Junk food tax – a public health intervention to tackle non-communicable diseases: A lesson from Mexico

Jeffrey Chan

ABSTRACT

The rising prevalence of diet-related non-communicable diseases (NCDs) such as diabetes and cardiovascular diseases is a major global public health concern. The consumption of junk food – food high in fat, sugar, and salt – contributes to unhealthy weight gain, obesity, and NCDs. The World Health Organization recognizes the health benefits of introducing tax on junk food, proposing that such a policy would encourage healthier dietary choices leading to the reduction of NCD prevalence. Multiple countries have adopted this policy to tackle NCDs. This systematic review focuses on the experience from Mexico and hopes to provide insights on using health tax policy as a public health intervention. The prevalence of various NCDs in Mexico is among the highest in the world. To address this issue, Mexico has decided to regulate the junk food market by introducing an 8% and a 10% tax on non-essential energy-dense foods (NEDFs) and sugar-sweetened beverages (SSBs), respectively, since January 2014. The purchase and consumption of NEDFs and SSBs have declined in the post-tax period. Mathematical models on weight change, diabetes, and cardiovascular disease policy have also predicted a drop in the prevalence of overweight, obesity, diabetes, coronary heart disease, stroke, and mortality, even if calorie compensation is factored in. This translates into a promising reduction in the burden of health due to NCDs and healthcare costs, particularly for those of lower socioeconomic status, thus promoting health equity. However, the policy is not without shortcomings. For instance, the tax effect is not evenly distributed as it varies across types of foods, regions, and retailers; hence hindering the maximum potential of the policy. In addition, the awareness of the junk food tax and its motives is also not universal among the population, which diminishes the impact of the policy. Complementary strategies such as healthy food subsidies or educational campaigns to promote the policy should be considered to maximize the effect. Countries that are considering junk food tax as a public health policy to tackle NCDs should learn from Mexico's example.

Keywords: Junk food tax, Non-communicable diseases, Sugar-sweetened beverages, Non-essential energy-dense foods, Mexico.

1 INTRODUCTION

The rising prevalence of diet-related non-communicable diseases (NCDs) is a major global public health concern. NCDs have been a great challenge in Mexico, creating a huge burden to the society. For instance, diabetes prevalence and mortality in Mexico have been increasing over the years (NCD-RisC, 2016; WORLD HEALTH ORGANIZATION [WHO], 2016a; WHO, 2016b). Globally, Mexico sits among the top ten countries with most adults with diabetes (NCD-RisC, 2016).

The major risk factors of diabetes are overweight, obesity, and physical inactivity. The prevalence of these risk factors in Mexico is considerably significant (WHO, 2016b). One-third of children and around 70% of adults in Mexico were overweight or obese (WHO, 2016a).

Non-essential energy-dense foods (NEDFs) are foods high in added sugars, fat, energy, and salt (DREWNOWSKI & SPECTER, 2004). Sugar-sweetened beverages (SSBs) are drinks sweetened with added sugars (CENTERS FOR DISEASE CONTROL AND PREVENTION, 2022). The consumption of junk food, namely NEDFs and SSBs, contributes to unhealthy weight gain, obesity, and NCDs.

Facing the threatening situation of overweight, obesity and diabetes, Mexico was compelled to react by introducing NCD-targeting policies, although criticism suggested that the reaction might come too slowly (BARQUERA & WHITE, 2018). One established way in many countries to control NCDs was to regulate the junk food market via tax policy, and this public health intervention strategy was adopted by Mexico.

Public health intervention is any effort to improve population health. Public health interventions target and address underlying social determinants of health. There are several types of public health interventions, including policy development (KENT STATE UNIVERSITY COLLEGE OF PUBLIC HEALTH BLOG, 2018).

Junk food taxation is a public health response to the burden of diet-related NCDs and such policy is known to be rewarding to population health and economic productivity (BLAKELY et al., 2020). The WHO also recognizes the public health benefits of introducing tax on junk food given that such tax policy would encourage healthier dietary choices leading to the reduction of NCDs (WHO, n.d., 2022).

In January 2014, Mexico implemented a nationwide tax on NEDFs (8% tax) and SSBs (10% tax), respectively. This paper reviews the process and outcome of junk food tax as a behavioral public health intervention in Mexico.

2 METHODS

A database search on PubMed, Google Scholar, and Cochrane Library through September 2023 was conducted. The search was based on the following keywords: “junk food tax,” “junk food,” “tax,” “non-essential energy-dense food,” “sugar-sweetened beverage,” “non-communicable diseases,” “overweight,” “obesity,” “diabetes,” and “Mexico.” The selection criteria were retrospective observational studies, cohort studies, or prospective mathematical modeling studies in Mexico published between 2014 and 2023. NCD outcomes were compared before and after the implementation of junk food tax in the adult and pediatric populations.

3 RESULTS

Eight studies were included: national sales data of SSBs and plain water (COLCHERO et al., 2016); national purchase data of SSBs and bottled water (n=75954) (COLCHERO et al., 2017); survey data for body mass index (BMI), obesity, and diabetes analysis in those aged 20 or above (n=2735) (BARRIENTOS-GUTIERREZ et al., 2017); purchase data of taxed and untaxed beverages from households (n=6089) (NG

et al., 2018); health worker participants aged 19 or above for soft drink consumption analysis (n=1770) (SÁNCHEZ-ROMERO et al., 2020); participants aged 1 to 99 for oral health analysis (n=2648893) (HERNÁNDEZ-F et al., 2021); participants aged 6 to 17 for BMI, overweight, and obesity analysis (n=10886) (ILLESCAS-ZÁRATE et al., 2021); and urban households for food shopping pattern analysis (n=5493) (PEDRAZA et al., 2021).

3.1 EFFECTS OF NEDF TAX

The purchase of taxed food declined consistently in the first couple of years, and the margin of decline had increased between the years (TAILLIE et al., 2017). Among purchasers, those with the most unhealthy choices pre-tax showed greater decline of unhealthy purchase post-tax (TAILLIE et al., 2017). The mean volume of purchased taxed food also dropped (BATIS et al., 2018).

One year post-tax, the prevalence of overweight and obesity were projected to drop by 1.7% and 0.4%, respectively (ILLESCAS-ZÁRATE et al., 2021). Moreover, larger reductions would occur in school-aged, male, and low socioeconomic status (SES) children (ILLESCAS-ZÁRATE et al., 2021).

3.2 EFFECTS OF SSB TAX

SSB tax reduced the probability of consumers consuming soft drinks (SÁNCHEZ-ROMERO et al., 2020). The 10% increase in the price was estimated to result in an 11.6% decrease in SSB consumption (COLCHERO et al., 2015). The proportion of SSB non-consumers increased from 10% to 14% while that of medium and high consumers dropped from 50% to 43% (SÁNCHEZ-ROMERO et al., 2020).

The purchase of taxed beverages was seen to drop while that of untaxed beverages was seen to increase (COLCHERO et al., 2015). The mean volume changes of purchased taxed drinks before and after the tax also demonstrated a similar result (BATIS et al., 2018). Comparing with pre-tax period, there were both a decrease in sales (by 7.3%) and purchase (by 6.3%) of SSBs and increase in sales (by 5.2%) and purchase (by 16.2%) of plain water one year post-tax (COLCHERO et al., 2016, 2017). The SSB tax policy would also have a higher impact on those who had SSB purchasing habits prior to the tax. This population would have a larger reduction on their SSB purchase post-tax (NG et al., 2018).

According to the mathematical model, the average decrease in BMI per person would be 0.15 kg/m in ten years, which corresponds to a 2.54% decrease in obesity prevalence (BARRIENTOS-GUTIERREZ et al., 2017). Those in lower SES were also found to adhere to the policy at a greater extent than those in higher SES (BARRIENTOS-GUTIERREZ et al., 2017; BATIS et al., 2018).

The current SSB tax rate was projected to prevent nearly a quarter million cases of obesity and over sixty-thousand cases of diabetes over two years, of which a large proportion would be children (BASTO-

ABREU et al., 2019). By 2030, the tax would prevent up to 134000 cases of diabetes (BARRIENTOS-GUTIERREZ et al., 2017).

3.3 EFFECTS ON ORAL HEALTH

After the junk food tax was introduced, the number of outpatient visits due to dental caries dropped, so were the probability of experiencing dental caries, as well as the number of cases with Decayed, Missing, and Filled Teeth (HERNÁNDEZ-F et al., 2021).

3.4 EFFECTS ON ECONOMIC PRODUCTIVITY

Economic productivity gains were expected with the introduction of junk food tax due to the alleviation of health burdens (BASTO-ABREU et al. 2019). A 10% tax in SSB not only could lower the prevalence of NCDs, it could also save about $1 billion of direct healthcare cost (SÁNCHEZ-ROMERO et al., 2016).

4 DISCUSSION

4.1 PUBLIC HEALTH IMPLICATIONS

Junk food consumption is a risk factor for diet-related NCDs and reducing junk food consumption implies improvement in diet, which helps prevent diet-related NCDs. Taxation as a public health policy was used to intervene in the dietary choices of the public, hoping the public could stay away from junk food, develop a healthier dietary habit, and improve health by lowering the number of diet-related NCD cases.

Junk food tax has produced an overall constructive outcome in the general health of Mexicans. There have been predicted as well as measured improvement in the numbers obesity, diabetes, oral health, as well as in economic productivity and health equity. The result has been connected to the modification of purchase and consumption behavior. For instance, we see the choice of not drinking sugary drinks and substituting them with water (COLCHERO et al., 2016, 2017).

Price elasticity models determined that the taxation would bring a leverage effect, i.e. the percentage drop of SSB consumption (11.6%) would exceed that of price hike (10%) (COLCHERO et al., 2015). Thus, this would be an effective strategy to decrease consumption of junk food. Furthermore, higher reductions in consumption were found in households of low SES, and therefore producing a more equitable outcome (ILLESCAS-ZÁRATE et al., 2021; WHO, 2016a, 2022).

The junk food tax policy would also bring fiscal revenue (BONILLA-CHACÍN et al., 2016). The tax revenues could then be used to support public health services and promote health equity.

4.2 CHALLENGES AND LIMITATIONS

Despite the many benefits it brings, there were challenges and limitations in using tax as a public health intervention. First, there needed to be adequate promotion, education, and outreach, and the lack thereof would lead to suboptimal population awareness of the junk food tax, which would diminish the impact of the policy.

Moreover, the tax has faced strong resistance from the food and beverage industry (BONILLA-CHACÍN et al., 2016; GÓMEZ, 2019; PEDROZA-TOBIAS et al., 2021). Attributed by its political interests and social benefits, the industry has invested strongly to avoid corporate responsibility and oppose tax legislation (DU et al., 2018; GÓMEZ, 2019).

The design of the tax also required closer scrutiny. On one hand, the tax rate and coverage should be large enough to make effect (BONILLA-CHACÍN et al., 2016). A concern of having a small tax rate or coverage was that the public would simply substitute unhealthy taxed food with other unhealthy non-taxed or cheaper taxed food (BARRIENTOS-GUTIERREZ et al., 2017; BONILLA-CHACÍN et al., 2016). On the other hand, higher tax rate and coverage would inevitably face greater political opposition and thus less likely to sustain (FRANCK et al., 2013).

4.3 FUTURE DIRECTIONS AND IMPROVEMENTS

At an individual level, educational campaigns should be developed to promote the policy. Complementary policies should be considered, such as to reward the public for healthy behavior; for instance, providing healthy food subsidies to encourage even healthier food choices (BLAKELY et al., 2020; BROEKS et al., 2020; COLCHERO et al., 2013).

Improvements should be made to the current tax rate and coverage. Some strategies include the introduction of progressive tax rate (e.g., sugar-density tax) and the expansion of tax coverage to include more unhealthy food (e.g., ultra-processed foods and beverages) (BONILLA-CHACÍN et al., 2016; POPKIN & NG, 2021).

To minimize the resistance to public health tax policies, careful monitoring of industrial responses is important. We ought to identify and understand the stakeholders involved, recognize their stance and influence, and ensure accountability of all (CARRIEDO et al., 2021).

5 CONCLUSION

Using junk food taxation as a public health intervention shows promise to improve the dietary behavior of the public. There is strong evidence in support of a junk food tax to reduce population body weight, BMI, and the prevalence of obesity, diabetes, and dental diseases in Mexico. Not only that the tax reduces the burden of disease, this effect appears to be the most significant in low SES, which contributes

to the promotion of health equity, as it reduces future healthcare costs for the less favored individuals. Junk food tax also brings forth economic productivity gain due to improved health of the population. The policy should be further expanded and strengthened. Policymakers from other countries who are planning to implement taxation as public health intervention should learn from Mexico's experience for a better prospect.

REFERENCES

BARQUERA, S.; WHITE, M. Treating Obesity Seriously in Mexico: Realizing, Much Too Late, Action Must Be Immediate. Obesity (Silver Spring, MD.), v. 26, n. 10, p. 1530–1531, 2018.

BARRIENTOS-GUTIERREZ, T.; et al. Expected population weight and diabetes impact of the 1-peso-per-litre tax to sugar sweetened beverages in Mexico. PLoS one, v. 12, n. 5, p. e0176336, 2017.

BARRIENTOS-GUTIÉRREZ, T.; et al. Position paper on taxes to non-basic energy-dense foods and sugar-sweetened beverages. Salud Publica de Mexico, v. 60, n. 5, p. 586–591, 2018.

BASTO-ABREU, A.; et al. Cost-Effectiveness Of The Sugar-Sweetened Beverage Excise Tax In Mexico. Health Affairs, v. 38, n. 11, p. 1824-1831, 2019.

BATIS, C.; et al. First-Year Evaluation of Mexico's Tax on Nonessential Energy-Dense Foods: An Observational Study. PLoS Medicine, v. 13, n. 7, p. e1002057, 2016.

BLAKELY, T.; et al. The effect of food taxes and subsidies on population health and health costs: a modelling study. The Lancet. Public health, v. 5, n. 7, p. 404–413, 2020.

BONILLA-CHACÍN, M.E.; et al. Learning from the Mexican experience with taxes on sugar-sweetened beverages and energy-dense foods of low nutritional value: poverty and social impact analysis. Health, Nutrition and Population Discussion Paper, 2016.

BROEKS, M. J.; et al. A social cost-benefit analysis of meat taxation and a fruit and vegetables subsidy for a healthy and sustainable food consumption in the Netherlands. BMC Public Health, v. 20, n. 1, p. 643, 2020.

CARRIEDO, A.; et al. The political economy of sugar-sweetened beverage taxation in Latin America: lessons from Mexico, Chile and Colombia. Globalization and health, v. 17, n. 1, p. 5, 2021.

CENTERS FOR DISEASE CONTROL AND PREVENTION. Get the Facts: Sugar-Sweetened Beverages and Consumption. Available at: https://www.cdc.gov/nutrition/data-statistics/sugar-sweetened-beverages-intake.html. Accessed on: 6 Oct. 2023.

COLCHERO, M. A.; et al. After Mexico Implemented a Tax, Purchases of Sugar-Sweetened Beverages Decreased and Water Increased: Difference by Place of Residence, Household Composition, and Income Level. The Journal of Nutrition, v. 147, n. 8, p. 1552–1557, 2017.

COLCHERO, M. A.; et al. Beverages Sales in Mexico before and after Implementation of a Sugar Sweetened Beverage Tax. PLoS one, v. 11, n. 9, p. e0163463, 2016.

COLCHERO, M. A.; et al. Price elasticity of the demand for sugar sweetened beverages and soft drinks in Mexico. Economics and Human Biology, v. 19, p. 129–137, 2015.

DREWNOWSKI, A.; Specter, S. E. Poverty and obesity: the role of energy density and energy costs. The American journal of clinical nutrition, v. 79, n. 1, p. 6–16, 2004.

FRANCK, C.; et al. Taxing junk food to counter obesity. American Journal of Public Health, v. 103, n. 11, p. 1949–1953, 2013.

GÓMEZ E. J. Coca-Cola's political and policy influence in Mexico: understanding the role of institutions, interests and divided society. Health policy and planning, v. 34, n. 7, p. 520–528, 2019.

HERNÁNDEZ-F, M.; et al. Taxes to Unhealthy Food and Beverages and Oral Health in Mexico: An Observational Study. Caries Research, v. 55, n. 3, p. 183–192, 2021.

ILLESCAS-ZÁRATE, D.; et al. Potential Impact of the Nonessential Energy-Dense Foods Tax on the Prevalence of Overweight and Obesity in Children: A Modeling Study. Frontiers in Public Health, v. 8, p. 591696, 2021.

KENT STATE UNIVERSITY COLLEGE OF PUBLIC HEALTH BLOG. A Look At Public Health Interventions. Available at: https://onlinedegrees.kent.edu/college-of-public-health/community/public-health-interventions. Accessed on: 6 Oct. 2023.

NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants. Lancet (London, England), v. 387, n. 10027, p. 1513–1530, 2016.

NG, S. W.; et al. Did high sugar-sweetened beverage purchasers respond differently to the excise tax on sugar-sweetened beverages in Mexico?. Public Health Nutrition, v. 22, n. 4, p. 750–756, 2019.

PEDRAZA, L. S.; et al. Mexican households' food shopping patterns in 2015: analysis following nonessential food and sugary beverage taxes. Public Health Nutrition, v. 24, n. 8, p. 2225–2237, 2021.

PEDROZA-TOBIAS, A.; et al. Food and beverage industry interference in science and policy: efforts to block soda tax implementation in Mexico and prevent international diffusion. BMJ Global Health, v. 6, n. 8, p. e005662, 2021.

POPKIN, B. M.; NG, S. W. Sugar-sweetened beverage taxes: Lessons to date and the future of taxation. PLoS Medicine, v. 18, n. 1, p. e1003412, 2021.

SÁNCHEZ-ROMERO, L. M.; et al. Association between tax on sugar sweetened beverages and soft drink consumption in adults in Mexico: open cohort longitudinal analysis of Health Workers Cohort Study. BMJ (Clinical Research Ed.), v. 369, p. m1311, 2020.

SÁNCHEZ-ROMERO, L. M.; et al. Projected Impact of Mexico's Sugar-Sweetened Beverage Tax Policy on Diabetes and Cardiovascular Disease: A Modeling Study. PLoS Medicine, v. 13, n. 11, p. e1002158, 2016.

TAILLIE, L. S.; et al. Do high vs. low purchasers respond differently to a nonessential energy-dense food tax? Two-year evaluation of Mexico's 8% nonessential food tax. Preventive Medicine, v. 105S, p. S37–S42, 2017.

WORLD HEALTH ORGANIZATION. Global report on diabetes. Geneva: World Health Organization, 2016. Available at https://apps.who.int/iris/bitstream/handle/10665/204871/9789241565257_eng.pdf. Accessed on 6 Oct. 2023.

WORLD HEALTH ORGANIZATION. Health taxes. Available at: https://www.who.int/health-topics/health-taxes. Accessed on: 6 Oct. 2023.

WORLD HEALTH ORGANIZATION. Mexico country report on diabetes. Geneva: World Health Organization, 2016. Available at: https://www.who.int/diabetes/country-profiles/mex_en.pdf. Accessed on 6 Oct. 2023.

WORLD HEALTH ORGANIZATION. WHO manual on sugar-sweetened beverage taxation policies to promote healthy diets. Geneva: World Health Organization, 2022. Available at: https://iris.who.int/bitstream/handle/10665/365285/9789240056299-eng.pdf. Accessed on 6 Oct. 2023.