

QATAR UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SHORT TERM EFFECTS OF EXCISE TAXES ON DEMAND FOR CARBONATED

SWEETENED BEVERAGES IN QATAR.

BY

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A Project Submitted to
Faculty of the College of Business and Economics
in Partial Fulfillment of the Requirements for the Degree of
Master of Business Administration

January 2020

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ABSTRACT

ASHRAF, RISWIN., Masters : January : 2020, Master of Business Administration

Title: Short Term Effects of Excise Taxes on Demand for Carbonated Sweetened Beverages in Qatar.

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From January 1st 2019, the Qatari Government implemented a 50% taxation on “Sugar-Sweetened Carbonated Beverages, or SSBs” in Qatar. Taxation of unhealthy products is an effective, economic tool widely used across the world. This study looks into the short term effects of this tax on the consumption behaviour of consumers in Qatar. Using a survey instrument, the pre-tax and post-tax consumption was measured. Using the data collected, the change in consumption was examined, and the price elasticity of demand was calculated. The study found a significant reduction in consumption in the post-tax period. The price elasticity of demand was found to be highest among consumer cohort who consumed high amounts pre-tax, and unemployed or out of labour force consumers. (-1.37 and -1.14 respectively). The lowest elasticities were found to be among consumers who consumed lower quantities pre-tax, as well as Qatari consumers of SSBs (-0.39 each). The study also illustrates the perception of taxes among consumers. The price elasticity of demand for SSBs in Qatar was found to be 8%. SSB syrup import data leading up to and after the implementation of the taxation was also examined. From these early results, the taxation can be deemed to be effective in curbing SSB consumption, but subsequent studies that look into economic, commercial and health aspects are necessary to understand longer-term impact of such taxes.

DEDICATION

To Lulu and Millie.

ACKNOWLEDGEMENTS

Without the guidance of Dr Ashraf Eid, this project would not have been possible. Thanks to Dr Belaid for his continued support. Thanks to all professors, colleagues and friends who have been of support and encouragement through my MBA journey. And last, but not most, to my wife Shereen and daughter Millie, for their understanding, support and sacrifices.

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CHAPTER 1: INTRODUCTION

1.1. Context and Background

From January 2019, the Qatari government introduced excise taxes on goods deemed to cause harm to the health of its citizens and residents, as well as the environment. The announced goals of this tax are to reduce consumption and to increase revenue. The legal basis for this tax is the Gulf Cooperation Council's agreed-upon common excise tax system. (General Authority of Customs, 2019). Various countries have used taxation as a tool to curb the consumption of unhealthy food products while increasing revenue. For example, Study by Sarlio-lähteenkorva & Winkler, (2015) in Britain indicates that non-essential food products such as chocolate, ice cream, soft drinks and other unhealthy foods have been subjected to taxation, nicknamed "Sin Tax", for health and fiscal benefit.

Multiple studies in the North and South America, Europe and Asia have investigated the efficacy of economic tools like taxation in curbing consumption of products deemed harmful to the health of the population (Chriqui, Chaloupka, Powell, & Eidson, 2013). The extent to which such taxes alter the consumption depends on the price elasticity of demand for such goods (Andreyeva, Long, & Brownell, 2010). Price elasticity of demand has been found to vary among different cohorts; High consumers of sugar-sweetened beverages (SSB's) are found to have lower elasticities (Etilé & Sharma, 2015). Consumers from higher socio-economic strata were also found to have low elasticities, compared to consumers cohorts with low income (Bolt-Evensen et al., 2018).

This study ventures forth to examine the short-term effects of the excise tax on carbonated sweetened beverages in Qatar. Through the analysis of data from a survey

of consumers to collect self-reported information about consumption, and related parameters, this study evaluates the short-term impact of the tax on consumer consumption, and the difference in the impact among different consumer cohorts based on employment status, gender, nationality and level of consumption of SSBs prior to taxation.

Obesity has been identified as one of the more severe health afflictions in Qatar. 15.5% of the population of the Qatar Biobank Study has been afflicted with diabetes. More than 70% of the population was found to be over the healthy weight limit. (Qatar Biobank, 2017). The Qatar Biobank report also states that there are high levels of metabolic disorders and diabetes Mellitus in Qatar. The survey conducted by Biobank also found that more than 45% of the population also consumed fast food, more than three times per week. These findings, as well as rising healthcare costs, have made health a strategic priority of the country.

By late 2018, it was announced by the General Authority of Customs, that special customs taxes will be introduced on specific goods, including tobacco products, carbonated drinks, energy drinks and special goods including alcohol. Tobacco products, energy drinks and special goods would be taxed at 100%, and carbonated drinks (flavoured beverages) would be taxed at 50%. The General Authority of Customs states that additional tax revenue generated from these taxes would be invested in healthcare infrastructure and education. (General Authority of Customs, 2018). The 50% taxation on carbonated beverages would be applied to any product that falls under the category of flavoured or sweetened aerated water or beverages. If the product started as concentrates, gel, powder or extract, the tax would be applied on the product at the retail point. (General Authority of Customs, 2019).

1.2. Purpose of the Research

The tax on carbonated sweetened beverages, which was implemented on January 1st 2019, is the first such instance in the State of Qatar. Until that date, no taxation had been implemented on sugar-sweetened beverages, cigarettes, energy drinks, or any other fast-moving consumer goods . Prior to this tax, a 5% customs duty was applied to all goods entering Qatar via the customs. This 5% customs tariff is applied to all goods, except for specific items of medical or of relevance to national strategic priorities. A study on the impact of taxation on consumer goods will provide insights about the effectiveness of economic tools like taxation, to control or curb consumption of goods that affect the health of the population. Qatar is home to a diverse community, inclusive of Qataris as well as economic immigrants from Asia, other parts of the middle-east, far-eastern countries, Europe, Africa and the Americas. Qatar is also considered to be one of the richest countries in the world per capita, with GDP Per capita estimated at 129,630 USD (Segarra, 2018).

Qatar is also considered to be one of the hottest, with temperatures of up to 48 Degree Celcius during the summer months (weather.com, 2019) with SSBs and other cold beverages consumed widely during this period. This study would also provide insight into the perception of the residents about such taxes. As the effectiveness of taxes on consumption reduction depends on the elasticity of demand for these items, it is essential to identify the price elasticity of demand among different consumer cohorts. Based on the results of the study, strategies can also be set for marketing and targeting messages via social media or other channels, to increase the effectiveness and to reduce consumption. Analysis of pre-tax and post-tax consumption data will also reveal the effectiveness of such a tax, so as to analyze the costs and benefits of

the tax implementation. Also based on the results of the sin tax, further application of similar taxes on other products can be considered.

1.3. Scope of the Study

The study includes the examination of primary and secondary data. The primary data source is the responses to the survey of citizens and residents of Qatar above the age of 18 who speak the English language. The study focuses on consumers of taxed products, namely sweetened carbonated beverages, cigarettes and energy drinks. The study is applied without distinction of nationality, income, level of education or geographical area. Though the study focuses mainly on the self-reported consumption behaviour in pre-tax and post-tax periods, the perceptions about the taxes are also investigated. The survey also collected information about the age, nationality (Qatari or Non-Qatari) and the income level of consumers. The study excluded consumers below the age of 18, as the participation of consumers under the age of 18 requires parental consent. The data collected were analyzed to generate insights about the consumption behaviour of different consumer groups, changes in consumption, and the price elasticity of demand. Data on tobacco and energy drinks consumption is also collected but is not included in the analysis or scope of this project as the number of respondents did not meet the target number for respondents.

1.4. The motivation behind the study

The excise tax implemented since January 1st 2019 is not only the first instance of taxation motivated by a desire to curb the consumption of products deemed unhealthy but is the first instance of any taxation in the state of Qatar. Self-reported

consumption recall is the best source available at the moment to examine the short term effects of taxation. Qatar is widely known as the richest country in the world based on GDP per capita. The effect of taxation on widely consumed products is of relevance from not only an academic point of view but also from a business and economic policy-making perspective as well. During the extensive literature review into the nuances of excise tax, I have not come across any investigation into the short term effect of these taxes, neither in Qatar nor in any country of the GCC. Research into the parameters of the study will reveal information and increase understanding of how a highly diverse population, in the richest country in the world, compared to other instances of tax implementation on SSBs.

1.5. Benefits of the study

As mentioned above, the literature review has revealed a gap in the knowledge regarding consumption change after the implementation of the taxation on SSB in a country with similar features as Qatar. Using the survey instrument, the study examines the SSB consumption of the population in Qatar. The consumption is measured for both pre-tax and post-tax period. The subsequent data analysis delves into the change in demand for the taxed products, as well as variations in demand change based on age, gender, income and nationality (Qatari vs Non-Qatari). The study sheds light on the short-term effect of the tax on demand. Though more detailed analysis of cross-price elasticities, substitution effects and own-price elasticities and multi-factor analysis is required to have a more thorough understanding of the effect of the taxation with predictive possibilities on the possible health benefits, this study provides a foundation on which such studies can be built. As this study is an interrupted time series that measures cross-sectional demand characteristics, the

immediate effect of taxation on the purchase behaviour of consumers can be understood. The study also provides an analysis of import statistics for two quarters following the implementation of the tax, which gives insights into the change consumer behaviour in the short term. The study is also expected to show if the level of taxation is sufficient to create a meaningful difference in consumption through new social media targeted advertisement techniques, messaging campaigns can be implemented to increase the effectiveness of such taxation policy, increase awareness as well as gain buy-in to the deployment of more such tools.

1.6. Structure of the Study

The focus of efforts in the study has been to estimate the emergence of variation in consumer consumption of SSB's before and after the implementation of excise taxation, and also to quantify it with a reasonable degree of accuracy. The study starts with an exhaustive examination of literature, with emphasis on the latest research involving the effectiveness and efficiency of economic tools to bring about changes in consumers consumption of SSBs. After the literature review, few gaps in existing understanding and knowledge are identified, notably a lack of investigation into short term effects of taxation of SSBs in Qatar and more widely in the GCC. To collect data necessary to generate insights to fill this gap, a survey instrument was created and distributed within the general population of Qatar, as will be explained in the methodology. The data is then analysed to identify patterns in the population cohorts with respect to consumption. An arbitrary score is first assigned to consumption, which was later converted to a daily-consumption based on few estimations. Pre-tax and post-tax consumption, the percentage change in consumption and price elasticity of demand are calculated. Differences are found to emerge in these parameters

between various cohorts. The reasons for these differences are stipulated and analysed in the discussions section of this document. This study had limitations of time and resources, among other things, including access to data. These limitation and challenges are addressed, subsequently leading to an evaluation of possibilities for future investigations.

CHAPTER 2 LITERATURE REVIEW

Formulating the tax level is of critical importance and has a direct correlation to the effectiveness of the taxes. Chriqui et al., (2013) Studied three different points to consider while formulating beverage taxation; a) type of tax, point of collection and presentation to consumers, b) which variety of beverages to tax, c) amount of tax to be collected to affect consumption. The authors would go on to recommend various taxation options like sales tax & excise tax, on beverages like all SSB's, soft drinks, or sweetened drinks of any kind, with taxes affected and collected directly at the point of sale, or different points in the supply chain. The most common type of tax levy is “penny-ounce-tax” in the United States, and this has been reviewed extensively in the following text, including other instances of percentage hikes in prices, among South American and Asian countries.

Critical consideration and goal for implementation of economic tools like taxation is its effect on the health of the citizens, and naturally, most of the studies concerning the effectiveness of SSB taxation has been on the impact of the health of a country's or city's residents. In a nationwide impact study in the United States in adults between 25 and 65 years, a penny-per-ounce tax was estimated to reduce SSB consumption by 15 per cent, preventing 2.4 million incidences of diabetes, 95,000 coronary heart incidences, 26,000 premature deaths and 8,000 strokes, while adding 13 billion dollars of revenue and reducing 17 billion dollars of medical expenses between 2010 and 2020. (Wang et al., 2012).

Passthrough of tax to consumers has been found to have a high impact on the subsequent effect on demand for SSBs and consequences on population health. Yann Le Bodo et al. (2016) found that a 10 to 20% SSB price increase would lead to a reduction in demand. From their investigation of evidence across the world, the

authors of the study concluded that consumers would substitute for an untaxed SSB product or taxed products available at a lower price. Similarly, A study comparing sales of SSBs with and without taxes in Barbados, a reduction of 4.3% in sales was found, in comparison with sales without taxes. The study found a change in buying behaviour in customers; an increase in sales of cheaper SSB brands was observed. (Alvarado et al., 2019).

In Great Britain, a study of 32,249 households and analysis of their purchases of all foods and beverages from 2012 to 2013 found that sugary foods like chocolates, cakes, biscuits and confectionaries have comparable price sensitivities as SSBs. (Smith, Cornelsen, Quirnbach, Jebb, & Marteau, 2018). Though the price sensitivity was found to be comparable across all income groups, the highest effect was observed in low-income groups. Hence, the formulation of taxation has to take into account the different income groups and their predicted responses to the tax increase.

Level of pre-tax consumption also has been found to affect the effectiveness of per-capita consumption changes after implementation of taxes. Investigators studied the effect of taxes on high consumers of SSBs. They found an increasing trend across decreasing consumption quantiles. Lower consumers of SSBs were found to have higher elasticity in demand. Though the higher consumers had lower elasticities, a higher tax was estimated to have higher health gains due to a higher tax burden and subsequent reduction in consumption. (Etilé & Sharma, 2015).

A similar study in Mexico investigated the difference in response based on pre-tax consumption levels. The results of this longitudinal study were consistent with the conclusions from the Etilé & Sharma (2015) research and found that households who consumed higher quantities of products showed a greater decline over two years. (Taillie, Rivera, Popkin, & Batis, 2017).

The type and nature of households have also been found to have an impact on the consumption changes after implementation of economic tools. Swedish Households that had a history of making healthier choices benefited most, and least impact was found on households that had a history of consuming unhealthy products, though, with time, there was a reduction in consumption of harmful products. (Nordström & Thunström, 2010). This observation would be later confirmed by Etilé & Sharma (2015) and Taillie, Rivera, Popkin, & Batis (2017). This is consistent with the results of the studies investigating high quantity consumers.

Similar results have been found in studies analyzing consumption changes across reducing quantiles. Investigators found an increasing trend of elasticity across decreasing consumption quantiles. Lower consumers of SSBs were found to have higher elasticity in demand. Though the higher consumers had lower elasticities, a higher tax was estimated to have higher health gains due to a higher tax burden and subsequent reduction in consumption. (Etilé & Sharma, 2015).

Most studies on the effects of taxes had been based on aggregated sales data or secondary data. To fill the gap in this knowledge, (Wada, Han, & Powell, 2015) studied 24-hour self-reported recall of dietary choices from 1998-2008 Nutrition Examination Survey, along with Soda prices from the same period, and found that there was a strong negative association between the prices the intake. Adults showed the strongest negative association, while the association was observed to a lesser degree in children and adolescents.

An analysis of longitudinal data from January 1st 2013 and December 31st 2015, from two thousand households in Chile, showed a decrease of 3.4% against an increase in the price of 2%. The most significant change was found in high socioeconomic status households. (Caro et al., 2018). In contrast, In Brail, There was

a 1.03% reduction in low-income consumers, while the decrease in average and high-income consumers was seen at 0.63%. Claro et al. (2012) found that a 1% increase in prices resulted in a 0.85% reduction in SSB calorie consumption.

Social and economic status has been found to impact the consumption of SSBs significantly. A study in Norway investigated the development in the frequency of consumption, inequalities in consumption based on socio-economic status and trends in disparities in consumption to assess patterns from socio-economic inequality from childhood to adulthood. The results showed a decrease in consumption and lower consumptions among adults with higher education. The study found no narrowing of inequalities in consumption from childhood to adulthood. (Bolt-Evensen et al., 2018).

Literature is rich in content investigating the impact of SSB taxation. Wilde et al. (2019) studied the cost-effectiveness of a national penny per ounce SSB tax in the United States. The study found that the tax had high cost-saving impacts. The greatest effect was found for 100% passthrough of tax, with incremental implications for 50% pass-through. A 100% tax through was estimated to prevent 4,494 lifetime cardiac events (specifically myocardial infarctions), compared to a no-tax case and 1540 less total ischemic heart diseases per million adults. From a cost perspective, considerable savings in healthcare costs, amounting to 45 Billion USD dwarfed the 1.84 Billion USD estimated for implementation of the tax. The study by Zheng, Dharmasena, Capps Jr, & Janakiraman (2018) on the effect of the price change on comparable products have shown similar results. The authors found elasticities of -0.664 and -0.229 for sparkling and non-sparking bottles water respectively, which also contributed to a reduction of plastic use by 50 grams per households.

A similar study in Mexico investigated the difference in response based on pre-tax consumption levels. The results of this longitudinal study were consistent with the

conclusions from (Hsiao & Wang, 2013), and found that households who consumed higher quantities of products showed a more significant decline over a two year period. (Taillie, Rivera, Popkin, & Batis, 2017)

Passthrough of tax has been found to have a high impact on the subsequent effect on demand for SSBs and consequences on population health. Investigators have found that a 10 to 20% SSB price increase would lead to a reduction in demand. From their investigation of evidence across the world, the authors concluded that consumers would substitute for an untaxed SSB product or taxed products available at a lower price. (Yann Le Bodo et al., 2016)

Effects of taxes on the country also include economic changes, especially loss of revenue to manufacturers and the subsequent effect on employment. But a 2014 study into these concerns in Mexico found no employment reduction in retail stores associated with the taxation and fiscal policy relating to SSB's (Guerrero-López, Molina, & Colchero, 2017). But a 2015 study in the United States which used a macroeconomic simulation model to examine the net effect of 20% SSB tax on employment found a 0.06% and 0.03% increase in employment in the states of Illinois and California, attributed to investments from increased revenue from the taxes. (Powell, Wada, Persky, & Chaloupka, 2014). Ruff & Zhen (2015) Used a dynamic loss model in New York City to examine the effect of a calorie-based SSB tax on obesity. A 5800 calorie reduction was expected, which resulted in a per-person weight loss of 0.46 kgs in year 1 and 0.92 kgs in year 10. the highest weight reduction was anticipated in the first year, and 95% of weight reduction was expected within five years of implementation.

More evidence was examined by Andreyeva, Chaloupka, & Brownell, (2011), who concluded that a nationwide penny-per-ounce tax on SSB would result in a 79

Billion dollar revenue increase and a significant reduction in caloric intake from 190-200 calories per day to 145-150 calories per day. The comparatively low sensitivity of high consumption customers was also evident from (Li & Dorfman, 2019) study.

Adults were found to consume 31% fewer beverages after the introduction of a 1.5 cent per ounce tax in Philadelphia. The children who were surveyed in the study showed no detectable impact, but high consumers among children were found to have reduced their consumption after the tax. The study also found that the demand for the products decreases among stores in which the tax was applied, and increased in stores outside the city where taxes were not applied. (Cawley, Frisvold, Hill, & Jones, 2019)

Andrejeva et al. (2010) found an 8-10% reduction in consumption from a 10% increase in SSB prices. Another study after the introduction of the tax in Philadelphia found a 40% lower consumption within two months of implementation of taxes, 64% reduction of consumption of energy drinks and 58% increase in the consumption of bottled water. Zhong, Auchincloss, Lee, & Kanter (2018)

To address the growing obesity epidemic in the country, the Guatemalan government had introduced taxes on SSBs. A study evaluating own-price and cross-price elasticities found statistically significant negative elasticities. SSBs had its price elasticity of -1.39, indicating that a 10% increase in prices would create a 13% decrease in consumption. (Chacon, Paraje, Barnoya, & Chaloupka, 2018)

Carlos M. et al. (2017) conducted investigations into price elasticity of SSBs in Chile. The authors estimated price elasticity at -1.37 for soft drinks, which indicates a 13.7% reduction in consumption for a 10% tax. The authors also discovered that untaxed food and beverages behave as a substitute for SSBs, as a 6.3% increase in the consumption of plain water was observed. To have the best health outcomes, also

recommended is an incentive system for healthier food options to increase benefits from the tax. (Guerrero-López, Unar-Munguía, & Colchero, 2017)

Not all investigations into the impact of SSB taxation has returned results that show benefits. Clark & Dittrich (2010) examined different taxes dubbed "fat taxes" and concluded a possibility for reversal of intended effects. Momin & Wood (2018) opined based on their study that there was no causal link between SSB consumption and child body mass index. Fletcher et al. (2010) studied the impact of taxes on soft drinks on the body mass index (BMI) and weight of the population in the United States. Their results showed an effect, albeit small in magnitude. Studies have also been conducted on alternate types of taxes; one of which found a possible adverse effect of taxes.

A review of the health consequences of high consumption of SSBs and the implications on health and economy was carried out by Amber Hsiao and Claire Wang (2019). The authors recognised several evidence gaps, especially in the potential unexpected consequences, as well as cost-effectiveness of the policy interventions. The review found clear evidence that SSBs contributed to the obesity epidemic, severe health conditions, high-calorie intake and unfavourable population health. The study identified the need for repeated measurements, natural experiments, pilot studies and the need to analyse evidence from various demographic cohorts. (Hsiao & Wang, 2013)

The impact of taxes depends on multiple variables and complex factors, including social, economic, political and educational. Many studies have depended on modelling and simulation. Oliver T. et al. (2014) argue that an evaluation should consider making use of appropriate established empirical and experimental approaches to testing causal effects. The authors go on to argue that such a study

should be founded on a theoretical framework that is appreciative of underlying complexities. (Mytton, Eyles, & Ogilvie, 2014).

Consistent with other results, a study by Escobar et al. (2013) found a negative relationship between prices and consumption. They also found that higher price for SSBs was associated with increased demand for substitute beverages like fruit juice and milk. The authors concluded that understanding price elasticity in low and medium-income countries, and identification of health gains, impact on economy, jobs, and other unintended consequences need to be addressed. (Cabrera Escobar, Veerman, Tollman, Bertram, & Hofman, 2013)

There was early scepticism into the efficacy of SSB taxation, though similar economic tools like Tobacco Excise Tax had produced results. Taxes which only created a marginal increase in prices were found not to cause a reduction in consumption that was considered beneficial to the health of individuals. Though, taxes at about 4% was found to cause a decrease in consumption of SSBs by high-risk children, from low-income households. (Sturm, Powell, Chriqui, & Chaloupka, 2010) While addressing health and environment using economic tools, taxes on SSBs is only a part of the equation. The complete diet needs to consider, including incentivizing and encouraging the consumption of healthier foods. Cornelsen et al., (2019), found that the energy consumption in the studied households in the united states were generally above the recommended levels. The authors also found that a 20% increase in price would reduce the purchase of "empty calories" (non-nutritious calories) would reduce the energy intake by reducing the demand for products like desserts and puddings. But increasing the price on these foods were also associated with a reduction in the purchase of protein and fibre, by the households studied. The authors concluded that combining price decrease in healthy foods is necessary for significant

gains in healthy habits, along with an increase in the price of unhealthy foods. (Cornelsen, Mazzocchi, & Smith, 2019)

A 2019 article by Fernandez et al. agrees with the above finding. The authors of the study recognise that even to date, the evidence to causally link SSB taxes and reduction in the incidence of obesity. Mexico and Berkeley, California being two cases were natural experiments as a result of SSB taxation has been implemented, had shown SSB taxes to alter the behaviour of SSB consumption.

Authors warn policymakers and the general public to beware of industry tactics to offset the reduced demand for SSB products. The authors also recommend increasing access of the population to healthier options, educating the consumers about substitute products considered to be healthier, as well as introducing further taxes to unhealthy products. (Fernandez & Raine, 2019). The results of a study in the Philippines found that due to increased marketing and advertising, the sales were sustained. Products were also offered in lower quantities, offsetting the effect of 6% higher prices. (Onagan et al., 2018)

Y. Zheng et al. (2012) Shed light on the significance of tax knowledge of consumers. Media coverage and information gained from grocery shopping were ideally expected to inform consumers of the tax change. Their study of consumers of various income levels revealed that one-third of consumers had no knowledge of the tax status of products they were shopping for. They also found that consumers assumed higher taxes on products that they considered "sinful".

Investigators have also looked at the factors influencing the effects of taxation policies in various countries. A combination of higher prevailing obesity rates, higher consumption levels and taxes higher than 4% were found to deliver significant health benefits. Countries with small populations were not expected to benefit significantly

from taxation, and also the socio-economic status of the population of the country was found to influence the benefits of taxation. The authors remind the negative relationship between SES and obesity in high-income countries. This has been attributed to easy access to cheap, unhealthy fast food. (Jou & Techakehakij, 2012)

Yoshida & Simoes (2018) recommends intervention centred around educational institutions and schools to reduce SSB intake. Intervention programs are suggested to be designed specifically for different age groups, language spoken by consumers, as well as their tradition and culture.

CHAPTER 3: METHODOLOGY

Based on the literature review, the existing knowledge and lack-there-of in certain areas, the below research questions are identified.

1. What is the impact of the excise tax on the consumption of SSBs in Qatar, if any?
2. If there is an impact, what is the percentage change in consumption?
3. How has the tax impacted the following groups, in comparison to each other?
 - a. Qataris and Non-Qataris.
 - b. Employed and Unemployed/Out of labor force consumers.
 - c. Male and Female Consumers.
 - d. Heavy (high) SSBs and light (low) SSBs consumers (pre-tax period).
4. Is there a visible impact on the commerce of SSBs?
5. What is the price elasticity of demand for the sample as a whole, as well as for each of the cohorts listed in Research Question 3?

The data used for analysis is of primary and secondary nature. The primary data is collected using a survey questionnaire. The questionnaire is designed using “Qualtrics” survey and data collection website. The link to the questionnaire was distributed primarily via social media apps including Instagram, Facebook, LinkedIn and WhatsApp. The link was shared among primary contacts, who were requested to share it amongst their peer groups further. Preface to the survey clarified the topic of the project as “impact of excise tax on consumer demand”. The survey was published entirely in English. A census sample of English-speaking residents above 18 years was chosen due to accessibility and feasibility.

The survey was designed to be self-administered and was estimated to take between 15 and 20 minutes. Confidentiality was guaranteed, and it was clarified that the survey was completely voluntary and anonymous. The respondents were also given an option to volunteer to provide their email address if they were interested in receiving the results of the cross-sectional study. The survey was designed to make it possible for the respondents to skip any question. The link remained available for a response from 8th April 2019 to 22nd May 2019.

The survey began by asking the respondents to choose the products that they had consumed in the one year prior. If the respondent chose 1) Soft drinks of sugary drinks, 2) Energy Drinks, or 3) Cigarettes, they would proceed into the survey. If the response to the question was 4) “I do not consume the above. (will exit the survey)”, the survey would end.

The respondents who proceed into the survey were then asked questions intended to collect demographic information included Nationality (Qatari or Non-Qatari), Gender, Period of stay in Doha (0-5 year, 5-10 years, 10-15 years, 15-20 years and more than 20 years), Age of the respondents (18-25 years, 25-30 years, 30-40 years, 40-50 years and more than 50 years), and employment status. The employed respondents are also asked to volunteer information about their monthly salary levels (as between 0 and 5000, 5001 and 10,000, 10,001 and 15,000, 15,001 and 20,000, or 20,000 and above).

The proceeding questions are designed to measure the awareness of the respondents about the existence of the excise tax on products. The respondents were asked to answer “yes” on “no” based on the awareness of the implementation of taxation as well as the level of taxation, on Soft drinks, and other flavoured drinks, energy drinks and Cigarettes.

The subsequent questions measured the level of agreement of the respondents to the announced purpose of the taxes (“taxes are to protect health and environment”) as well as on their belief if taxing soft drinks, sugary drinks and tobacco would reduce the consumer demand for these products. The respondents could choose 1) Strongly agree 2) Agree 3) Neither agree nor disagree 4) Disagree or 5) Strongly disagree.

Respondents who had chosen each product or a combination of various products are then asked questions about their pre-tax and post-tax consumption behaviour. Based on their individual consumption recall pre-tax, the respondents were asked to choose from “a) More than 7 cans/bottles of soft drinks/sugary drinks per week”, “b) 5-7 cans/bottles of soft drinks/sugary drinks per week”, “c) 2-4 cans of soft drinks/sugary drinks per week”, “d) at most, one can/bottle of soft drinks/ sugary drinks per week”

These options were assigned an arbitrary score of 1, 2, 3 and 4 by Qualtrics software based on the order in which the options were presented to the participants. To measure the consumption post-tax, identical options were presented to the participants, but with an additional option “I did not consume any carbonated drinks after the price increase”, which was assigned a score of 5, by the Qualtrics software. This was as this additional option was shown as the fifth option. (See Table. 1)

Table. 1 Measuring Pre-tax and Post-Tax SSB consumption.

Pre-Tax Consumption	Numerical Score for Pre-Tax Consumption	Post-Tax Consumption	Numerical Score for Post-Tax consumption.
More than seven cans/bottles of carbonated drinks per week.	1	More than seven cans/bottles of carbonated drinks per week.	1
5-7 Cans/bottles of carbonated drinks per week.	2	5-7 Cans/bottles of carbonated drinks per week.	2
2-4 Cans/Bottles of carbonated drinks per week.	3	2-4 Cans/Bottles of carbonated drinks per week.	3
At most, one can/bottle of carbonated drinks per week.	4	At most, one can/bottle of carbonated drink per week.	4
		I did not consume any carbonated drinks after the price increase.	5

The participants are then asked to record their agreement to the statement “I have reduced consuming carbonated drinks after the price increase”. The respondents could choose 1) Strongly agree 2) Agree 3) Neither agree nor disagree 4) Disagree or 5) Strongly agree.

3.1 Statistical Methods

After the completion of data collection, data are exported from the Qualtrics software as Windows Excel files. The data were cleaned and sorted. Participant data with incomplete entries are eliminated and excluded from the analysis. Pivot tables are used to analyze demography. Pivot tables are also used to create comparison charts

and visualizations for product consumption patterns, analysis of the level of agreement, as well as other data analysis.

The SSB consumer data were filtered in the following ways to address the research questions.

- A. All consumers of SSB's
- B. Exclusive consumers (consumers who only consume SSB's and does not consume other taxed products) and Non-Exclusive consumers (consumers who drink SSB's as well as Energy drinks and Cigarettes).
- C. Qataris and Non-Qatari SSB consumers
- D. Male and Female SSB consumers
- E. Unemployed/out of labour force and Employed.
- F. Heavy (high) SSBs consumers (5 or more than five cans/bottles per week) and light (low) SSBs consumers (4 or less than four cans/bottle per week).

After filtering the consumers as above, the mean consumption of each consumer was calculated as below.

3.1.1 Mean of Consumption score assigned by Qualtrics software.

(Refer to Table 1) For Example, suppose from a sample of 10 customers, 2 consumers declare their consumption to be more than 7 cans/bottles per week, 3 customers declare their consumption to be 5-7 cans/bottles per week and 5 customers declare their consumption to be at most 1 can/bottle per week, then the mean consumption for the sample of 10 customers is calculated as below.

$$((2 \times 1) + (3 \times 2) + (5 \times 4)) / (2 + 3 + 5) = 2.8$$

Or, expressed as a general formula,

$$\text{Mean consumption score Pre-tax} = \sum_{n=1}^4 \frac{n * c(n)}{R}$$

where n is the consumption score, c(n) is the number of respondents with the consumption score “n” and R is the total number of respondents

To calculate the post-tax consumption of customers, suppose from a sample of 10 customers, 1 consumer declares their consumption to be more than 7 cans/bottles per week, 2 consumers declare their consumption to be 5-7 cans/bottles per week, 4 consumers declare their consumption to be at most 1 can/bottle per week, and 3 customers declare that they have not consumed any SSB's, then the mean consumption for the sample of 10 customers is calculated as below.

$$((1 \times 1) + (2 \times 2) + (4 \times 4) + (3 \times 5)) / (1 + 2 + 4 + 3) = 3.6$$

Or, expressed as a general formula,

$$\text{Mean consumption score Post-tax} = \sum_{n=1}^5 \frac{n * c(n)}{R}$$

where n is the consumption score, c(n) is the number of respondents with the

consumption score “n” and R is the total number of respondents.

Hence, a reduction in SSB consumption would be indicated by an increase in consumption score. The difference between the mean of the consumption score was used to analyze the magnitude of change between pre-tax and post-tax consumption. The consumption score is arbitrary and does not correspond to quantity change in consumption.

3.1.2 Mean daily consumption.

Mean daily consumption is calculated by estimating corresponding daily consumption for each option presented to the respondents, as shown in Table 2. The daily consumption for customers consuming more than seven cans/bottles per week is assumed to be 1.5 cans/bottles per day. This value is an assumption based on practical judgement. For consumer groups consuming 5-7, the average weekly consumption was estimated to be 6 (average of 5 and 7). The daily consumption is calculated from this estimation by dividing the number by 7, the number of days in the week. The daily consumption estimation for consumer group 2-4 was also calculated similarly. For consumer group “at most One can per week”, the daily estimation is calculated by dividing 1 by 7, number of days in the week. For consumers who chose “I did not consume SSB’s after price change”, the daily consumption was considered as zero. (Refer to Table 2).

Table 2 Estimated daily consumption

Pre-Tax Consumption	Numerical score for Pre-tax consumption.	Post-Tax Consumption	Numerical Score for Post Tax Consumption	Cans Per Day (Estimated)
More than 7 cans/bottles of carbonated drinks per week.	1	More than 7 cans/bottles of carbonated drinks per week.	1	1.5000
5-7 Cans/bottles of carbonated drinks per week.	2	5-7 Cans/bottles of carbonated drinks per week.	2	0.8571
2-4 Cans/Bottles of carbonated drinks per week.	3	2-4 Cans/Bottles of carbonated drinks per week.	3	0.4286
At most, one can/bottle of carbonated drinks per week.	4	At most, one can/bottle of carbonated drink per week.	4	0.1429
		I did not consume any carbonated drinks after the price increase.	5	0.0000

After assigning daily consumption values for each cohort, the mean daily consumption was calculated for the below, for post-tax and Pre-tax consumption.

- A. All consumers of SSB's
- B. Exclusive consumers (consumers who only consume SSB's and does not consume other taxed products) and Non-Exclusive consumers (consumers who drink SSB's as well as Energy drinks and Cigarettes).
- C. Qataris and Non-Qatari SSB consumers
- D. Male and Female SSB consumers
- E. Unwaged and Employed.
- F. Heavy (high) SSBs consumers (5 or more than 5 cans/bottles per week) and

light (low) SSBs consumers (4 or less than 4 cans/bottle per week).

The mean daily consumption is calculated by dividing the sum of total daily consumption value of the population by the size of the population.

3.1.3 Estimation of Price elasticity.

To calculate the price elasticity of demand for SSBs, Qatari population data is collected from the Planning and Statistics Authority, Qatar. Population over 16 years are considered for analysis. The primary data collection instrument (survey) is distributed to the population above the age of 18. An assumption is made that 16-17-year-olds among the population exhibit similar characteristics in SSB consumption as 18+-year-olds. The Population in August 2018 and August 2019 are averaged to estimate the average population of Qatar in 2018 and 2019. Based on the percentage of Survey respondents to consumed SSBs, the estimated number of SSB consumers in the population is calculated. The total estimated per-day consumption of population pre-tax and post-tax is calculated. (Q1= Pre-tax consumption, Q2= Post-tax consumption).

The average pre-tax and post-tax price of all taxed SSB's are collected from groceries and hypermarkets for all taxed SSB's. The prices of all items are averaged pre-tax and post-tax. (P1= Average Pre-tax prices, P2= Average Post-tax prices.)

Q1, Q2 and P1, P2 was used to estimate the Price elasticity of demand for SSB's in Qatar for different cohorts.

The price elasticity was calculated using the following formula.

$$\text{Price Elasticity of Demand} = (Q_2 - Q_1) / (P_2 - P_1) * ((P_2 + P_1) / 2) / ((Q_2 + Q_1) / 2)$$

The following assumptions are made to calculate the Price elasticity of demand, in the absence of secondary data.

- A. Per-day consumption of consumers who consumed more than 7 cans/bottles per week was assumed to be 1.5.
- B. SSB consumption behaviour of 16 and 17-years old is assumed to be similar to 18+-years old.
- C. The survey participants are assumed to be representative of the whole population.

3.1.4 Analysis of Secondary Data

Secondary data used in the analysis include import statistics of SSB syrups. From the Statistics and Planning Authority (SPA), the import data by Quantity and value was obtained for all Quarters between Q1 2017 and Q2 2019. Per capita import of SSB Syrup is calculated for all quarters mentioned.

3.2 Attempts to collect Additional Secondary Data.

Sales data for taxed products leading up to and after the tax period was requested to all major manufacturers and suppliers of SSB products in Qatar and the region. This information was not shared by the companies citing confidentiality and legal reasons.

CHAPTER 4: DATA ANALYSIS AND RESULTS

4.1 Survey Respondents and Demography

A total of 342 people participated in the survey, out of which 279 completed all questions based on their consumption behaviours. Fifty-one participants responded as not to have consumed the concerned products in the last year. Three responses are invalid due to conflicting information or choices to questions, leaving 225 complete and valid responses. This includes consumers of SSBs, Cigarettes and Energy Drinks. The total number of SSB consumers who completed the survey is 192. (Table. 3)

Table 3 Details of Survey Respondents

Description	Count
Total Number of Respondents	342
Total complete responses	279
Number of People Who exited Selecting Option “Does not consume any products.”	51
Invalid answer for Product consumption Question	3
Total Complete Responses (all taxed products)	225
Total SSB Consumers (Entries accepted into the study)	192 (69% of total valid responses)

The majority of the participants of the survey are found to be Non-Qatari (79%). This is close to the percentage of non-Qataris in the total population. Qatari participants consisted of 21% of survey respondents. Females constituted the majority of the respondents (58%). The largest age group among the respondents is found to be between 31 and 40 years, constituting 40%, followed by 26-30 years at 26%, 18-25 years at 23%, leaving 41 years and above at a combined 12%. 76% of respondents said that they are employed, with 24% unemployed/out of labour force (Table. 4)

Table 4 Demography Statistics

Nationality	Percentage
Qatari	21%
Non-Qatari	79%
Gender	Percentage
Male	42%
Female	58%
Age	Percentage
18-25	23%
26-30	26%
31-40	40%
41-50	8%
More than 50	4%
Employment Status	Percentage
Employed	76%
unemployed/out of labour force	24%

4.2 Product Consumption

As seen in Figure 1, the largest single cohort of participants is found to be exclusive consumers of SSB's, at 58%, followed by people who consume SSB's and Cigarettes. The smallest cohort includes consumers who drink energy drinks exclusively, at 4%, indicating that consumers of energy drinks are very likely to consume SSB's or Cigarettes, or both. 9% said that they consume both SSBs and energy drinks and another 9% said that they consume SSBs, energy drinks and cigarettes.

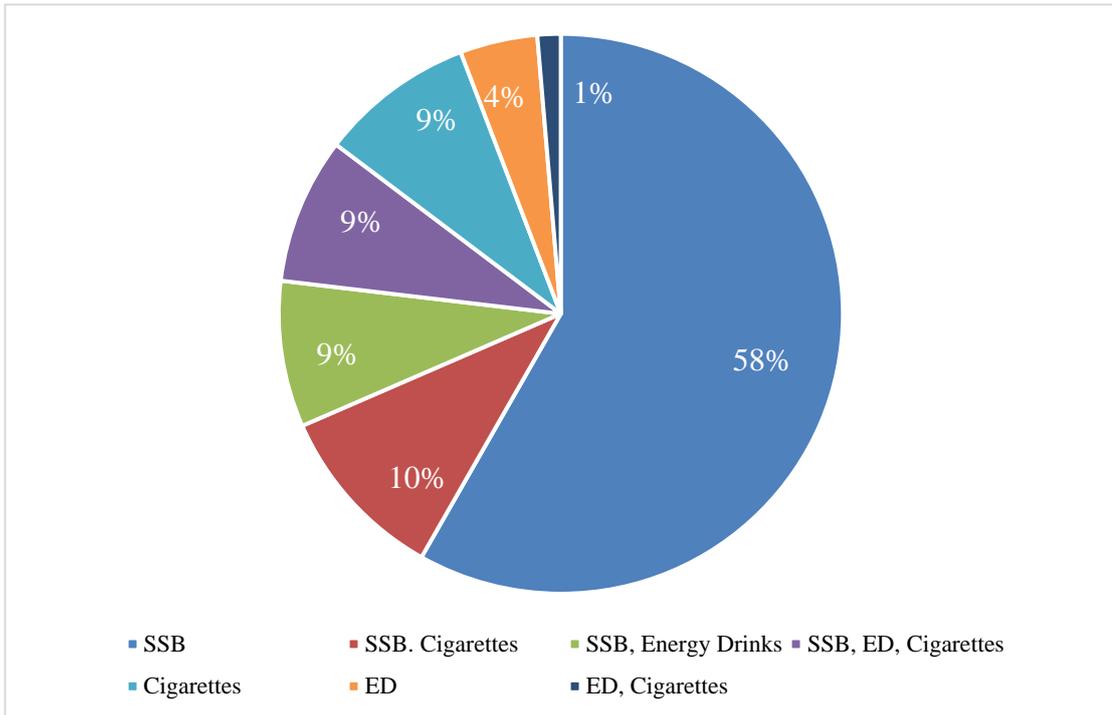


Figure 1 Products consumed by Survey Respondents

4.3 Public Perception about The Excise Tax.

There is a high level of agreement from the participants to the statement that taxation of unhealthy products reduce consumption. About 49% of Qataris and more than 57% of non-Qataris either agreed or strongly agreed to this statement. About 28% of Qataris and 28% of non-Qataris disagreed to this statement, and the rest (23% of Qataris and 15% of non-Qataris) said that they neither agreed nor disagreed to the statement “taxation reduced consumption (figure 2).

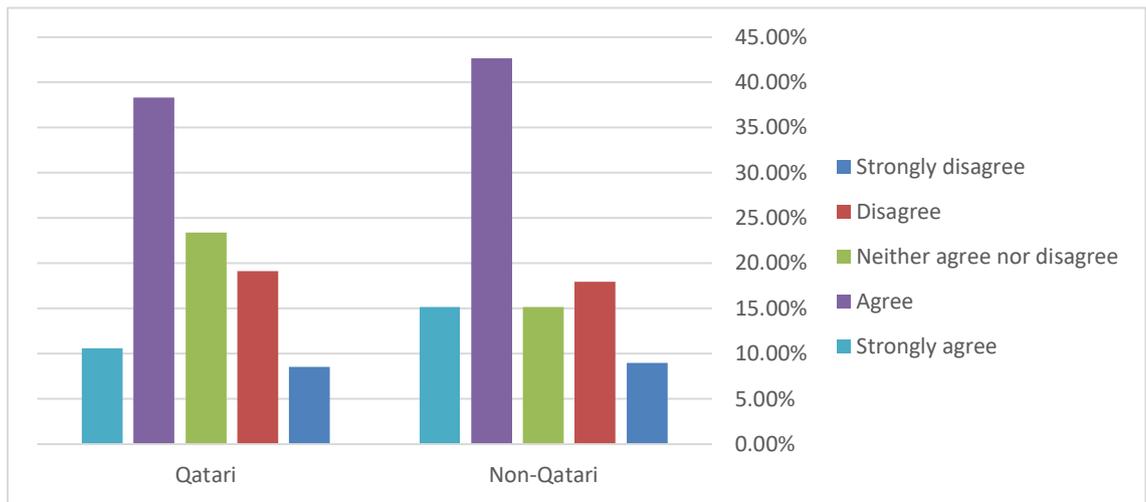


Figure 2 Level of agreement to “Taxing Reduces Consumption”.

As to whether the tax is applied to protect the health of the consumers and residents, a higher percentage of Qataris than non-Qataris are found to agree to the statement. Both groups showed a high level of agreement. A total of 89% of Qataris and 63% of non-Qataris viewed the excise taxes in a positive light. 11% of Qataris and 27% of non-Qataris said that they either disagree or that they neither disagree nor agree. (Figure 3).

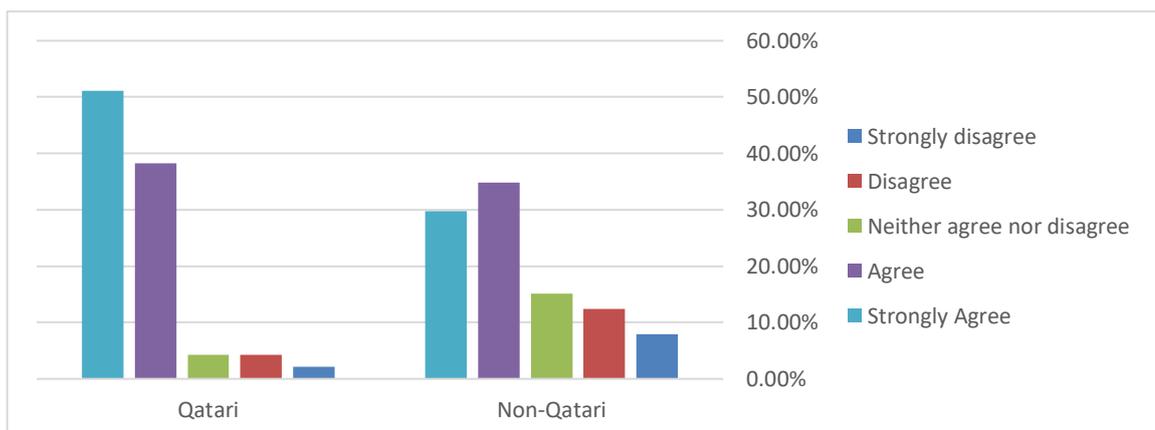


Figure 3 Level of Agreement to “The taxes are applied to protect health of Qatar residents and environment”

4.4 Self-Reported Consumption Behavior, Pre-Tax and Post-Tax.

Figure 4 shows the composition of SSB consumers pre-tax. The largest group reports to have consumed at most one can/bottle of carbonated drinks per week (46.15% of Qataris and 55.26% of non-Qataris). 33.33 % of Qataris and 30.26 % of non-Qataris is reported to consume 2-4 cans/bottles of SSB's per week. The percentage of respondents that reported to consume 5-7 cans/bottles of SSBs is 17.95% of Qataris and 9.21% of non-Qataris. The smallest group by percentage are consumers who consumed more than 7 cans/bottles of carbonated drinks per week, which includes 2.56% of Qatari and 5.26% of non-Qatari participants.

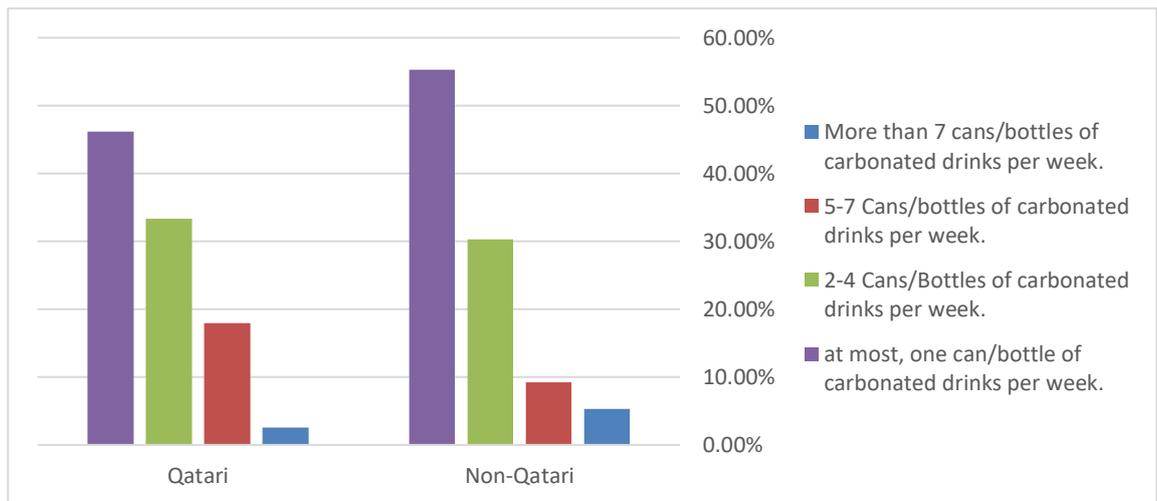


Figure 4 Pre-tax consumption of SSB.

In the post-tax period, 7.69% of Qatari and 12.42% of non-Qatari participants report having stopped consuming SSB. The percentage of consumers in the category of “at most one can of SSB/week” increased to 48.72% and 53.59% among Qatari and non-Qatari respondents respectively. As seen in Figure 5, the Qatari cohort that consumed more than 7 cans per week is non-existent during the pre-tax period, and

non-Qatari cohorts have shrunk to just 1.31% (from 5.26%).

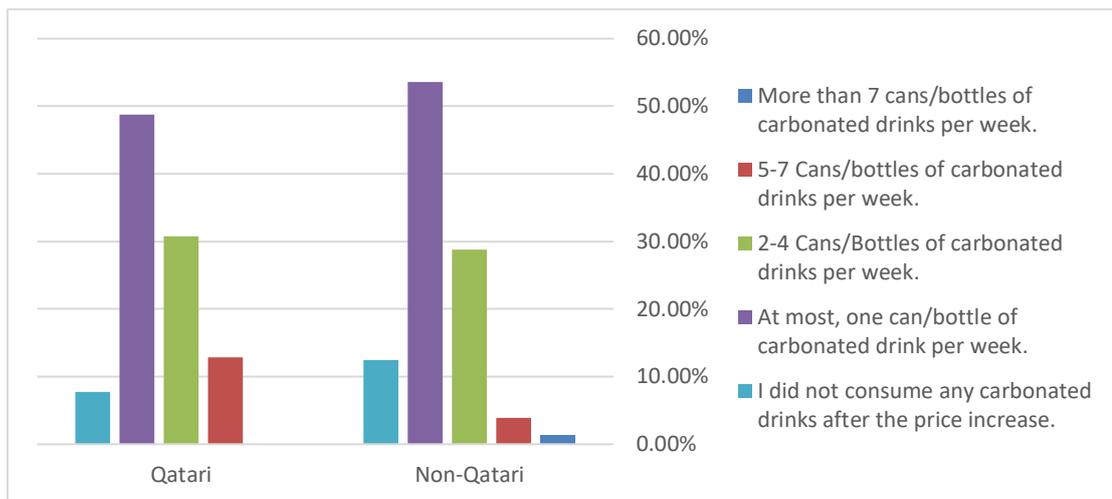


Figure 5 Post Tax consumption of SSBs.

Figure 6 shows the level of agreement to the statement “I have reduced consuming Carbonated Drinks after the price increase”. 48.72% of Qatari consumers and 46.41% of non-Qatari consumers report that they disagree with this statement, with 17.95% and 25.53% reporting to have neither agreement or disagreement.

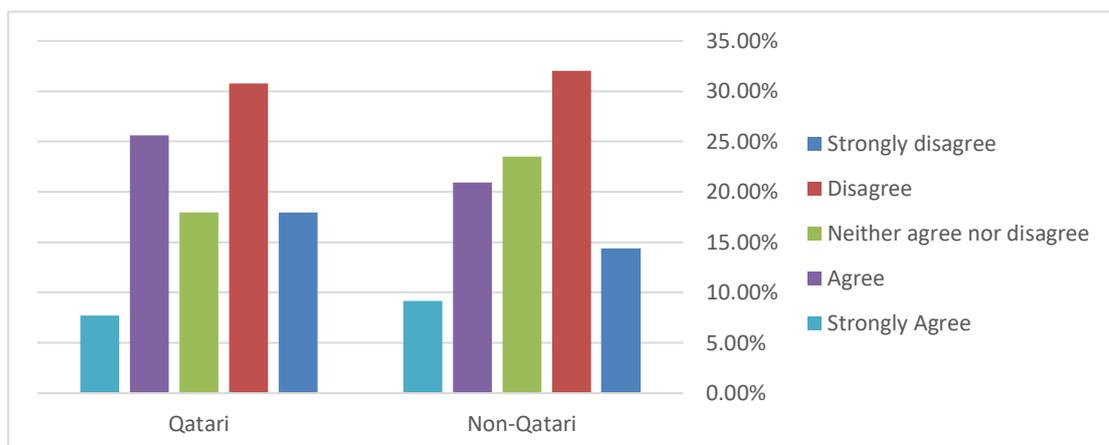


Figure 6 Agreement to statement about consumption reduction after taxation.

This is of note, as from the analysis of the pre-tax and post-tax it is clear that there is a significant shift in the percentage of consumers of different categories in consumption, with more consumers moving towards lower consumption.

4.5 Analysis of Consumer Consumption Score.

4.5.1 All consumers of SSBs.

From Table 5 and Figure 7, which indicate the mean score of consumption pre-tax and post-tax, it can be seen that there is an increase in the mean score by 0.3438, which suggests a reduction in mean consumption. (Higher consumption score after taxation means a lower consumption).

Table 5 Consumption Score: All Consumers of SSB

	Mean Consumption Pre-Tax	Mean Consumption Post-Tax	Difference
All Consumers of SSB- Consumption Score	3.3333	3.6771	0.3438

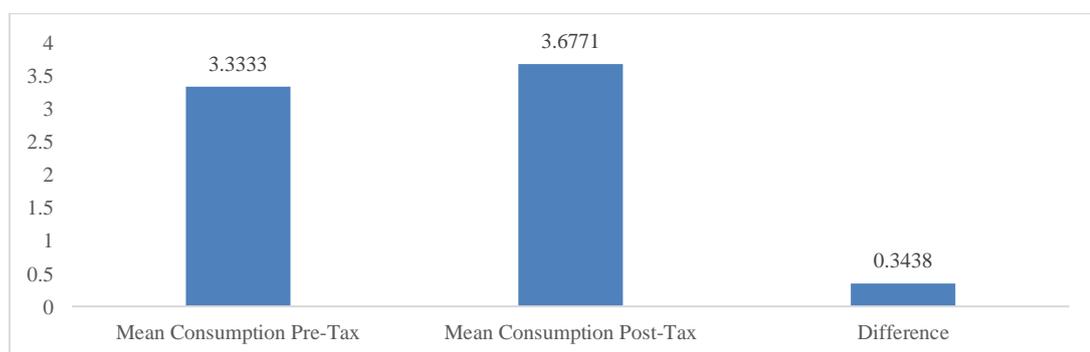


Figure 7 Consumption Score: All Consumers of SSB

4.5.2 Analysis of Consumption Change – Exclusive consumers of SSB and Non-Exclusive Consumers of SSB.

Analyzing table 6 and Figure 8, it can be seen that the reduction in consumption of consumers within the two groups is comparable. The mean SSB consumption of consumers who also consume other taxed products is seen to have decreased by a value slightly more than that of consumers who consume only SSBs.

Table 6 Consumption Score : Exclusive and Non-exclusive consumers

Consumer Group	Mean Consumption Pre-tax	Mean Consumption post-tax	Difference
Exclusively consume SSBs	3.4351	3.771	0.3359
Consumes SSBs and other taxed products	3.1148	3.4754	0.3606

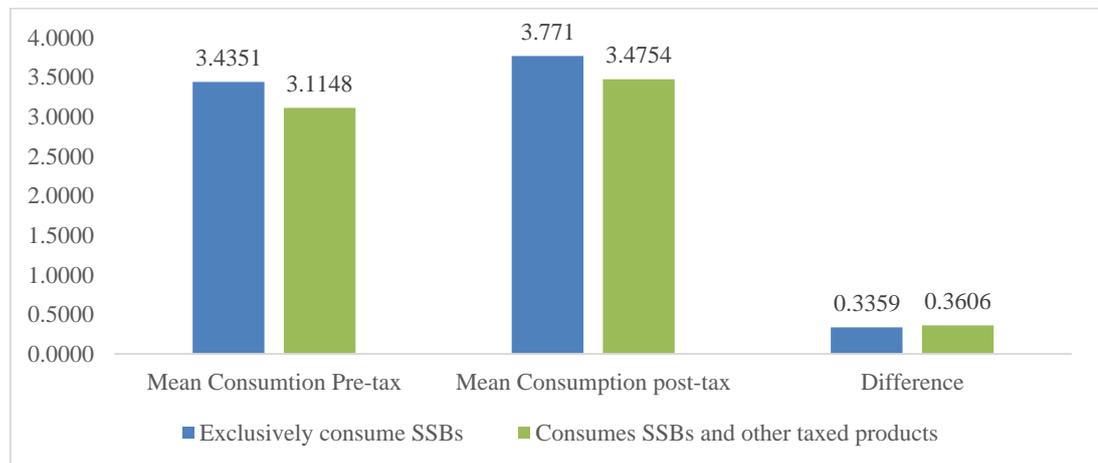


Figure 8 Consumption Score : Exclusive and Non-exclusive consumers

4.5.3 Analysis of Consumption Change: Qataris and Non-Qataris.

From Table 7 and Figure 10, it can be seen that there is a higher consumption

reduction amongst non-Qataris. The Qatari consumers have reduced consumption by a score of 0.2069, while the non-Qatari counterparts have reduced consumption by 0.3725.

Table 7 Consumption Score : Qataris versus Non-Qataris consumers

Consumer Group	Mean Consumption Pre-tax	Mean Consumption post-tax	Difference
Qatari Consumers of only SSB	3.3448	3.5517	0.2069
Non-Qatari consumers of SSB	3.4608	3.8333	0.3725

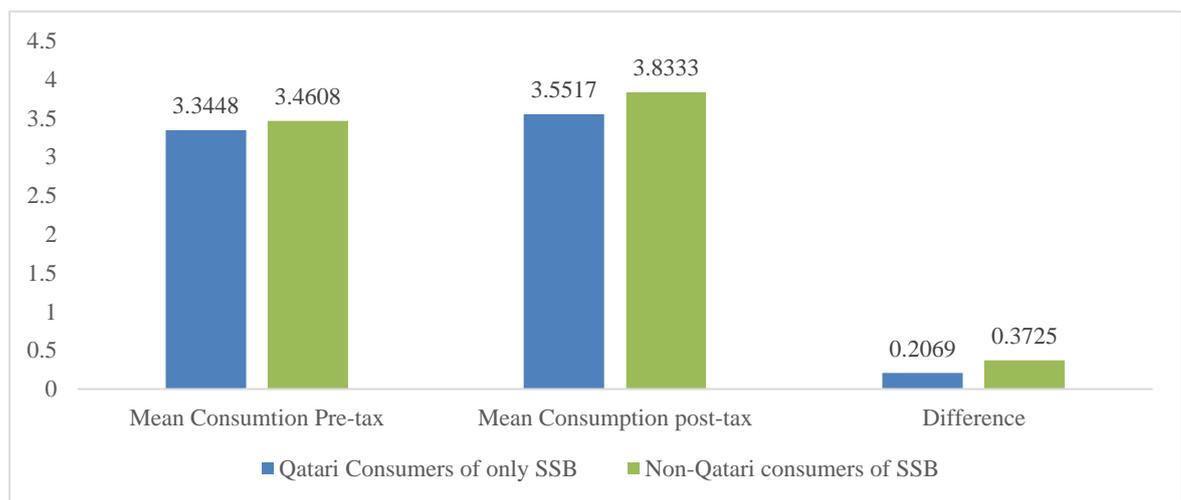


Figure 9 Consumption Score : Qatari and Non-Qatari consumers

4.5.4 Analysis of Consumption Change: Male and Female Consumers.

From figure 10 and Table 8, it is clear that there is a reduction in consumption in both Female and Male groups. There is a higher reduction in consumption score among female consumers compared to their male counterparts.

Table 8 Consumption Score: Female versus Male Consumers

Consumer Group	Mean Consumption Pre-tax	Mean Consumption post-tax	Difference
Female	3.5298	3.8333	0.3036
Male	3.2340	3.6596	0.4255

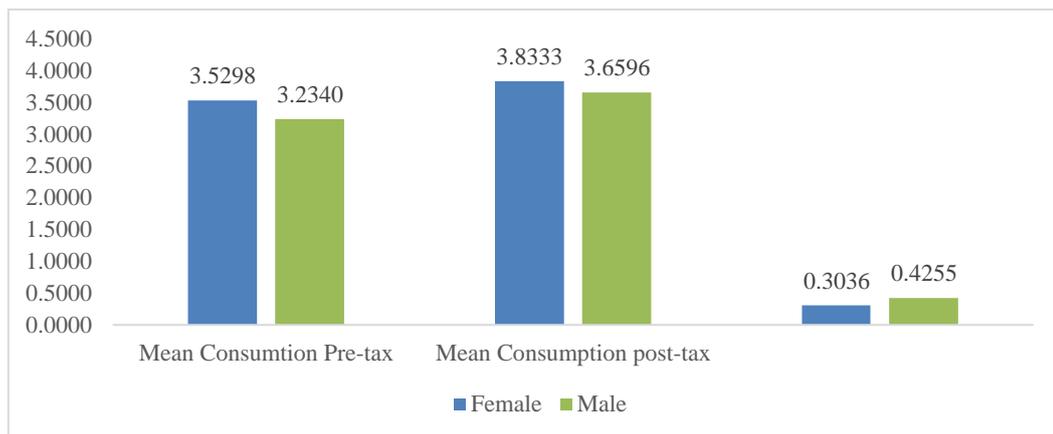


Figure 10 Consumption Score : Female and Male Consumers

4.5.5 Analysis of Consumption Change: Employed versus unemployed/ Out of Labor Force Consumers

A reduction in consumption can be seen in both Employed and unemployed/ Out of Labor Force Consumers. Unemployed/ Out of Labor Force consumers have reduced consumption to a higher degree, compared to employed consumers. (Refer to Table 8 and Figure 11)

Table 9 Consumption Score: unemployed/ Out of labour force versus employed consumers of SSB

	Mean Consumption Pre-tax	Mean Consumption post-tax	Difference in consumption score
Unemployed/ Out of Labor Force SSB Consumers	3.5313	3.9375	0.4063
Employed SSB Consumers	3.4040	3.7172	0.3131

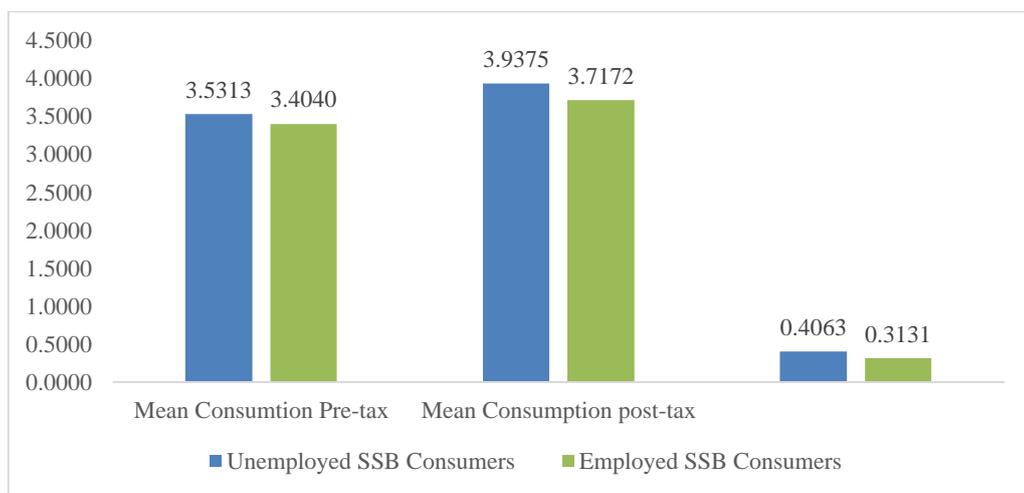


Figure 11 Consumption Score: unemployed/ Out of Labor Force and employed consumers of SSB

4.5.6 Analysis of Consumption Change: Heavy (High) SSBs Consumers versus Light (low) SSBs Consumers.

From Table 10 and Figure 12, it is clear that Heavy SSBs consumers have reduced consumption by a higher degree, than the light SSBs consumers.

Table 10 Consumption Score: Heavy SSBs versus Light SSBs Consumers.

	Mean Consumption Pre-tax	Mean Consumption post-tax	Difference in Consumption score
Heavy (High) Consumers	1.7000	2.8000	1.1000
Light (Low) Consumers	3.6358	3.8395	0.2037

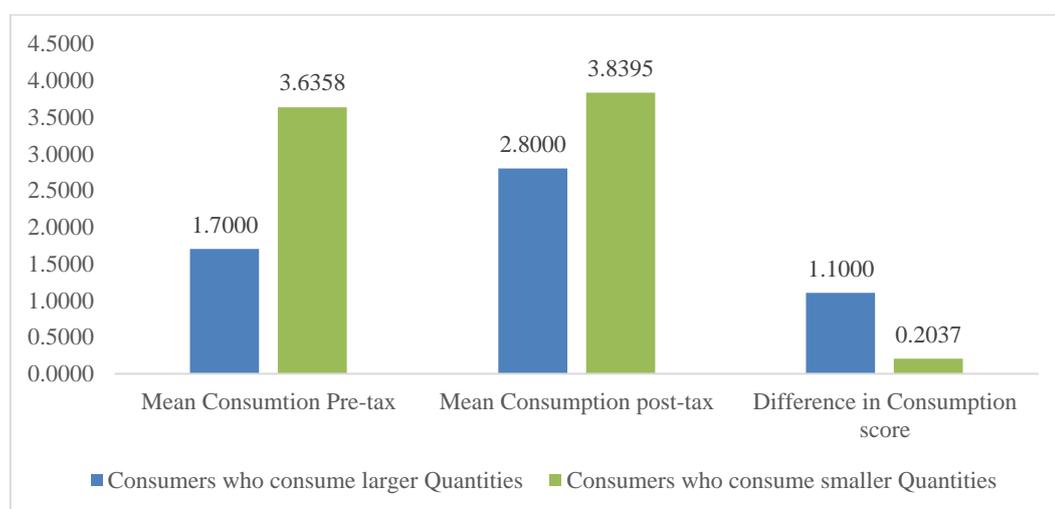


Figure 12 Consumption Score: Heavy SSBs Consumers and Light SSBs Consumers.

Table 11 summarizes the change in consumption among different SSB consumer cohorts. The greatest shift in consumption is observed in the group High Quantity consumers group, followed by male consumers of SSBs and unemployed/out of labour force consumers of SSBs. The least change in consumption is seen in Qatari consumers of SSBs.

Table 11 Consumption Score : All consumer groups

Consumer Group	Change in Consumption
Exclusively consume SSBs	0.3359
Consumes SSBs and other taxed products	0.3606
Qatari Consumers of SSB	0.2069
Non-Qatari consumers of SSB	0.3725
Unemployed/out of labour force Consumers of SSBs	0.4063
Employed SSBs Consumers	0.3131
Female	0.3036
Male	0.4255
Heavy (high) SSBs Consumers	1.1000
Light (low) SSBs Consumers	0.2037

4.6 Per Day Consumption Analysis and Price Elasticity of Demand.

To calculate the price elasticity of demand, the average price of SSBs as well as the quantity of consumption, need to be known before taxation as well as after taxation. This calculation is shown in Table 12.

As seen in Table 12, the average price for SSBs before taxation is found to be 1.47 QAR.

Table 12 Pre-tax and Post-tax price analysis, with average price.

Item	Price Pre-Tax (QAR)	Price Post-Tax (QAR)
355 ml can of Mountain Dew	1.5	2.25
355 ml can of Pepsi Cola	1.5	2.25
500ml bottle of Sprite	1.75	2.75
500 ml bottle of Coca-Cola	2	3
7UP 150 ml can	1.25	2
Fanta Orange 150 ml can	1.25	2
Coca-Cola Light 150 ml	1.25	2
Mirinda Orange 150 ml can	1.25	2
Average Price	1.47	2.28

4.6.1 Consumers who exclusively consume SSBs versus consumers who consume other taxed products in addition to SSB's.

Consumers who exclusively consume SSBs have reduced consumption by 0.0948 cans per day. This is a reduction of 28.3%. Consumers who consume other taxed products along with SSB's reduced their consumption by 0.1346 cans/day, which translates to a 29.6% change in consumption. This is illustrated in Table 13 and Figure 13. (Refer Appendix 1 Table 24 for calculations)

Table 13 Daily consumption : Exclusive and non-exclusive consumers.

	Mean Consumption Pre-tax	Mean Consumption post-tax	Change in Consumption	Percentage Change in Consumption
Exclusively consume SSBs	0.3342	0.2394	-0.0948	-28.3%
Consumes SSBs as well as other taxed products	0.4543	0.3197	-0.1346	-29.6%

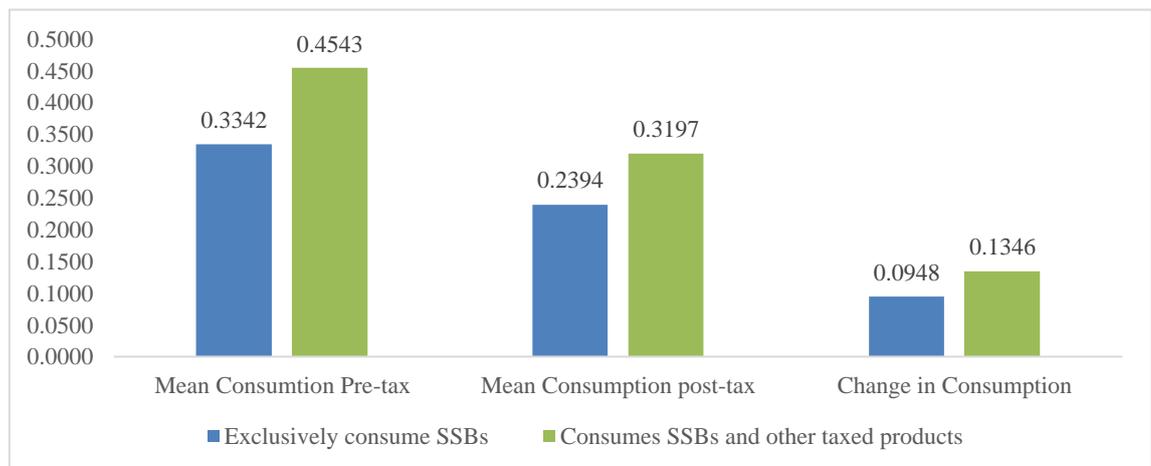


Figure 13 Daily consumption : Exclusive and non-exclusive consumers.

Table 14 Price Elasticity : Exclusive and non-Exclusive consumers.

Consumer Group	Price Elasticity
Consumers of SSB who do not consume other taxed products:	-0.77
Consumers of SSB who also consume other taxed products:	-0.81

4.6.2 Per Day Consumption Analysis: Qataris and Non-Qataris.

Non-Qatari consumers reduced their consumption by 32.2%. This is a reduction of 0.1064 cans/bottles per day. Qatari consumers reduced per-day consumption by half the value of the non-Qatari counterparts. The percentage change in consumption of Qatari consumers is 15.5%, which is equivalent to 0.0542 cans per day. (Table 14 and Figure 14)

Table 15 Daily consumption: Qatari and Non-Qatari Consumers of SSBs.

	Mean Consumption Pre-tax	Mean Consumption post-tax	Change in Consumption	Percentage Change in Consumption
Qatari Consumers of only SSB	0.3498	0.2956	-0.0542	-15.5 %
Non-Qatari consumers of SSB	0.3298	0.2234	-0.1064	-32.2 %

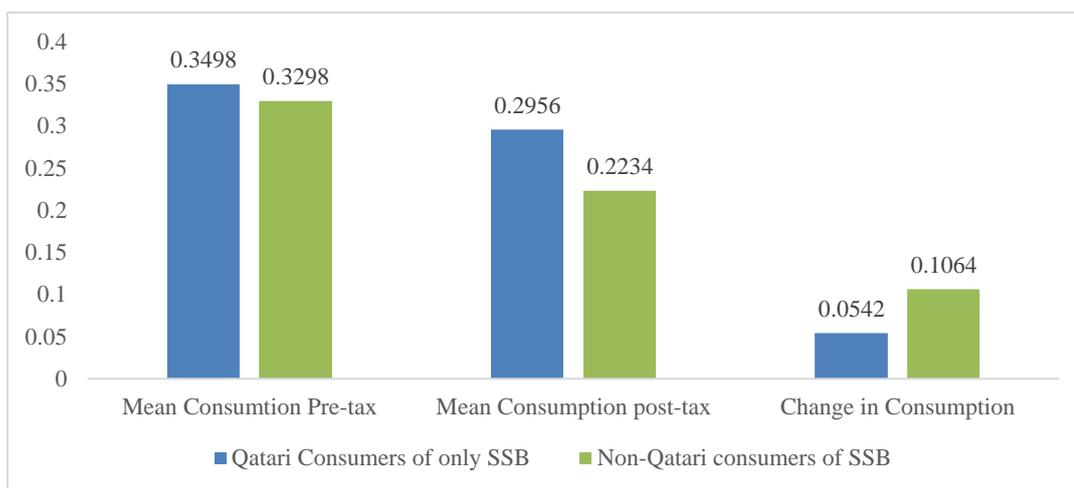


Figure 14 Daily consumption : Qatari and Non-Qatari Consumers of SSBs.

Based on the change in consumption, the price elasticity of demand for Qatari and Non-Qatari consumers are as shown in Table 15. (Refer to Appendix 1, Table 24 for calculations)

Table 16 Price Elasticity: Qatari and Non-Qatari consumers of SSBs.

Consumer Group	Price Elasticity
Qatari Consumers of SSB:	-0.39
Non-Qatari consumers of SSB:	-0.89

4.6.3 Per Day consumption Analysis: Unemployed/out of Labor Force and Employed Consumers.

From Figure 15 and Table 15, it is clear that unemployed/out of labour force consumers have reduced daily consumption by 40%. This is equivalent to a reduction of 0.1228 cans/bottles per day. Consumption reduction in employed consumers is comparatively less, at 0.0859 cans/day, or 25.12%.

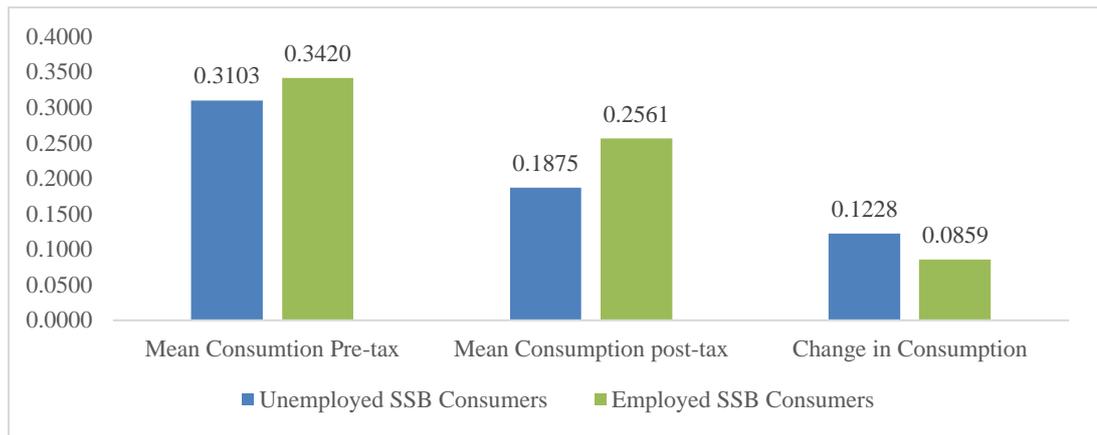


Table 15 Daily consumption: Unemployed/ Out of Labor Force versus Employed

Figure 15 Per Day Consumption, Employed and unemployed/out of labor force Consumers of SSB.

Table 17 Consumers of SSBs.

	Mean Consumption Pre-tax	Mean Consumption post-tax	Change in Consumption	Percentage Change in Consumption
Unemployed/out of labor force	0.3103	0.1875	-0.1228	-39.57 %
Employed	0.3420	0.2561	-0.0859	-25.12 %

Based on the change in consumption, the price elasticity of demand for employed and unemployed/out of labour force customers are calculated as in Table 16. (Refer to Appendix 1, Table 24 for calculations)

Table 18 Price Elasticity: unemployed/out of labour force and Employed consumers of SSB.

Consumer Group	Price Elasticity
unemployed/out of labour force Consumers of SSB:	-1.14
Employed consumers of SSB:	-0.66

4.6.4 Per Day consumption Analysis – Female versus Male

Female consumers of SSBs have reduced consumption by 25.5%, while male counterparts have reduced consumption by 31.9%. This is equivalent to 0.0740 and 0.1322 cans/bottles per day reduction for female and male consumers, respectively. (Table 15 and Figure 16)

Table 19 Daily consumption : Female and Male consumers of SSB.

	Mean Consumption Pre-tax	Mean Consumption post-tax	Change in Consumption	Percentage Change in Consumption
Female	0.2900	0.2160	-0.0740	-25.5 %
Male	0.4134	0.2812	-0.1322	-31.9 %

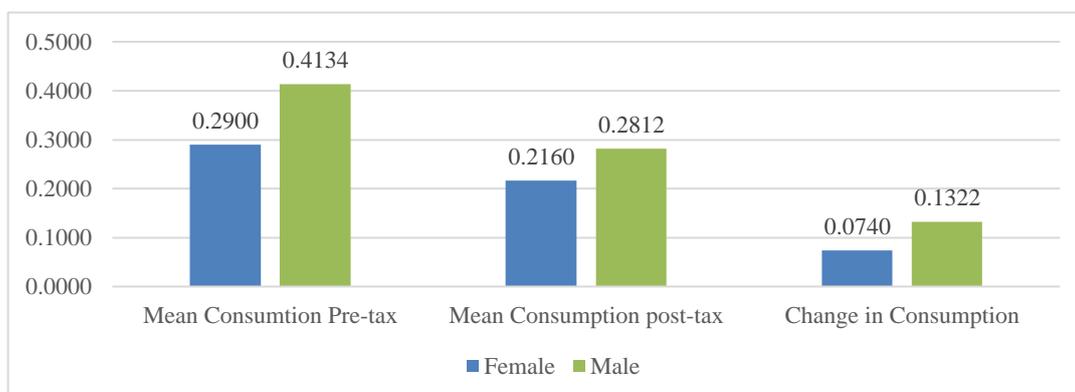


Figure 16 Daily consumption : Female and Male consumers of SSB

Based on the change in consumption, Table 16 shows price elasticity of demand for Female and Male consumers. (Refer to Appendix 1, Table 24 for calculations)

Table 20 Price Elasticity: Female and Male Consumers of SSBs.

Consumer Group	Price Elasticity
Female Consumers of SSB :	-0.68
Male consumers of SSB:	-0.88

4.6.5 Per Day consumption Analysis – High Consumers of SSB’s and Low Consumers of SSBs.

Consumer group that consumed a high quantity of SSB’s reduced consumption by 45.58%, while consumers who consumed less quantity reduced consumption by 15.71%. For the former, this is equivalent to a reduction of 0.4786 cans/bottles per day, and 0.0388 for the latter. (Table 17 and Figure 17).

Table 21 Daily consumption: high consumers vs low consumers of SSBs.

	Mean Consumption Pre-tax	Mean Consumption post-tax	Difference in Consumption score	Percentage Change in Consumption
High Consumers	1.0500	0.5714	-0.4786	-45.58%
low Consumers	0.2469	0.2081	-0.0388	-15.71%

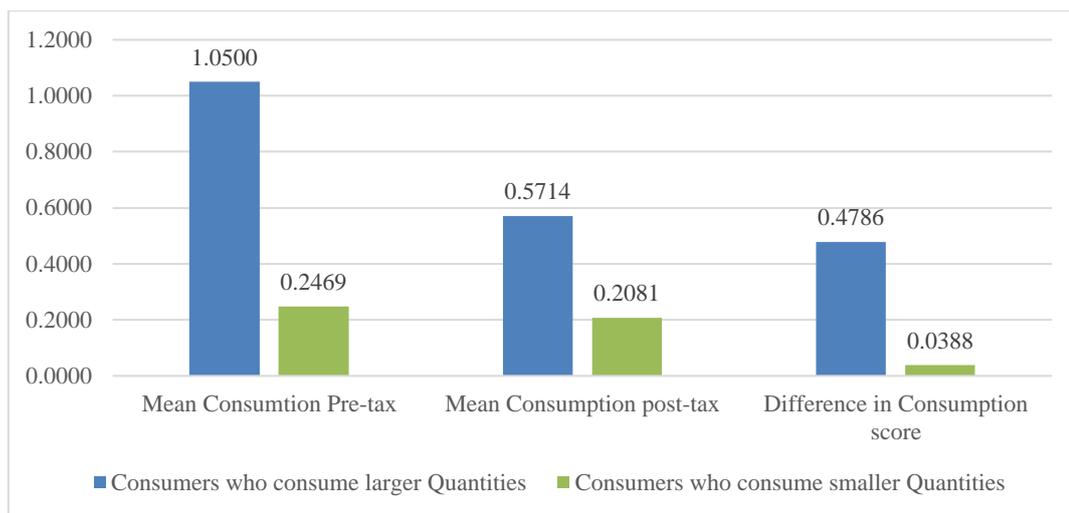


Figure 17 Price Elasticity: High consumers and low consumers of SSBs.

Based on the change in consumption, Table 18 shows the price elasticity of demand for high consumers and low consumers of SSBs (Refer Appendix 1, Table 24 for calculations)

Table 22 Price Elasticity: High Consumers and light consumers of SSBs.

Consumer Group	Price Elasticity
High Consumers of SSB:	-1.37
Low consumers of SSB:	-0.39

Table 19, Figures 18 and 19 summarize the comparison of the change in per-day consumption as well as the percentage change in per-day consumption. The highest percentage change in reduction is found to be in the high quantity consumption group, followed by unemployed/out of labour force consumers of SSBs and non-Qatari consumers of SSBs. The lowest percentage change in consumption is seen in Qatari consumers of SSBs, followed by the “low quantity” consumer group.

Table 23 Change in daily estimated consumption, and the price elasticity of all consumers.

Consumer Group	Change in Per-day Consumption	% Change in Per-day Consumption	Price elasticity of Demand
Exclusively consume SSBs	-0.0948	-28.3	-0.77
Consumes SSBs and other taxed products	-0.1346	-29.6	-0.81
Qatari Consumers of only SSB	-0.0542	-15.5	-0.39
Non-Qatari consumers of SSB	-0.1064	-32.2	-0.89
Unemployed SSB Consumers	-0.1228	-39.57	-1.14
Employed SSB Consumers	-0.0859	-25.12	-0.66
Female	-0.0740	-25.5	-0.68
Male	-0.1322	-31.9	-0.88
High Qty Consumers	-0.4786	-45.58	-1.37
Low Qty Consumers	-0.0388	-15.71	-0.39

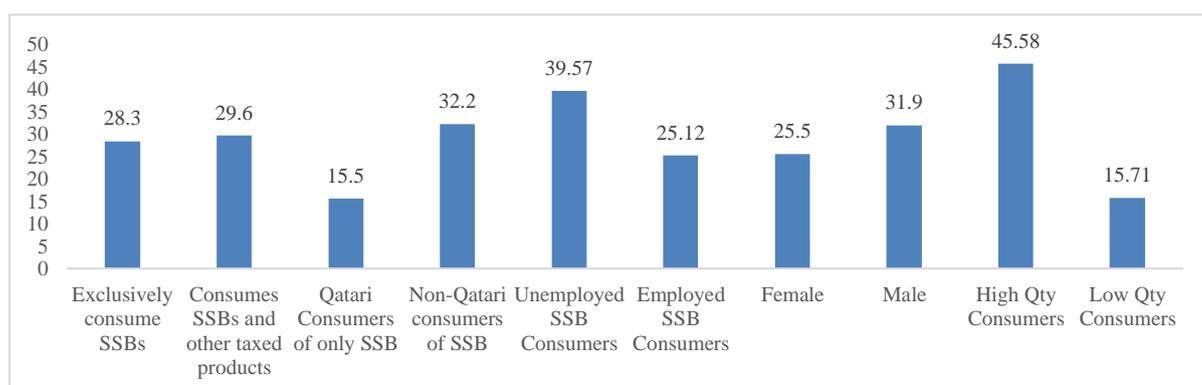


Figure 22 Percentage change in daily estimated consumption

4.7 Analysis of Secondary Data

Secondary data considered for the study analysis includes:

- A. Quarterly imports of sugar syrup from 2017 Q1 to 2019 Q2.
- B. The monthly population reported from January 2017 to July 2019.

From the above data, the per capita import of syrup was calculated, along with quarterly percentage growth. Also, the quarterly percentage growth was calculated, keeping 2017 Q1 as the base. This is seen in Table 20. It is clear that there is a considerable drop in the per-capita imported quantity of SSB syrup by 55% compared to the previous quarter, and by a factor of 61% compared to the base quarter. Although, the imported syrup quantity bounced back with the per-capita import increasing by 67% over the earlier quarter. This can be attributed to commercial entities in the SSB industry being over-cautious about the SSB demand after the tax implementation, and later correcting the quantity to the new market, as well as expecting higher demands in the summer months. (Refer to Appendix 1, Table 27 for calculations)

Table 24 Quarterly import of SSB Syrup.

Quarter	Per-capita Import of Syrup (Kg) Per Quarter	Percentage Quarterly Growth	Percentage growth over Base Quarter (2017, Q1)
2019, Q2	0.89	66.61	-34.87
2019, Q1	0.53	-54.97	-60.91
2018, Q4	1.18	14.21	-13.18
2018, Q3	1.04	21.77	-23.98
2018, Q2	0.85	-56.12	-37.57
2018, Q1	1.94	6.75	42.27
2017, Q4	1.82	13.25	33.27
2017, Q3	1.61	15.27	17.69
2017, Q2	1.39	2.10	2.10
2017, Q1	1.36		

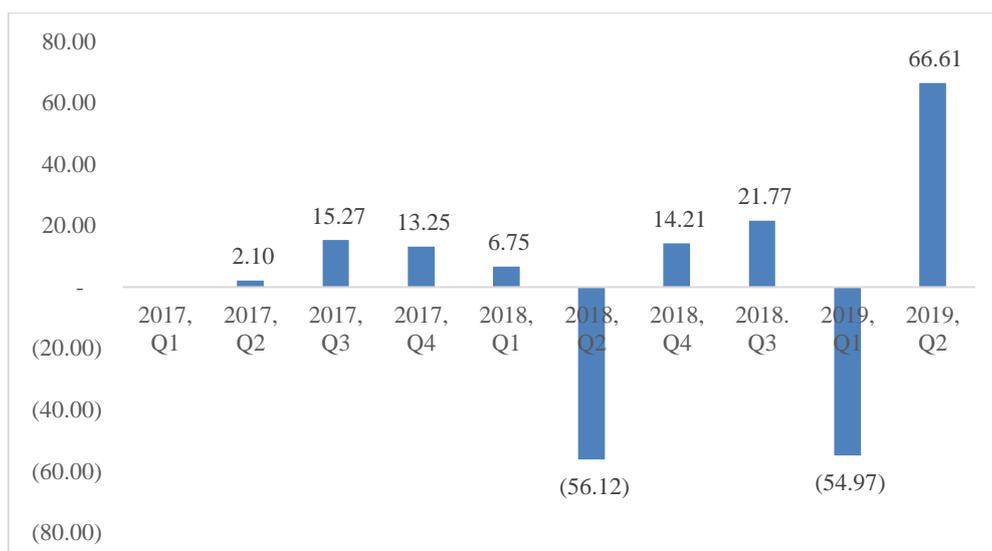


Figure 18 Percentage Quarterly Change of Import.

4.7 Estimating change in SSB consumption of Qatar population

The average population of Qatar is calculated, as explained in section 3.1.4, as shown below in Table 21. (Refer to Appendix 1, Table 28 for calculations).

Table 25 Estimation of Population in Qatar that consumes SSBs.

	Aug 2019 Population	Aug 2018 Population	Average Population
Population 16 Years and Above	2,303,755.00	2,235,610.00	2,269,682.50
Estimated Population that Consume SSB's	1,585,379.78	1,538,484.30	1,561,932.04

The total change in consumption is illustrated below in Table 22. It can be seen that the consumption reduced by 29% after the implementation of SSB taxes. This is shown further in Figure 20.

Table 26 Change in consumption of Cans/Bottles of SSB Per day due after taxation.

	Daily Consumption Pre-Tax	Daily Consumption Post-Tax	Difference	% Change in Daily Consumption
Estimated Consumption per day by Average National Population	581,663.49	413,755.80	-167,907.69	-28.8%

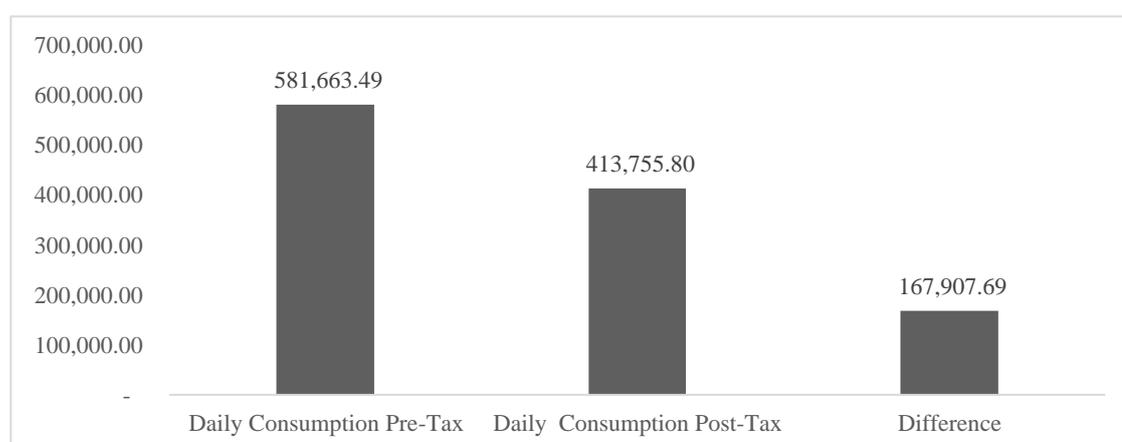


Figure 19 Daily consumption – Pre-tax and Post-tax

Price elasticity of demand is calculated using the quantity of consumption before and after taxation, and average price for SSBs before and after imposition. (Refer to Appendix 1, table 29 for calculations)

Table 27 Parameters to calculate price elasticity of SSBs in Qatar.

Average Price		Quantity Consumed	
Pre-Tax	Post-Tax	Pre-Tax	Post-Tax
1.47	2.28	581,663	413,756

Using the formula from 3.1.3, the price elasticity of demand for SSBs in Qatar was calculated and found to be -0.78. The value is interpreted as “with a price increase of 10%, the consumption goes down by a factor of 7.8% (rounded to 8%). This shows that the price elasticity of SSBs in Qatar Population is comparable to elasticities found in other countries, consistent with investigations by Andreyeva et al. (2010) and Claro et al., (2012).

CHAPTER 5: DISCUSSIONS AND IMPLICATIONS

Analysis of data has shown that there is a high level of agreement within the population that implementation of taxation is for the welfare of the country's citizens and residents. This agreement is found to be higher among non-Qataris. Though there is a significant agreement to the statement that taxing SSBs will reduce consumption of the population, paradoxically, 49% of Qataris and 46% of non-Qataris stated that they had not reduced consumption after taxation. This is also of interest, as survey data shows that there is a significant reduction in consumption. Hence, there is a dissonance in the response of the participants when asked if they consumed fewer products after the taxation. One of the factors that prompted this response could be the fact that agreement to the statement "I have consumed less after taxation" might have been associated with an implicit recognition to be affected by taxes. The respondents could have construed this recognition to be an agreement for further price hikes.

There is a change in consumption across all cohorts examined by the study, with the highest changes seen in the segment of unemployed consumers/out of labour force and high consumer of SSBs groups. Demand elasticity among the unemployed/out of labour force consumers is found to be -1.14, almost 35% more than the average price elasticity of all consumers.

Consumers who only consumed SSBs are seen to have higher elasticities compared to consumers who consumed other products (Cigarettes and Energy drinks). This can be attributed to the increased financial burden on the latter due to an increase in prices for not just SSBs, but also other products regularly consumed by them.

High level of change in high consumer groups is especially of notice, as high consumer groups have been seen to be the group affected least, as identified by Etilé &

Sharma (2015) and Nordström & Thunström (2010). Such a high degree of change had only been seen as a long term effect of taxation, as shown by Taillie, Rivera, Popkin, & Batis (2017). This could be due to the high level of taxation in Qatar (50%), while the tax rate in the studies mentioned earlier was much lower (between 10 and 30%). Another group that showed the least elasticity is Qataris. Policymakers can leverage this insight to prepare programs among Qatari customers to increase the effectiveness of the tax, to bring down the consumption to levels comparable to other groups.

Demand among female consumers is found to be less elastic when compared to their male counterparts. This is expected, as pre-tax consumption of SSBs by female consumers are much lower than the male consumers.

The price elasticity of demand for SSBs in Qatar is found to be comparable to similar studies conducted across North and South America, Europe and Asia such as by Andreyeva et al. (2010) and Claro et al., (2012). To the question of whether or not if the taxation policy has been successful depends on the internal goals set by the General Authority of Customs as well as economic and health policymakers.

Analysis of the per-capita import of syrups shows that there is a dramatic reduction in the imported quantity of sugar syrup in the quarter after the implementation of the tax, which was corrected by a normalized market in the next quarter. This can be attributed to better demand planning and increased demand due to summer months. Evaluation of more data as it becomes available is necessary to gain further insights from such an analysis.

CHAPTER 6: CONCLUSION

This study aims to investigate the changes in consumer behaviour after the implementation of SSB taxation in Qatar. The study showed significant changes in consumption and price elasticity of demand comparable to international figures. Changes were seen between price elasticities among different cohorts. Significant differences in elasticity were found between Qataris and non-Qataris, male and female customers and groups with different pre-tax consumption behaviours. The import of sugar syrup for SSBs was also found to have been affected by the taxation, but data is not sufficient at this time to make a judgement about the commercial impact of the taxes. Health benefits from these taxes also depend on consumers choosing cheaper products or alternatives and hence, further studies are required.

6.1 Limitations of the study

This study is an analysis of purchase behaviours of 192 English-speaking consumers of SSBs, filtered down from more than 340 participants in a survey. A more comprehensive study with more participants, especially with the inclusion of blue-collar workers, will provide a broader view of the consumption behaviour landscape. The study also assumes that the sample population is representative of the total population of Qatar. Inclusion of minors and consumers who does not speak Arabic will also provide a more comprehensive view. An assumption has been made that the average daily consumption of consumer who chose “more than 7 cans/bottles per week” to be 1.5 cans/bottles per week. More detailed questionnaires can remove such ambiguities. As the study analyses self-reported consumption changes, biases in response can also exist.

6.2 Scope for Further Research

Further Study of secondary data, including analysis of sales figures from SSB producers and vendors, charted across periods leading up to and after the implantation can provide precision in the calculation of price elasticity of demand. Future studies associated with this current study can reveal trends in consumption since the implementation of taxation. Longer-term studies of body weight and other metabolic parameters can show the real effects of consumption change from a healthcare point of view. Such studies can provide insights into a possible reduction in healthcare expenditure, as a result of the implementation of SSB tax.

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APPENDIX A: CALCULATIONS

Calculation of Price Elasticity of Demand for SSB's based on Estimated Change in Daily Consumption.

Table 28 Calculations

	Q1 (Estimated Daily Consumption)	Q2 (Estimated Daily Consumption)	P1	P2	Price elasticity
Exclusively consume SSBs	0.3342	0.2394	1.47	2.28	-0.77
Consumes SSBs and other taxed products	0.4543	0.3197	1.47	2.28	-0.81
Qatari Consumers of only SSB	0.3498	0.2956	1.47	2.28	-0.39
Non-Qatari consumers of SSB	0.3298	0.2234	1.47	2.28	-0.89
Unemployed SSB Consumers	0.3103	0.1875	1.47	2.28	-1.14
Employed SSB Consumers	0.342	0.2561	1.47	2.28	-0.66
Female	0.29	0.216	1.47	2.28	-0.68
Male	0.4134	0.2812	1.47	2.28	-0.88
Consumers who consume larger Quantities	1.05	0.5714	1.47	2.28	-1.37
Consumers who consume smaller Quantities	0.2469	0.2081	1.47	2.28	-0.39

Import Data of SSB Syrup (Source : Statistics and Planning Authority)

Table 29 Calculations

Beverages Ready For Consumers Based Upon Cocoa (E.G. Lemonade, Pepsi Cola, Coca Cola, Miranda, 7Up, Canada Dry)			Nonalcoholic Beverage, Cola	
Quarter	Weight(Kg)	value (QAR)	Weight (Kg)	value (QAR)
2019, Q2	13,456.79	118,418.92	2,415,021.06	6,459,930.54
2019, Q1	41,580.00	223,157.34	1,475,923.57	5,135,971.03
2018, Q4	189,036.00	1,465,267.00	3,228,877.00	8,632,345.00
2018, Q3	82,999.00	741,579.00	2,672,980.00	9,782,435.00
2018, Q2	671,745.00	1,783,744.00	2,277,367.00	5,819,112.00
2018, Q1	453,385.00	1,432,465.00	5,196,094.00	13,365,666.00
2017, Q4	399,533.00	1,303,030.00	4,845,402.00	16,982,985.00
2017, Q3	345,681.00	1,173,595.00	12,403,913.00	36,135,580.00
2017, Q2	55,106.00	465,418.00	3,679,023.00	3,679,023.00
2017, Q1	51,137.00	403,709.00	3,597,367.00	9,984,152.00

Monthly Population Data (Source : Statistics and Planning Authority)

Table 30 Calculations

Month	Population (Monthly)
Jun-19	2,638,657.00
May-19	2,740,479.00
Apr-19	2,772,294.00
Mar-19	2,760,586.00
Feb-19	2,772,947.00
Jan-19	2,766,459.00
Dec-18	2,674,320.00
Nov-18	2,757,437.00
Oct-18	2,743,932.00
Sep-18	2,717,886.00
Aug-18	2,561,643.00
Jul-18	2,450,285.00

Month	Population (Monthly)
Jun-18	2,580,734.00
May-18	2,731,910.00
Apr-18	2,706,817.00
Mar-18	2,685,053.00
Feb-18	2,700,390.00
Jan-18	2,643,728.00
Dec-17	2,641,669.00
Nov-17	2,682,596.00
Aug-17	2,668,415.00
Sep-17	2,634,234.00
Aug-17	2,446,328.00
Jul-17	2,471,919.00
Jun-17	2,545,820.00
May-17	2,700,539.00
Apr-17	2,675,522.00
Mar-17	2,659,261.00
Feb-17	2,673,022.00
Jan-17	2,576,181.00

Calculation of Imported SSB Syrup Quantity, Percapita

Table 31 Calculations

Population (Quarterly: Averaged)	Per-capita Import of Ready to sell (Kg)	Per-capita Import of Syrup (Kg)
2,717,143	0.004953	0.89
2,766,664	0.015029	0.53
2,725,230	0.069365	1.18
2,576,605	0.032213	1.04
2,673,154	0.251293	0.85
2,676,390	0.169402	1.94
2,664,227	0.149962	1.82
2,517,494	0.137312	4.93
2,640,627	0.020869	1.39
2,636,155	0.019398	1.36

Calculation of Population Number for Price elasticity of Demand Calculations

Table 32 Calculations

	Aug 2019 Population	Aug 2018 Population	Average Population
Total Population	2,303,755.00	2,235,610.00	2,269,682.50
SSB Consumers (69%), Based on Survey Data	1,585,379.78	1,538,484.30	1,561,932.04

Table 33 Calculations

	Daily Consumption Pre-Tax	Daily Consumption Post-Tax	Difference
Estimated Consumption per day by Average National Population (Multiplying average daily consumption by average population)	581,663.49	413,755.80	167,907.69

APPENDIX B : SURVEY QUESTIONNAIRE

SURVEY QUESTIONNAIRE

Survey form to measure consumer demand before and after Introduction of Taxes on Soft drinks, Sugary drinks, Energy Drinks and Tobacco Products.

Dear Respondent,

I would like to invite you to participate in my research study as a part of my graduation project in MBA, at Qatar University.

The study is a part of my project “Impact of Excise Tax on consumer demand for Soft Drinks, Sugary drinks, Energy drinks and Tobacco products”. The study involves surveying of Qatar residents who consume Soft drinks, Sugary drinks, Energy drinks, or Tobacco products.

The survey should not take more than five minutes of your time. The information collected will be kept strictly confidential. Your participation is completely voluntary and anonymous. If you would like to obtain the results of the study, you may provide your email address at the end of the survey. However, this is entirely optional. You may withdraw from the survey at any time.

If you have any questions, please contact the below persons.

Email: ra1607460@qu.edu.qa (Riswin Ashraf, MBA Student, Qatar University)

ashraf.eid@qu.edu.qa (Dr Ashraf Eid, Project Supervisor, CBE, Qatar University)

If you have read, understood and agreed to the above, and you are willing to participate, please click on “NEXT” to start the survey. If you do not wish to participate, please close the window to Exit.

I sincerely appreciate your help and support.

Thank you for your valuable time,

Riswin Ashraf

MBA Student

College of Business and Economics

Qatar University.

Basic information.

1) Nationality: I am

- a) Qatari
- b) Non-Qatari

2) Gender: I am

- a) Male
- b) Female

3) I have been living in Doha for

- a) 0-5 Years
- b) 5-10 Years
- c) 10-15 years
- d) 15-20 years
- e) More than 20 years

4) My Age is

- a) 18-25 years
- b) 25-30 Years
- c) 30-40 Years
- d) 40-50 Years
- e) More than 50 years.

5) Employment and Monthly salary

- a) I am not employed.
- b) My Salary is between 0 and 5000 QAR
- c) My Salary is between 5001 and 10,000 QAR
- d) My Salary is between 10,001 and 15,000 QAR
- e) My Salary is between 15,001 and 20,000 QAR
- f) My Salary is more than 20,000 QAR

Questions about Awareness.

Please choose the best option, according to your awareness of the statements.

1) I am aware that the price of Tobacco products has increased by 100% from 1st January 2019.

- a) Yes
- b) No

2) I am aware that the price of Soft drinks/Sugary drinks (Like Pepsi, Coke, 7-Up, Gatorade) has increased by 50% from 1st January 2019.

- c) Yes
- d) No

3) I am aware that the price of Energy drinks (Like Redbull, Monster, Power Horse) has increased by 100% from 1st January 2019.

- e) Yes
- f) No

4) I believe that taxing soft drinks, sugary drinks, energy drinks and tobacco reduce consumer demand for these products.

- a) Strongly agree
- b) Agree
- c) Neither agree nor disagree
- d) Disagree
- e) Strongly disagree

5) The taxes are applied on the above products to protect health of Qatar residents and environment.

- a) Strongly agree

- b) Agree
- c) Neither agree nor disagree
- d) Disagree
- e) Strongly disagree

Questions about Product Consumption

Select the products that you personally consume now or have consumed in the last one year.

- 1) Soft drinks/ Sugary drinks (Like Coke, Pepsi, 7-Up, Mirinda, Fanta, Gatorade)
- 2) Energy drinks (Like Redbull, Monster, Power horse)
- 3) Cigarettes
- 4) I do not consume any of the above. (will exit the survey)

(Note: The pages that are shown to the respondents will be based on their choice of above options. On selection of Option 4, the respondent will exit the survey)

Page 1

Soft drinks & sugary drinks, like Pepsi, Coca Cola, 7 Up, Mirinda, Fanta, or similar, Gatorade, Canned Lipton Sweet-tea or similar. Please choose the statement that matches with your response the most.

- 1) **Before** January 1st 2019 Tax and price increase on soft drinks, I used to consume
 - a. More than 7 cans/bottles of soft drinks/sugary drinks per week.
 - b. 5-7 Cans/bottles of soft drinks/sugary drinks per week.
 - c. 2-4 Cans/Bottles of soft drinks/sugary drinks per week.

- d. 1 can/bottle of soft drinks/sugary drinks per week.
- 2) **After** the introduction of Tax and price increase on soft drinks since January 1st 2019, I now consume,
- a. More than 7 cans/bottles of soft drinks/sugary drinks per week.
 - b. 5-7 Cans/bottles of soft drinks/sugary drinks per week.
 - c. 2-4 Cans/Bottles of soft drinks/sugary drinks per week.
 - d. 1 can/bottle of soft drinks/sugary drinks per week.
 - e. I did not consume any soft drinks/sugary drinks after the price increase.
- 3) I have reduced consuming Soft drinks & Sugary drinks after the price increase.
- a. Strongly agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly disagree
- 4) Where do you purchase the **most** amount of sugary drinks or soft drinks that you consume?
- a. Corner stores, grocery stores, or petrol stations.
 - b. Hypermarkets, like Lulu, Al Meera, Carrefour, or Monoprix.
 - c. Fast food restaurants like KFC, McDonalds, Burger King or Pizza hut.
 - d. Vending machines.

Page 2

Energy drinks, like Redbull, Power Horse, Monster, or similar. Please choose the statement that matches with your response the most.

- 1) **Before** January 1st 2019 Tax and price increase on Energy drinks, I used to consume

- a. More than 7 cans of Energy drinks per week.
- b. 5-7 cans of Energy drinks per week.
- c. 2-4 can of Energy drinks per week.
- d. At most, 1 can of Energy drinks per week.

2) **After** the introduction of Tax and price increase on Energy drinks since January 1st 2019, I now consume,

- f. More than 7 cans/bottles of Energy drinks per week.
- g. 5-7 cans of Energy drinks per week.
- h. 2-4 cans of Energy drinks per week.
- i. At most, 1 can of Energy drinks per week.
- j. I did not consume any Energy drinks after the price increase.

3) I have reduced buying and consuming Energy drinks after the January 1st price increase.

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree