

Diet: A Public Health and Economic Concern

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CERTIFICATE OF APPROVAL

Honors Thesis

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Abstract

The food we eat is governed and sometimes justifiably so. There are taxes and policies meant to protect consumers and children from products that hurt our health. This thesis has gathered data and analyzed if these policies are performing in favor of the desired outcome. Is a tax on sugar-sweetened beverages making a healthy difference? Does taxing and eliminating processed foods high in saturated fatty acids benefit the health of citizens? Does restricting foods marketed to children promote lower percentages of obesity in young children? The analysis run by JMP does not support that taxes on sugary beverages result in lower cases of diabetes. Literature, however, supports results that taxes and policies indirectly lead to healthier consumers by lowering obesity levels. Although policies against saturated fats are making a difference, the outcome is not a desirable one as heart disease is higher among countries that have this policy. With more analysis of such national policies, governments can reevaluate the efforts and resources used to keep citizens healthy.

Introduction

The focus of this thesis is to evaluate the efficacy of different countries' policies and taxes on improving the health of its residents. Factors used to evaluate health include diabetes and heart disease.

How does a government tackle the rising rates of diabetes, heart disease, and obesity? These three conditions have a common denominator: diet. A doctor treats your already existing condition and most likely is not there in the beginning to shape your diet. This is where government policies come in. Policies protecting against sugar-sweetened beverages, foods high in saturated fats, and marketing to children aren't just implemented for public health concerns but also for an economic benefit. Regulations exist not just because "bad" foods exist but because policies are needed to alleviate costs and burdens of obesity, diabetes, and heart disease, which is the number one cause of death in women and men in the United States. Items that carry no nutritional value and pose a risk to consumers' health are commonly taxed such as cigarettes and alcohol. Soda and juices fall under this category but are not taxed in the United States. It can be argued that these unhealthy foods are actually encouraged as they qualify under the food stamp program. National policies take shape in the form of taxes and marketing. The price of soda is increased by either an excise tax or a sales tax. An excise tax increases the price per ounce while a sales tax raises the cost by a percentage of the product's price. An excise tax is paid by the producer but can be passed on to the consumer if the producer raises its prices. To avoid paying, the producer can alter the recipe to fit healthier guidelines. The tax serves as a deterrent for a consumer to purchase an unhealthy beverage while the extra money generated hopefully goes towards offsetting the cost of healthy, organic food and health programs. The

immediate benefit of a tax on sugar-sweetened beverages is to reduce consumption which leads to the target outcome of a reduced national obesity status.

The food we eat is supposed to be converted into energy that our body needs. Diabetes is one of the four main non-communicable diseases. Non-communicable means that it is not passed from person to person and that the disease is personal. When you can't process food efficiently for use as energy you have diabetes. The problem most associated with sugar is diabetes. Sugar is an energy source that our cells need. Insulin is a vital hormone that regulates blood sugar. It is made in the pancreas and helps glucose get into our cells. After you eat, your blood sugar, or glucose, rises. The hormone insulin is then released by the pancreas into the bloodstream where it communicates to individual cells to open up and absorb glucose. The glucose will then be stored for energy to use later. Therefore, not enough insulin production means low levels of stored energy. Once blood sugar has entered your cells, the levels of sugar in your blood will of course decrease and the amount of insulin sent out will also decrease. Due to insulin levels being low, the liver now wants to release some blood sugar for energy so that the individual does not get headaches, feel dizzy, or pass out. Things get out of hand when cells become resistant to insulin. They won't let them in and levels of both glucose and insulin are high. Muscle cells are full of blood sugar and now fat cells need to compensate for the extra glucose storage. This means unhealthy weight gain. Type I diabetes has not been confirmed to be caused by outside factors such as diet and exercise. Type II diabetes, however, is associated with the consumption of sugar-sweetened foods and beverages (Wand et al. 2015). Type II diabetes is the most common type of diabetes. Being obese, overweight, and living a sedentary lifestyle puts you at a higher risk of developing Type II diabetes. The link between the disease and sugar is that the lifestyles of those with high amounts of fat and visceral fat include higher than normal

consumptions of soda and other sugary beverages. Sugar sweetened drinks are a big concern in public health. Consumption of soda and “liquid candy” have long been known to cause weight gain. Weight is not the sole problem, however. Sugary drinks are also associated with low intakes of essential nutrients like calcium and health problems like diabetes (Malik et al. 2006). Several cities in the United States have a policy against SSB but implementation has not reached a national level (University of North Carolina Chapel Hill).

Perhaps the most impactful agent against harming the environment and bettering our health is changing the way we eat. Our farms and factories have to produce hundreds of thousands of pounds of food to feed seven billion people and by 2050, two billion more people (Gibbons). A good portion of the food produced does not get to the mouths of everyone. The small adjustments we make to our diets will add up to a positive impact on our health, the economy, and our environment. Substituting a meatless meal may seem like you saved merely half a chicken but going meatless once a week for a year means approximately 56 days without meat, 284 kg less of annual greenhouse gas emissions, and 19,000 liters of water saved (Stylianou et al. 2019). As a solution, humans can consider turning to meat substitutes. It is no question that cutting back on meat will eventually cut back on gas emissions, water, and our intake of bad fats.

Fat used to be the bane of diets, but people have realized that some fats were never the enemy. Natural fats found in coconuts and avocados have oils that are good for us. These foods contain unsaturated (monounsaturated and polyunsaturated) fats that make us healthier in the long run. Replacing saturated fat with highly processed carbohydrates, however, has been shown to lead to higher risks of heart disease (Hu, 2010). It so happens that food companies trying to shave off saturated fat replace it with refined carbohydrates. The alteration appeals to those

trying to avoid unhealthy fats yet consumers may not be aware of the poor substitution. Man-made trans fat apparent in highly processed food and beverages aren't just unhealthy, they are plainly considered bad and sometimes toxic. There are no known health benefits from trans fat made from hydrogenation. Harvard Health reports that for every 2% of calories consumed that are trans fat then there is a 23% increase in the risk of heart disease (Harvard Health Publishing, 2015; Siri-Tarino, 2010). A noticeable difference is to find fats that are liquid at room temperature such as oils. These are less likely to build up plaque and cholesterol in arteries than solid fats like butter or margarine.

Today, people of the vegan lifestyle do it for health, ethical, and especially environmental reasons. In 2006, it was reported that 1.6% of Americans identify as vegan (Craig, 2009). Because this diet focuses on plant-based foods which are mostly whole and natural, the diet tends to supply people with higher levels of fiber, folic acid, and iron. This leads to a generally lower risk of diabetes and some cancers. Obesity is a health problem that increases the risk of cancer. Vegetarians and vegans are on average less likely to be obese than omnivores, decreasing the risk of cancer among vegetarians and vegans. Some limitations are associated with strictly plant based diets, however. B-12 deficiency can be avoided by supplements or fortified grain products. Unfortunately, B-12 is not found in sufficient amounts in natural foods like leafy greens and fermented soy products (Watanabe et al. 2014). The same methods apply to calcium. Along with tofu and tahini, plant based eaters will need to reinforce calcium intake with fortified cereals or beverages such as orange and apple juice. Sufficient zinc intake can be provided by legumes, whole grains, and soy products. A constant lack in any one of the aforementioned vitamins and minerals would be a considerable flaw in a plant-based diet. Although followers may generally

be thinner with a lower risk of cardiovascular disease, a diet consistently low in calcium and vitamin D puts them at risk of bone fractures (Ross et al. 2011)

Healthy and environmentally conscious eating habits are becoming widely popular. Sustainability is more than just an honest practice to reduce the depletion of resources but it is now also an aesthetic that dominates the marketing industry and advertisements. A quick walk through the aisles of the grocery store and you will notice how many companies have labeled their products with “new look” or “less plastic used.” The food industries are figuring out that people want seemingly sustainable and clean products and so the colorful, bulky boxes of cookies are no more. Instead, they are designed minimalistic with green leaves and a cardboard texture. This marketing strategy reaches out to children as well. There are “kid” versions of comparably healthy mainstream brands such as Kind, Annie’s, and CLIF. What consumers have to be careful of are brands that have simply change their look but not their ingredients.

The aim of this thesis is to address the three following questions:

Question 1. Is a tax on sugar-sweetened beverages making a healthy difference for the nation’s citizens?

Null Hypothesis: The prevalence of diabetes among a population does not significantly differ based on the existence of a tax on sugar-sweetened beverages.

Alternative Hypothesis: The prevalence of diabetes among a population significantly differs based on the existence of a tax on sugar-sweetened beverages.

Question 2. Does taxing and eliminating processed foods high in saturated fatty acids benefit the health of citizens?

Null Hypothesis: The rate of heart disease in a country does not significantly differ based on the existence of a policy against trans saturated fats.

Alternative Hypothesis: The rate of heart disease in a country significantly differs based on the existence of a policy against trans saturated fats.

Question 3. Does restricting foods marketed to children promote lower percentages of obesity in young children?

Null Hypothesis: The percent of children aged two through four years that are considered overweight does not differ significantly based on the existence of policies about marketing food to children.

Alternative Hypothesis: The percent of children aged two through four years that are considered overweight differs significantly based on the existence of policies about marketing food to children.

Methods

Question 1 Is a tax on sugar-sweetened beverages making a healthy difference for the nation's citizens?

Data was collected through the World Health Organization as part of a descriptive study (GHO, 2020, <http://apps.who.int/gho/data/view.main.2473>). Countries were asked to respond to the question "Is your country implementing any of the following fiscal interventions? - taxation on sugar-sweetened beverages." Responses included: yes, no, don't know, and no response. The data on diabetes prevalence was also collected by the World Health Organization (International Diabetes Federation & Diabetes Atlas). I used a t-test to compare differences between the taxation of sugar-sweetened beverages and the prevalence of diabetes.

Question 2 Does taxing and eliminating processed foods high in saturated fatty acids benefit the health of citizens?

Data on the existence of national policies on saturated fatty acids / trans-fats was discovered through the World Health Organization's Indicator Metadata Registry List (GHO, 2020, <http://apps.who.int/gho/data/view.main.2473>). As part of the WHO NCD Country Capacity Survey, countries had to respond to the question "Is your country implementing any national policies that limit saturated fatty acids and virtually eliminate industrially produced trans-fats (i.e. partially hydrogenated vegetable oils) in the food supply?" Responses included: yes, no, don't know, and no response. The World Health Organization also provided a world data table of heart disease in the population (World Health Organization. https://www.who.int/cardiovascular_diseases/en/cvd_atlas_29_world_data_table.pdf?ua=1). I used a t-test to compare differences between policies on saturated fatty acids and the levels of heart disease in a population.

Question 3 Does restricting foods marketed to children promote lower percentages of obesity in young children?

Data was collected through the Indicator Metadata Registry List provided by the World Health Organization (GHO, 2020, <http://apps.who.int/gho/data/view.main.2473>). Countries responded "yes, no, don't know, or no response" to the survey "Is your country implementing any policies to reduce the impact on children of marketing of foods and non-alcoholic beverages high in saturated fats, trans-fatty acids, free sugars, or salt?" Responses with "don't know" and "no response" were omitted. Data on global levels of overweight children was collected through the Institute for Health Metrics and Evaluation (Ritchie & Roser, 2017). I used a t-test to

compare differences between policies reducing marketing of bad food to children and levels of overweight children by country.

All statistical analyses were performed in JMP version 14 (JMP 14.1, 2020) Statistical significance was determined if $p \leq 0.05$.

Results

Question 1 .Is a tax on sugar-sweetened beverages making a healthy difference for the nation's citizens?

Countries responding “yes” to having a policy on SSB recorded an average of 8.07% of the population (ages 20 to 79) as having diabetes, a minimum of 1% (Benin), and a maximum of 13.5% (Mexico). Countries responding “no” to having a policy on SSB recorded an average of 7.68% of the population (ages 20 to 79) as having diabetes, a minimum of 1.8% (Zimbabwe), and a maximum of 22.5% (Kiribati) (See Appendix A). The prevalence of diabetes among the population does not differ significantly based on the existence of a tax on sugar-sweetened beverages (t-test: t - ratio = 0.465748; p = 0.6579, Fig.1)

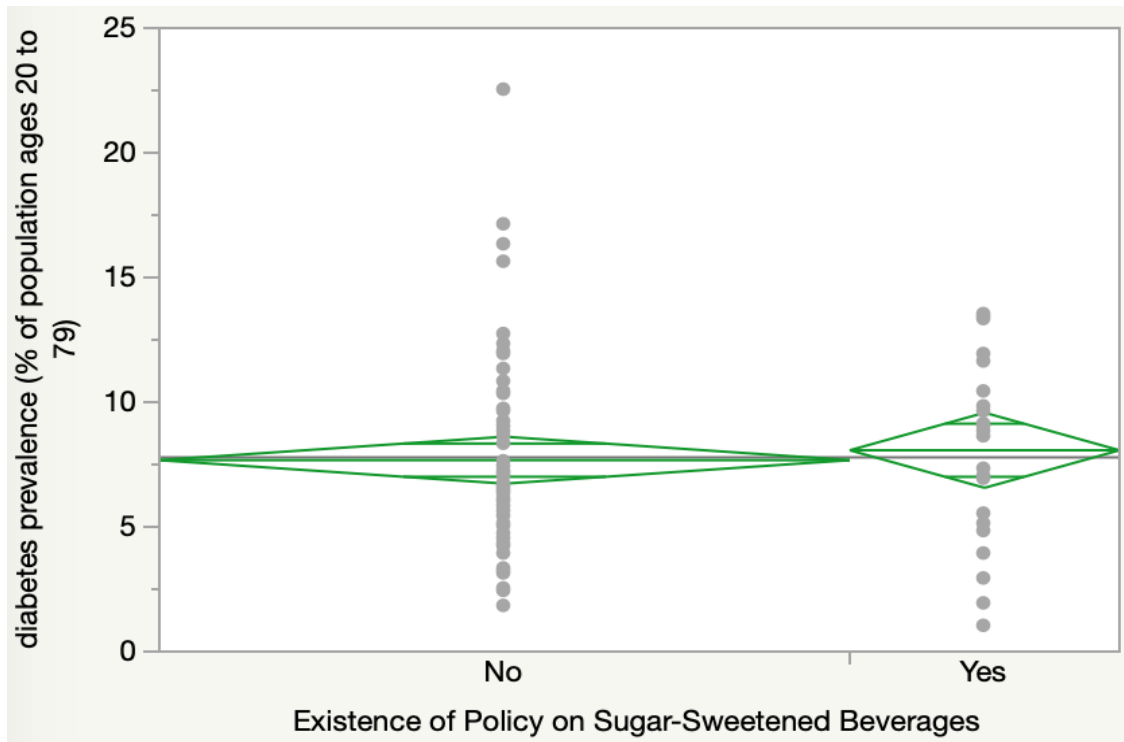


Figure 1. Diabetes Prevalence Based on Existence of Policy on SSB

Question 2. Does taxing and eliminating processed foods high in saturated fatty acids benefit the health of citizens?

Countries responding “yes” to having a policy against fatty acids recorded an average rate of heart disease as 1.72 people per million, a minimum of 0.455 per million (Ecuador), and a maximum of 6.01 per million (Belarus). Countries responding “no” to having a policy against fatty acids recorded an average rate of heart disease as 0.85 people per million, a minimum of 0.26 per million (Brunei Darussalam), and a maximum of 2.77 per million (Armenia) (See Appendix B). The rate of heart disease differs significantly depending on the existence of policies against saturated fatty acids (t-test: t - ratio =3.449455; p = 0.0014, Fig.2).

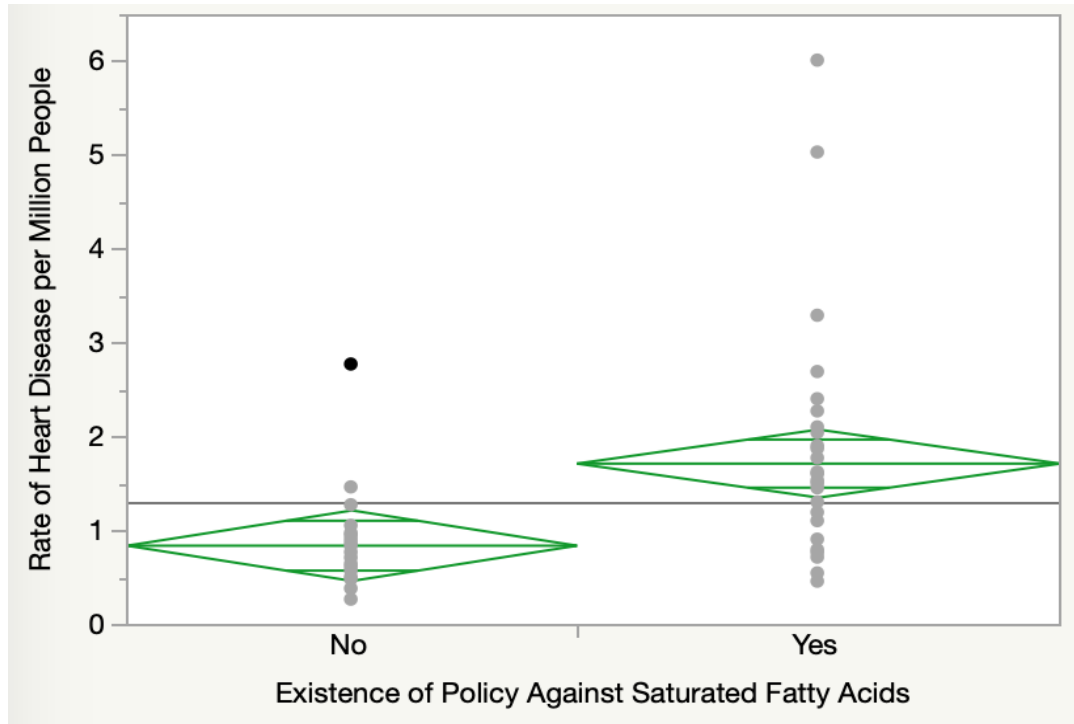


Figure 2. Rate of Heart Disease Based on Policies Against Saturated Fatty Acids

Question 3. Does restricting foods marketed to children promote lower percentages of obesity in young children?

Countries responding “yes” to having a policy in food marketing recorded an average of 27.1% of children deemed overweight, a minimum of 7.67% (Eritrea), and a maximum of 47.0% (Qatar). Countries responding “no” to having a policy in food marketing recorded an average of 22.2% of children deemed overweight, a minimum of 5.44% (Nepal), and a maximum of 46.6% (Oman) (See Appendix C). The percent of overweight children differs significantly based on the existence of policies in marketing food to children (t-test: t - ratio = 2.437703; p = 0.0182, Fig.3).

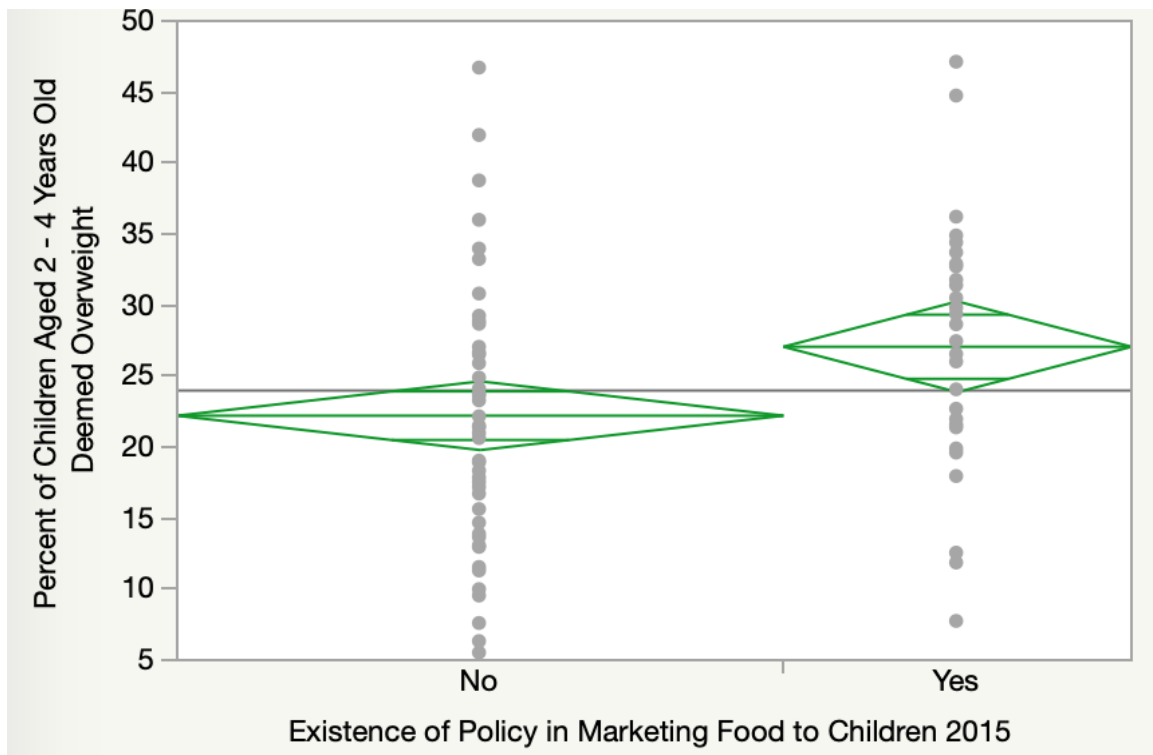


Figure 3. Percent of Overweight Children Based on Policies in Marketing Food to Children

Discussion

The results in this study support that a tax on sugary beverages is not working in favor of diabetes. Although policies against saturated fats are making a difference, the outcome is not a desirable one as heart disease is higher among countries that have this policy. With more analysis of such national policies, governments can reevaluate the efforts and resources used to keep citizens healthy. Further analysis should include in depth research of the behavior and health of citizens over time per country. The data used for analysis was collected for a one-year period. It is important to collect numerous data points for a country over a longer period of time. For example, the data supports that the percentage of overweight children differs based on policies in marketing. Countries with a policy in place actually have a higher average of overweight children. It should not be assumed that the policy is not working but that this trend is apparent

because the countries with marketing limitations are the ones that need it in order to lower unhealthy trends.

There are several ways around these protective policies and several unintended consequences. In avoiding the higher prices of taxed goods, Denmark showed an increase in cross-border purchasing of fatty foods (Cornelsen & Green, 2014). The same study showed that there needs to be at least a 20% increase in prices for consumers to significantly cut down on their purchasing of unhealthy food. A simple tax on food will not necessarily stop people from buying what they crave especially wealthy people in developed countries. People of a lower socioeconomic status are more likely to be affected by national policies. Citizens in this category do not overcome chronic diseases and change their diets with the ease that wealthier people do. So, higher prices on unhealthy foods are helpful to reduce health inequalities.

Mexico's Ministry of Finances implemented SSB and non-essential energy-dense food taxes in January 2014. The tax was implemented for societal, economic, and public health reasons. Out of 30 countries in the Organization of American States, Mexico takes second place at having the highest prevalence of obesity (Orio, 2007). High sugar and high fat foods are found to be elastic in Mexico meaning that the demand for the good changes based on the price. In fact, a study found that a 10% increase in price correlated to a 11.6% reduction in demand (Pérez-Escamilla et al. 2017). Several other countries, including the United States, behave differently and treat these goods as inelastic to a certain degree. For example, a 10% increase in price will not significantly dissuade consumers, but a 20% increase is more likely to finally decrease demand. Mexico's studies find strong support that taxes and policies are working in favor of decreasing consumption. After one year of implementation the study found a 6% reduction, then in the following year, a 9% reduction (Pérez-Escamilla et al. 2017). For solid results, the

evaluations should be completed for many more years after the policy was implemented to ensure that the reduction in consumption was not based on a mere first exposure or reaction. This particular public health concern involves economic and human behavior and behavior is difficult to simplify into numbers. It is also challenging to isolate variables when evaluating behavior. Nevertheless, policies and taxes are doing their part in reducing consumption of junk food, but more evidence is necessary to show that it reduces obesity leading to diabetes and heart disease. When faced with a policy that alters our behavior, humans will either find a substitute, abide by the changes, or pay what they need to in order to not alter their ways.

The following study, performed in 2015 focusing on the United States, Canada, and Western Europe, found that “looking at beverages, a penny-per-ounce tax on sugar-sweetened beverages in the United States was projected to reduce consumption by 15%, reduce many cases of cardiovascular disease, stroke, and diabetes thereby saving more than \$17 billion in medical costs and generating an estimated \$13 billion in annual tax revenue (Wang et al. 2012).” As seen in Figure 1, the association between taxes and the prevalence of diabetes is unfavorable. The same is true on the state level in the United States and this is most likely due to the existing tax being too low and not effective in changing caloric intake in consumers.

Diet alone has such a significant impact on our everyday lives than we realize. We must eat everyday several times a day. At first, food could be something overlooked but think about how much of our budget is allocated towards food and how much land it takes to produce everyone’s meals. Think about the waste generated from just one home cooked meal and then multiply that by the millions of families in the world. Agriculture and the food industry run our everyday lives and have the power to influence the environment, economy, and health more than any other entity.

References

Cornelsen, L., & Green, R. (2014). Why fat taxes won't make us thin. *Journal Of Public Health*.

Retrieved 30 March 2020, from <https://academic.oup.com/jpubhealth/article/37/1/18/1558688>.

Craig, W. (2009). Health effects of vegan diets. *The American Journal Of Clinical Nutrition*, 89(5), 1627S-1633S. doi: 10.3945/ajcn.2009.26736n

GHO | By category | Policies, strategies and action plans - Data by country. (2020). Retrieved December 2019, from <http://apps.who.int/gho/data/view.main.2473>

Gibbons, A. The Evolution of Diet. Retrieved 10 November 2019, from <https://www.nationalgeographic.com/foodfeatures/evolution-of-diet/>

Harvard Health Publishing. (2015, February). The truth about fats: the good, the bad, and the in-between. Retrieved from <https://www.health.harvard.edu/staying-healthy/the-truth-about-fats-bad-and-good>

Hu, F. B. (2010, June). Are refined carbohydrates worse than saturated fat? Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2869506/>

International Diabetes Federation, & Diabetes Atlas. (n.d.). Diabetes prevalence (% of population ages 20 to 79). Retrieved from <https://data.worldbank.org/indicator/SH.STA.DIAB.ZS>

JMP 14.1 [Computer software]. Retrieved from <https://software.usf.edu/jmp-14>

Malik, V. S., Schulze, M. B., & Hu, F. B. (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review—. *The American journal of clinical nutrition*, *84*(2), 274-288.

Orio MS, Kristin. Joint US–Mexico Workshop on Preventing Obesity in Children and Youth of Mexican Origin: Summary. National Academies Press, 2007.

Pérez-Escamilla, R., Lutter, C. K., Rabadan-Diehl, C., Rubinstein, A., Calvillo, A., Corvalán, C., ... & Ewart-Pierce, E. (2017). Prevention of childhood obesity and food policies in Latin America: from research to practice. *Obesity Reviews*, *18*, 28-38.

Ritchie, H., & Roser, M. (2017, August 11). Obesity. Retrieved from <https://ourworldindata.org/obesity>

Ross AC, Taylor CL, Yaktine AL, et al., editors. (2011). Dietary Reference Intakes for Calcium and Vitamin D. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK56070/>

Siri-Tarino, P. W., Sun, Q., Hu, F. B., & Krauss, R. M. (2010, March). Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/20071648>

Stylianou, N., Guibourg, C., & Briggs, H. (2019, August 9). Climate change food calculator: What's your diet's carbon footprint? Retrieved from <https://www.bbc.com/news/science-environment-46459714>

University of North Carolina Chapel Hill. (n.d.). U.S. Policy Evaluations. Retrieved from <http://globalfoodresearchprogram.web.unc.edu/where-we-work/united-states/u-s-policy-evaluations/>

Wang, M., Yu, M., Fang, L., & Hu, R. Y. (2015). Association between sugar-sweetened beverages and type 2 diabetes: A meta-analysis. *Journal of diabetes investigation*, 6(3), 360–366. <https://doi.org/10.1111/jdi.12309>

Wang, Y. C., Coxson, P., Shen, Y. M., Goldman, L., & Bibbins-Domingo, K. (2012). A penny-per-ounce tax on sugar-sweetened beverages would cut health and cost burdens of diabetes. *Health Affairs*, 31(1), 199-207.

Watanabe, F., Yabuta, Y., Bito, T., & Teng, F. (2014, May 5). Vitamin B₁₂-containing plant food sources for vegetarians. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4042564/>

World Health Organization.

https://www.who.int/cardiovascular_diseases/en/cvd_atlas_29_world_data_table.pdf?ua=1.

Accessed February 2020.

Appendix A

Table 1. Tax on SSB and Diabetes Prevalence Per Country

Country	Tax on SSB	Diabetes Prevalence (% of population ages 20 to 79)	Country	Tax on SSB	Diabetes Prevalence (% of population ages 20 to 79)
Afghanistan	No	9.2	Greece	No	4.7
Albania	No	9	Haiti	No	6.7
Algeria	No	6.7	Honduras	Yes	7.3
Bahamas	No	8.8	Hungary	Yes	6.9
Bahrain	No	15.6	Iceland	No	5.8
Bangladesh	No	9.2	India	Yes	10.4
Barbados	Yes	13.4	Indonesia	No	6.3
Belize	No	17.1	Iran	Yes	9.6
Benin	Yes	1	Iraq	Yes	8.8
Bhutan	No	10.3	Ireland	No	3.2
Bosnia and Herzegovina	No	9	Israel	No	9.7
Botswana	No	5.8	Italy	No	5
Brazil	Yes	10.4	Jamaica	No	11.3
Brunei Darussalam	Yes	13.3	Japan	No	5.6
Cambodia	No	6.4	Jordan	No	12.7
Cameroon	No	6	Kenya	No	3.1
Canada	No	7.6	Kiribati	No	22.5
Central African Republic	No	6	Mexico	Yes	13.5

Chile	Yes	8.6		Micronesia	No	11.9
Country	Tax on SSB	Diabetes Prevalence (% of population ages 20 to 79)		Country	Tax on SSB	Diabetes Prevalence (% of population ages 20 to 79)
China	No	9.2		Monaco	Yes	2.9
Colombia	No	7.4		Mongolia	No	4.7
Comoros	No	12.3		Montenegro	Yes	9
Costa Rica	Yes	9.1		Morocco	Yes	7
Côte d'Ivoire	No	2.4		Mozambique	No	3.3
Croatia	No	5.4		Myanmar	No	3.9
Cuba	No	9.6		Namibia	No	4.5
Cyprus	No	9		Nauru	No	12
Denmark	No	8.3		Nepal	No	7.2
Djibouti	Yes	5.1		Netherlands	No	5.4
Dominica	Yes	11.6		Peru	No	6.6
Dominican Republic	No	8.6		Philippines	No	7.1
Ecuador	Yes	5.5		Poland	No	6.1
El Salvador	Yes	8.8		Portugal	Yes	9.8
Eritrea	No	5.1		Qatar	No	15.6
Estonia	No	4.2		Trinidad and Tobago	No	16.3
Eswatini	No	4.5		Tunisia	Yes	3.9
Ethiopia	No	4.3		United States of America	No	10.8
France	Yes	4.8		Uruguay	Yes	7.3
Finland	No	5.6		Uzbekistan	No	6.5
Gabon	No	6		Vanuatu	Yes	11.9

Country	Tax on SSB	Diabetes Prevalence (% of population ages 20 to 79)		Country	Tax on SSB	Diabetes Prevalence (% of population ages 20 to 79)
Gambia	Yes	1.9		Venezuela	No	7
Georgia	No	5.8		Viet Nam	No	6
Germany	No	10.4		Zambia	No	4.5
Ghana	No	2.5		Zimbabwe	No	1.8

Appendix B

Table 2. Existence of Policy Against Saturated Fat and Rate of Heart Disease per Million People By Country

Country	Policy Against Saturated Fatty Acids 2017	Rate of Heart Disease per Million People	Country	Policy Against Saturated Fatty Acids 2017	Rate of Heart Disease per Million People
Afghanistan	Yes	1.45	Gabon	No	0.766
Albania	No	1.27	Gambia	No	0.568
Algeria	No	0.478	Georgia	Yes	5.03
Andorra	No	0.971	Germany	Yes	2.1
Antigua and Barbuda	No	0.712	Ghana	No	0.512
Argentina	Yes	0.903	Greece	Yes	1.53
Armenia	No	2.77	Israel	Yes	0.905
Australia	Yes	1.3	Italy	Yes	1.62
Austria	Yes	1.9	Jamaica	Yes	0.715
Azerbaijan	Yes	2.69	Japan	No	0.708
Bangladesh	No	0.904	Jordan	Yes	0.711
Barbados	No	1.06	Nepal	No	0.947
Belarus	Yes	6.01	Netherlands	Yes	1.19
Belgium	No	1.46	New Zealand	Yes	1.6
Belize	No	0.61	Nicaragua	No	0.502
Brazil	Yes	0.792	Niger	No	0.383
Brunei Darussalam	No	0.263	Spain	Yes	1.1

Country	Policy Against Saturated Fatty Acids 2017	Rate of Heart Disease per Million People		Country	Policy Against Saturated Fatty Acids 2017	Rate of Heart Disease per Million People
Bulgaria	Yes	3.29		Sri Lanka	No	0.862
China	Yes	0.543		Sudan	No	0.866
Colombia	Yes	0.719		Sweden	Yes	2.27

Comoros	No	0.378		Switzerland	Yes	1.5
Denmark	Yes	1.87		Syrian Arab Republic	No	0.643
Djibouti	No	1.05		United Arab Emirates	Yes	0.761
Dominica	No	0.385		United Kingdom of Great Britain and Northern Ireland	Yes	2.04
Dominican Republic	No	0.844		United States of America	Yes	1.77
Ecuador	Yes	0.455				
Egypt	No	1.47				

El Salvador	No	0.831				
Equatorial Guinea	No	0.651				
Finland	Yes	2.4				
France	Yes	0.771				

Appendix C

Table 3. Percent of Overweight Children and Policy in Marketed Food by Country

Country	Percent of Children Deemed Overweight	Policy in Marketing Food to Children 2015		Country	Percent of Children Deemed Overweight	Policy in Marketing Food to Children 2015
Afghanistan	22.074	No		Iceland	36.131	Yes
Albania	38.681	No		India	11.778	Yes
Algeria	28.587	No		Indonesia	17.097	No
Andorra	26.564	No		Iran	19.522	Yes
Antigua and Barbuda	30.717	No		Iraq	28.794	No
Argentina	17.449	No		Ireland	29.727	Yes
Armenia	33.885	No		Israel	28.552	Yes
Australia	25.814	Yes		Italy	34.807	Yes
Austria	21.406	No		Jamaica	18.247	No
Azerbaijan	35.908	Yes		Japan	13.579	No
Bahamas	23.197	No		Mexico	23.974	Yes
Bahrain	17.867	Yes		Micronesia (Federated States of)	41.88	No
Belarus	21.884	Yes		Nepal	5.444	No
Belgium	18.953	No		Netherlands	19.81	Yes
Belize	18.848	No		New Zealand	32.81	Yes
Benin	20.538	No		Nicaragua	21.308	No
Bhutan	15.546	No		Niger	7.52	No
Bolivia	29.155	No		Nigeria	17.765	No

Brazil	32.631	Yes		Norway	26.503	Yes
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Country	Percent of Children Deemed Overweight	Existence of Policy in Marketing Food to Children 2015		Country	Percent of Children Deemed Overweight	Existence of Policy in Marketing Food to Children 2015
Brunei Darussalam	18.883	No		Oman	46.626	No
Bulgaria	33.617	Yes		Pakistan	6.247	No
Burkina Faso	13.798	No		Philippines	9.905	No
Burundi	9.452	No		Poland	22.682	Yes
Canada	29.286	Yes		Portugal	31.684	Yes
Chile	44.657	Yes		Qatar	47.039	Yes
China	24.093	No		Romania	24.035	No
Colombia	12.473	Yes		Russian Federation	24.803	No
Comoros	28.596	No		Rwanda	20.563	No
Congo	12.973	No		Spain	34.317	Yes
Denmark	30.412	Yes		Sri Lanka	23.681	No
Dominica	28.585	No		Sudan	11.465	No
Dominican Republic	23.619	No		Suriname	12.915	No
Ecuador	20.894	No		Sweden	26.426	No
Egypt	23.543	No		Switzerland	22.606	Yes
El Salvador	16.632	No		Syrian Arab Republic	33.91	No
Eritrea	7.667	Yes		United Arab Emirates	32.666	Yes

Estonia	26.969	No		United Kingdom	26.46	Yes
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Country	Percent of Children Deemed Overweight	Existence of Policy in Marketing Food to Children 2015		Country	Percent of Children Deemed Overweight	Existence of Policy in Marketing Food to Children 2015
Fiji	31.304	Yes		United States of America	24.027	No
Finland	21.493	Yes		Zambia	35.937	No
France	21.295	Yes		Zimbabwe	11.215	No
Gambia	12.878	No				
Georgia	33.143	No				
Germany	25.932	Yes				
Honduras	14.587	No				
Hungary	27.369	Yes				