assess the impact of taxation on the purchase of SSBs, it was observed that the total number of purchases of such beverages was reduced on an average by 7.6% in the following two years post the implementation. The effect was much higher at 11.7% reduction in the purchase among households with limited resources (Arantxa Colchero et al., 2015). Also, part of the total revenue of nearly 2.6 billion US\$ that was generated was utilised for various societal needs including the installation of water fountains in Mexican schools (Álvarez-Sánchez et al., 2018).

United States of America

The first ever taxation on SSBs in the United States of America (USA) came into action in 2014 in Berkeley, California, USA. It levied a general tax of one cent for every ounce of SSB and also on the sweetening agents. This tax has been exempted to products such as alcoholic drinks, milk-based products, 100% natural juices and drinks having medicinal properties (Falbe et al., 2015).

A study conducted in two large grocery chains in Berkeley has shown the declination in sale of SSBs sales by almost 9.6% post the implementation. Also, a 1.5 cents of excise duty tax per an ounce of SSB was levied in Philadelphia in 2017. In a study conducted to see the differences in price of SSBs from large chain retailers prior to taxation and post taxation, it was observed that the price of SSBs was raised by around 0.7-1.6 cents per ounce of SSB depending on the type of point of sale, such as supermarkets, mass merchandisers and pharmacies. The findings from this study showed a significant reduction in the overall sales of SSBs by 51% post the implementation (Roberto et al., 2019).

Barbados

The Government of Barbados

introduced its own adoption of SSB in the form of ‘ad valorem tax’ in 2015 based on the alarming findings of increased levels of obesity and diabetes, from a nationally representative survey. This added an additional 10% levy on the sugary beverages, making them more expensive by almost 6% when compared to the pre-tax prices (Howitt et al., 2015). A post-tax survey was conducted to observe the effect of ‘ad valorem tax’ on the sales of SSBs. An average decrease of nearly 5% in the weekly sales was observed, while the average weekly sales of non-sugary drinks saw an almost 5% increase. The major contributor to the total decrease in sales was found to be from the carbonated drinks (Alvarado et al., 2019).

United Kingdom

SSB taxation was imposed in the United Kingdom (UK) as the Soft Drinks Industry Levy (SDIL) starting from 2018. It is a tiered system in which tax is being levied both on the producers and importers of SSBs. This two-tier system is based on amount of sugars added in a drink, i.e. the higher the sugars are, the higher the levied tax. Based on two main categories of levels of added sugar in 100 ml (5-8 grams and more than 8 grams), an 18 pence for a litre of a drink and 24 pence for a litre of a drink was levied, respectively. However, it gives a tax exemption to 100% natural fruit juices, milk-based products and drinks which have added sugars of less than 5 grams in quantity per 100ml of a drink.

The targeted revenue of 500 million pounds expected to be generated via this system by 2020 will be used specifically for the purpose of promoting healthy behaviours in the schools through the development and implementation of programmes related to various sports and physical education training activities (Burki, 2016; Moore et al., 2019).

South Africa

In order to combat the increasing

prevalence of type-2 diabetes, South Africa instituted the first ever SSB tax in the year 2018. This tax was named as ‘Health Promotion Levy’ (HPL) and it was the first of its kind in the region of the sub-Saharan continent (Popkin and Hawkes, 2016). Similar to the multi-tiered tax regimen that was implemented in the United Kingdom, HPL also levies a fixed 2.1 cent for every gram of sugar content irrespective of its addition or not, making it costlier. That means the threshold level is based on the amount of the sugar content rather than the amount of sugar added. The threshold of sugar remains at 4gms/100 ml (Veerman, 2017). A before and after study conducted in South Africa post the implementation of HPL observed the differences in the individual attitudes and behaviours towards the consumption of SSBs. It was observed that the intake of taxed sugary beverages has decreased while the intake of untaxed beverages has increased. They have observed that HPL had an impact on the total amount of sugar in the beverages with almost 31% reduction in the sugar, with an additional 9% reduction due to reformulation. However, the reduction in sugar consumption due to differences in the behavioural patterns was less than 21% only (Essman et al., 2021).

Benefits of taxation on SSBs

Imposing taxes on SSBs is considered as one of the viable mechanisms to reduce the overall consumption of sugars. Available evidence is also of suggestive of the positive impact of SSB taxation on obesity and diabetes (World Health Organisation, 2017a).

The benefits of taxation on SSBs can be categorised mainly into four categories. (i) Taxation leading to higher prices of sugary drinks, impacting the consumption of SSBs which, in turn, can have a potential public health impact. (ii) Such taxation can also lead to generation of large revenues, which can be utilised for public health interventions at a mass scale. (iii) Having a taxation reform at the policy

level can be helpful in delivering a strong message to the citizens of a state and can serve as a constant reminder about the higher consumption of SSBs, which cannot be part of a healthy diet. (iv) This also can sensitise the manufacturers to restructure their business strategies and reformulate their products as per the health standards and guidelines, eventually giving them incentives in the long run for making healthier products (Backholer and Martin, 2017). For example, evidence suggests that, by increasing the prices of SSBs by 20%, there can be almost 20% reduction in their consumption (Powell et al., 2013). Additionally, such SSB taxes can also reduce the healthcare-related costs in terms of mitigating such costs by preventive measures such as levying taxes. That means a levied tax of one cent per ounce of a drink can save an estimated amount of nearly 17 billion US\$ in terms of related healthcare expenditures (Wang et al., 2012). It is estimated that by imposing even a minimum tax on SSBs, an approximate amount of 13 billion US\$ and 11.8 billion US\$ would be generated in USA and China, respectively. This money that is generated via SSB taxes can be used for promoting health among the communities by encouraging healthy eating behaviours, developing infrastructure related to sports and other physical activities, capacity building for effective implementation of various public health programmes, etc. (Chaloupka, 2011). Also, imposing taxes on SSBs can lead to reduced consumption in low income and younger age groups. For example, in Mexico after imposing such taxes, there was an increased reduction in consumption of SSBs by 11.8% among households with limited resources when compared to a reduction of 7.6% in other groups (Arantxa Colchero et al., 2015).

DISCUSSION

With the ever increasing prevalence of NCDs having a huge toll on the nation's health, SSBs have gained attention as the

major drivers of NCD epidemic (World Health Organisation, 2018). SSBs being high in energies while having almost no nutritive value to the consumers, has been the major identifying factor, which has led to the widespread attention among the scientific community and policy makers. Hence, SSB tax has been seen as one of the major reforms required at the policy level in many nations, in addressing the rising level of NCDs. Similar to the other taxes related to products such as tobacco and alcohol, associated with NCDs, SSB tax is seen as a strategy to bring a change in consumption patterns of the individuals, families and communities (Malik and Hu, 2015).

This adoption of SSB taxations has gained momentum and popularity among policy makers in the last decade, with over 50 countries adopting such policies at a larger scale and pace, with an anticipated effort to accelerate the fight against NCDs via awareness campaigns and policy reforms that affect the SSB consumption patterns of the public (University of North Carolina, 2021). Also, it has been thought that implementing such taxes on SSBs would not only bring in the changes in consumption behaviours of the people. This can be more fruitful in reducing the consumption practices, especially among the youth, as they are more affected by the increased prices when compared to adults (Malik et al., 2013).

However, the most important aspect of implementing policy reforms is to study the effect of such reforms along with comparing and contrasting the levels of consumption prior to and post the implementation of such reforms. Hence, to understand the effect of such taxation on overall SSB sales and consumption, various surveys and research were undertaken, in an effort to produce evidence associating the SSB tax with consumption patterns among the public.

Although, in the nascent stages and with certain limitations, the effect of SSB taxations on consumption of SSBs among the general population is impactfully

positive. However, research-based evidence on SSB taxations in LMIC is lacking. But, considering the higher level of marketing campaigns in such countries which aimed at tapping the huge business potential of such markets with large number of populations, the research needs of SSBs in LMIC has to be prioritised. The major reason behind lack of such data on SSBs in LMIC would have been probably due to a series of much more complex healthcare needs and related risk factors existing in such countries.

The data from Mexico's SSB tax estimated an approximately 10% decline rates in the sales of taxed beverages while plain water sales saw an increase by nearly 13. Households of low socioeconomic status reduced purchases of taxed beverages by 17% (Arantxa Cochero et al., 2017). Similar observations were also made in other countries where such tax reforms were introduced (Berardi et al., 2016; Essman et al., 2021). Although it's a very small reduction in the context of larger populations, this can be seen as an immediate striking affect. However, the possibility of individuals coming back to older consumption behaviours cannot be ruled out, considering the socioeconomic development leading to increased preferences towards comfort foods, including SSBs.

Also, it has been observed that the consumption patterns of the individuals are inclined towards non-taxed beverages post the implementation of taxations. Although, the non-taxed products are less in sugar content, considering the taxations according to the quantity of sugar, such an inclination might increase their affinity for such drinks, which possibly can have a negative effect on the behavioural changes, because there is a chance for them to still consume a greater number of less sugary drinks for a prolonged period of time, which, in turn, can be detrimental in nature, in the context of obesity and diabetes. Hence, the focus of such taxations could be on the entire spectrum of sugar-natured

drinks, rather than on any specific section. In addition to the sugar content, considering the sizes of the drinks would also be of prime importance. As these measures are being adopted to alter the consumption behaviours, it is necessary to keep in check other things such as small sized sugary drinks, which can become potential hindering factors in altering the consumer behaviours.

The pass-through rates of the taxes help us better in understanding the role of such taxes in health prevention. The pass-through rate indicates the amount of increase in the price of the product that has to borne by the individual consumers, rather than tax sharing across manufacturers, vendors and consumers (Silver et al., 2017). Therefore, the pass-through rate would have a direct impact on the cost of SSB in the form of increased maximum selling prices for consumers. Hence, higher pass-through rates of SSB tax would take the cost of the product to a higher level, thereby demanding increased prices from the consumers (Backholer and Martin, 2017). This has been thought to have a direct effect on the purchasing patterns of the consumers and has the potential of bringing down their higher consumption owing to the raised cost of SSB. Therefore, the higher the pass-through rates, the better the tax implementation and, henceforth, the better prevention (Madsen, Krieger and Morales, 2019). Hence, achieving high level of pass-through rates leads to increased penetration of such policy reforms into public. This would not only have a direct impact on the prices of SSBs, but also could act as a facilitating medium for increasing awareness among the public. However, more research in the longer timelines can accurately estimate the pass-through rates and assess their impact on the consumption based on the changes in a timely manner (Backholer and Martin, 2017).

CONCLUSION

The suggestive and conclusive

evidence on the impact of SSB tax on the consumption behaviours and consumption patterns of the people is still in the nascent stages. However, the existing evidence is highly optimistic and is suggestive of the positive impact of SSB taxes in terms of reduction in overall consumption of SSBs. However, while these findings might be optimistic, the other aspects of combating NCDs shouldn't be ignored, which otherwise can produce negative effects rather than outcomes of interest. Yet, it is also extremely important to understand how these taxes help in generating higher revenues to the government which, in turn, can be used for various healthcare needs of the respective nations.

The revenue generated through such taxes can be utilised in implementing comprehensive health care programmes especially in LMIC, by providing preventive, promotive, curative, rehabilitative and palliative services as a way to progress towards Universal Health Coverage (UHC). Such revenues can also be utilised for developing and building appropriate urban planning mechanisms that have an inbuilt space for facilitating non-sedentary lifestyles in the communities. That is, through such mechanisms, individuals, families and communities would become much closer to such places/facilities rather than traveling to far off places for maintaining regular physical activity.

In addition to this, taxation of SSB would definitely have an impact on the prevalence of obesity, which is a major risk factor for diabetes and other NCDs. By prevention of such huge burden of NCD, the money saved from the part of healthcare-related costs for managing such diseases can be utilised for providing equitable health services and developing health infrastructure. Hence, it is conclusive that the money that is generated either directly or indirectly by imposing SSB taxes can be used for various welfare measures of the population.

The important step in that direction

is by putting in place an effective taxation mechanism that can also be sustained in the long run along with other measures. Educating the people, especially the targeted groups (children and adolescents) on the harmful effects of SSBs in the context of NCDs is also equally important. This can be done via incorporating or formulating policies at the local level, which can prevent selling of all types of sugary drinks at places such as schools, institutions, sporting arenas/club houses and parks among many others. Preventing the sale of SSBs at local level, especially at the places used for physical activity or recreation, can send a strong message to the public at the right place and right time. Such a message might have the potential to alter the behaviours of the consumers, helping them progress towards their health goals. Also, research on SSBs has to be promoted in order to measure the benefits against the drawbacks on the sale of SSBs in the context of taxes and disease burden, respectively. However, creating a positive environment to bring in the behavioural changes to promote a healthy lifestyle among the people is the key to reduce the overall consumption of SSBs and to have a positive health outcome. SSB tax when combined with other preventive and promotive measures has the potential to be an effective tool in moving the populations towards the positive spectrum of health rather than looking at it as the only measure.

REFERENCES

- Allcott, H., Lockwood, B.B. and Taubinsky, D., 2019. Should We Tax Sugar-Sweetened Beverages? An Overview of Theory and Evidence. *Journal of economic perspectives*, [online] 33(3), pp.202–227.
<https://doi.org/10.1257/jep.33.3.202>.
- Alvarado, M., Unwin, N., Sharp, S.J., Hambleton, I., Murphy, M.M., Samuels, T.A., Suhrcke, M. and

- Adams, J., 2019. Assessing the impact of the Barbados sugar-sweetened beverage tax on beverage sales: An observational study. *International Journal of Behavioral Nutrition and Physical Activity*, [online] 16(1), pp.1–11. <https://doi.org/10.1186/S12966-019-0776-7/FIGURES/3>.
- Álvarez-Sánchez, C., Contento, I., Jiménez-Aguilar, A., Koch, P., Gray, H.L., Guerra, L.A., Rivera-Dommarco, J., Uribe-Carvajal, R. and Shamah-Levy, T., 2018. Does the Mexican sugar-sweetened beverage tax have a signaling effect? ENSANUT 2016. *PLOS ONE*, [online] 13(8), p.e0199337. <https://doi.org/10.1371/JOURNAL.PONE.0199337>.
- Arantxa Cochero, M., Rivera-Dommarco, J., Popkin, B.M. and Ng, S.W., 2017. In Mexico, Evidence Of Sustained Consumer Response Two Years After Implementing A Sugar-Sweetened Beverage Tax. *Health affairs (Project Hope)*, [online] 36(3), pp.564–571. <https://doi.org/10.1377/HLTHAFF.2016.1231>.
- Arantxa Colchero, M., Salgado, J.C., Unar-Munguía, M., Molina, M., Ng, S. and Rivera-Dommarco, J.A., 2015. Changes in Prices After an Excise Tax to Sweetened Sugar Beverages Was Implemented in Mexico: Evidence from Urban Areas. *PLOS ONE*, [online] 10(12), p.e0144408. <https://doi.org/10.1371/JOURNAL.PONE.0144408>.
- Backholer, K. and Martin, J., 2017. Sugar-sweetened beverage tax: the inconvenient truths. *Public Health Nutrition*, [online] 20(18), pp.3225–3227. <https://doi.org/10.1017/S1368980017003330>.
- Berardi, N., Sevestre, P., Tépaüt, M. and Vigneron, A., 2016. The impact of a ‘soda tax’ on prices: evidence from French micro data. [online] 48(41), pp.3976–3994. <https://doi.org/10.1080/00036846.2016.1150946>.
- Bernabé, E., Vehkalahti, M.M., Sheiham, A., Aromaa, A. and Suominen, A.L., 2014. Sugar-sweetened beverages and dental caries in adults: a 4-year prospective study. *Journal of dentistry*, [online] 42(8), pp.952–958. <https://doi.org/10.1016/J.JDENT.2014.04.011>.
- Bomback, A.S., Derebail, V.K., Shoham, D.A., Anderson, C.A., Steffen, L.M., Rosamond, W.D. and Kshirsagar, A. v., 2010. Sugar-sweetened soda consumption, hyperuricemia, and kidney disease. *Kidney international*, [online] 77(7), pp.609–616. <https://doi.org/10.1038/KI.2009.500>.
- Burki, T.K., 2016. Sugar tax in the UK. *The Lancet. Oncology*, [online] 17(5), p.e182. [https://doi.org/10.1016/S1470-2045\(16\)30021-3](https://doi.org/10.1016/S1470-2045(16)30021-3).
- Cawley, J., Thow, A.M., Wen, K. and Frisvold, D., 2019. The Economics of Taxes on Sugar-Sweetened Beverages: A Review of the Effects on Prices, Sales, Cross-Border Shopping, and Consumption. <https://doi.org/10.1146/annurev-nutr-082018-124603>, [online] 39, pp.317–338. <https://doi.org/10.1146/ANNUREV-NUTR-082018-124603>.
- Chaloupka, F.C.J.F., 2011. *Sugar-Sweetened Beverage Taxation as Public Health Policy-Lessons from Tobacco*. [online]
- Essman, M., Taillie, L.S., Frank, T., Ng, S.W., Popkin, B.M. and Swart, E.C., 2021. Taxed and untaxed beverage intake by South African young adults after a national sugar-

- sweetened beverage tax: A before-and-after study. *PLoS Medicine*, 18(5).
<https://doi.org/10.1371/journal.pmed.1003574>.
- Falbe, J., Rojas, N., Grummon, A.H. and Madsen, K.A., 2015. Higher Retail Prices of Sugar-Sweetened Beverages 3 Months After Implementation of an Excise Tax in Berkeley, California. *American journal of public health*, [online] 105(11), pp.2194–2201.
<https://doi.org/10.2105/AJPH.2015.302881>.
- Madsen, K.A., Krieger, J. and Morales, X., 2019. Sugar-sweetened beverage taxes: Emerging evidence on a new public health policy. *JAMA*, [online] 321(18), p.1777.
<https://doi.org/10.1001/JAMA.2019.5344>.
- Malik, V.S. and Hu, F.B., 2015. Fructose and Cardiometabolic Health: What the Evidence From Sugar-Sweetened Beverages Tells Us. *Journal of the American College of Cardiology*, [online] 66(14), pp.1615–1624.
<https://doi.org/10.1016/J.JACC.2015.08.025>.
- Malik, V.S., Pan, A., Willett, W.C. and Hu, F.B., 2013. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *The American Journal of Clinical Nutrition*, [online] 98(4), pp.1084–1102.
<https://doi.org/10.3945/AJCN.113.058362>.
- Malik, V.S., Popkin, B.M., Bray, G.A., Després, J.P. and Hu, F.B., 2010a. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation*, [online] 121(11), pp.1356–1364.
<https://doi.org/10.1161/CIRCULATIONAHA.109.876185>.
- Malik, V.S., Popkin, B.M., Bray, G.A., Després, J.P., Willett, W.C. and Hu, F.B., 2010b. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. *Diabetes care*, [online] 33(11), pp.2477–2483.
<https://doi.org/10.2337/DC10-1079>.
- Moore, G., Young, A., Hassan, A. and James, K., 2019. Will the implementation of a sugar tax reduce obesity levels?: an insight from Scotland. *Indonesian Journal of Contemporary Management Research*, [online] 1(2).
<https://doi.org/10.33455/IJCMR.V1I2.98>.
- Nakamura, R., Mirelman, A.J., Cuadrado, C., Silva-Illanes, N., Dunstan, J. and Suhrcke, M., 2018. Evaluating the 2014 sugar-sweetened beverage tax in Chile: An observational study in urban areas. *PLOS Medicine*, [online] 15(7), p.e1002596.
<https://doi.org/10.1371/JOURNAL.PMED.1002596>.
- NCD Risk Factor Collaboration, 2017. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *The Lancet*, 390(10113), pp.2627–2642.
- Park, S., Blanck, H.M., Sherry, B., Brener, N. and O’Toole, T., 2012. Factors associated with sugar-sweetened beverage intake among United States high school students. *The Journal of nutrition*, [online] 142(2), pp.306–312.
<https://doi.org/10.3945/JN.111.148536>.
- Popkin, B.M. and Hawkes, C., 2016. Sweetening of the global diet, particularly beverages: patterns, trends, and policy responses. *The lancet. Diabetes & endocrinology*, [online] 4(2), pp.174–186.

- [https://doi.org/10.1016/S2213-8587\(15\)00419-2](https://doi.org/10.1016/S2213-8587(15)00419-2).
- Powell, L.M., Chriqui, J.F., Khan, T., Wada, R. and Chaloupka, F.J., 2013. Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes. *Obesity reviews: an official journal of the International Association for the Study of Obesity*, [online] 14(2), pp.110–128. <https://doi.org/10.1111/OBR.12002>
- Roberto, C.A., Lawman, H.G., Levasseur, M.T., Mitra, N., Peterhans, A., Herring, B. and Bleich, S.N., 2019. Association of a Beverage Tax on Sugar-Sweetened and Artificially Sweetened Beverages With Changes in Beverage Prices and Sales at Chain Retailers in a Large Urban Setting. *JAMA*, [online] 321(18), pp.1799–1810. <https://doi.org/10.1001/JAMA.2019.4249>.
- Silva, A., Etilé, F., Boizot-Szantai, C. and Dharmasena, S., 2013. The Impact of Beverage Taxes on Quantity and Quality of Consumption in France. In: *Agricultural and Applied Economics Association Conference*. [online] pp.1–15. <https://doi.org/10.22004/AG.ECON.150428>.
- Silver, L.D., Ng, S.W., Ryan-Ibarra, S., Taillie, L.S., Induni, M., Miles, D.R., Poti, J.M. and Popkin, B.M., 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*, [online] 14(4). <https://doi.org/10.1371/JOURNAL.PMED.1002283>.
- University of North Carolina, 2021. *The Global Food Research Program*. [online] Policy research - Fiscal policies.
- US Department of Health and Human Services, 2015. *2015-2020 Dietary Guidelines for Americans*. [online]
- Veerman, L., 2017. The impact of sugared drink taxation and industry response. *The Lancet. Public health*, [online] 2(1), pp.e2–e3. [https://doi.org/10.1016/S2468-2667\(16\)30039-1](https://doi.org/10.1016/S2468-2667(16)30039-1).
- Wang, Y.C., Coxson, P., Shen, Y.M., Goldman, L. and Bibbins-Domingo, K., 2012. A penny-per-ounce tax on sugar-sweetened beverages would cut health and cost burdens of diabetes. *Health affairs (Project Hope)*, [online] 31(1), pp.199–207. <https://doi.org/10.1377/HLTHAFF.2011.0410>.
- World Health Organization, 2014. *Global status report on noncommunicable diseases 2014*. [online] *World Health Organization Reports*.
- World Health Organization, 2017a. *Tackling NCDs: “best buys” and other recommended interventions for the prevention and control of noncommunicable diseases*. [online]
- World Health Organization, 2017b. *Taxes on sugary drinks: Why do it?*
- World Health Organization, 2018. Fiscal Policies for Diet and Prevention of Noncommunicable Diseases. *Bulletin World Health Organization*, 96(3), pp.201–210. <https://doi.org/10.2471/BLT.17.195982>.