Combating obesity in Saudi Arabia through taxation on sugar-sweetened beverages: political and public views and determinants in Mecca city

Rakan Abdulaziz M Ekram

Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

University College London (UCL)
December 2021
Declaration

I, Rakan A Ekram confirm that the work presented in this report is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature ___________________________ Date ___________________________ 22/12/2021
Abstract

A 2013 national survey in Saudi Arabia estimated an obesity prevalence of 28.7% among citizens aged 15 years or older. As part of social and financial reforms, the government implemented taxation on sugar-sweetened beverages (SSBs) with the aim of tackling obesity and diversifying the government's economic resources. The goal of this thesis is to explore whether this recently imposed tax addresses the drivers of SSB consumption and could, therefore, help reduce the prevalence of obesity. The primary objective of this thesis is to explore the contextual factors shaping the political priority for the taxation of SSBs over other nutrition-related policies. The secondary objectives are to explore the drivers of SSB consumption and the attitudes of the participants towards the taxation and its acceptability.

To address the primary objective, 14 semi-structured interviews were conducted with elite actors who influenced the food policies in Saudi Arabia. Relevant documents were reviewed and analysed separately and subsequently triangulated with the other findings. To address the second objective, 30 semi-structured interviews and four discussion groups were conducted with men from Mecca. In addition, a non-participant observation of industry marketing strategies was utilised. Each finding was analysed separately and triangulated with the other findings.

The main findings of this thesis are as follows:

1- SSB taxation was influenced and facilitated by the recent transition in the government, the need for financial resources following the price drop in oil and the recommendations from the World Health Organisation.

2- Three main domain factors influenced SSB consumption among Meccan men: individual (enjoyable attributes related to consumption, a lack of knowledge about the risk factors associated with consumption and the perception that SSBs are affordable), social (social norms, hospitality and family requests), and environmental (the high level of availability and accessibility and the increased industry marketing activities). The participants appreciated the need for the tax but thought it was too high, regressive, unfair and likely ineffective in reducing the consumption of SSBs.
By attempting to reduce the purchasing power through taxation, the Saudi government did not consider several factors that influence SSB consumption. To reduce the consumption of SSBs, more comprehensive policies and strategies that address the drivers identified in this work are needed.
Impact statement

The impact of this work is to shift the governmental perspective from simply thinking about a fiscal policy as a magic way to reduce the consumption of sugar-sweetened beverages (SSBs) to focussing on the actual determinants of SSB consumption and acting upon them.

While the Saudi government imposed a tax on SSBs to reduce the purchasing power in hopes of reducing the obesity prevalence, this project highlighted several other factors that influence SSB consumption. In addition, the beverage industry diluted the effect of the tax by launching lower premium brands and smaller sizes with lower prices. Therefore, the government should consider further public health measures by addressing the factors that influence the consumption of SSBs identified in this PhD project, as follows:

1. Increase public awareness programmes that focus on the risk factors associated with SSB consumption;
2. Educate the Saudi population on all types of SSBs, including a wider collection of beverages instead of just carbonated and energy drinks (e.g. commercial beverages containing vitamins);
3. Increase public awareness programmes that focus on the benefits of the government tax on SSBs, as they may indirectly cause the public to reduce consumption;
4. Encourage families to reduce the availability of SSBs inside their homes;
5. Restrict the availability of SSBs inside government buildings and increase private sectors that act similarly to the government in this restriction;
6. Prohibit advertisements of SSBs on national television;
7. Prohibit the SSB industry from sponsoring any governmental activities;
8. Impose a tax percentage according to the sugar content of the SSBs (not one based on the type of beverage).

The challenges and barriers to introducing other obesity-related food policies might be solved by establishing a new government entity chaired by the Ministry of Health (MoH). The Saudi government should also consider a clear budgetary line for
prevention services that include obesity-related food policies. The uses of this budgetary line should contain clear objectives and goals, as follows:

1. Establish new referral labs to identify the food and beverage composition in the commercial products and confirm the contents that corporations claim the food and beverages contain.

2. Build teams that contain trained employees working in labs, overseeing small and large businesses and working in different public health activities.

3. Fund research for the introduction of new evidence-based policies and for the evaluation of current policies.

4. Invest in civil societies that engage actively in government policies and utilise their roles to educate the Saudi population about the risks associated with SSB consumption.

5. Invest in awareness programmes that should be creative to appeal to the younger generations.
Acknowledgement

First and foremost, I thank God for giving me the opportunity and strength to finish this PhD. My most tremendous gratitude goes to the prophet Muhammed (peace be upon him), whose way in life has influenced and guided me.

I would like to give special thanks to my supervisors, Professor Kholoud Porter, Professor Edward Fottrell and Professor Zelee Hill. From our first collaboration, they made a valuable contribution to this project. I call them any student’s dream supervisory team.

I will never forget the moment when Professor Porter agreed to be my primary supervisor. She showed interest in my project by reading all the documents carefully, line by line, and by advising me to correct, read and restructure them multiple times. She offered rapid responses without showing any annoyance. Instead, I always felt welcome to talk with her, and sometimes we brainstormed together to find out ways to improve my project.

Professor Fottrell’s experiences in diabetes and the social determinants of health made my project easier. He directed me on how and from where to find good references. He made several contributions to this project. In addition, his kindness was unforgettable. I always felt welcome to have a little chat about my project and was constantly met with friendliness and support.

Professor Hill was a cornerstone in this project because she was the only qualitative expert on my supervisory research team. She guided me throughout this project by helping me identify the target groups to conduct the study, designing the question list with me and directing me in how to analyse the data. She spent a tremendous amount of time helping me. For example, one day, we spent almost four hours together designing the question list for the interviews. Moreover, she ensured that the information I gained during the field trips was valuable by reviewing the interview scripts and by analysing some of the scripts to validate my analysis.
A big thanks to the staff of University College of London and Institute for Global Health who helped and supported me through this project. I would also like to express my gratitude to the Saudi government for sponsoring this PhD project. Special appreciation goes to my family and friends for supporting me throughout this PhD.
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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AHA</td>
<td>American Heart Association</td>
</tr>
<tr>
<td>AHRQ</td>
<td>Agency for Healthcare Research and Quality</td>
</tr>
<tr>
<td>ASSBs</td>
<td>Artificial sugar-sweetened beverages</td>
</tr>
<tr>
<td>BMI</td>
<td>Body mass index</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular disease</td>
</tr>
<tr>
<td>DALYs</td>
<td>Disability-adjusted life years</td>
</tr>
<tr>
<td>Embase</td>
<td>Excerpta Medica dataBASE</td>
</tr>
<tr>
<td>EMRO</td>
<td>Regional Office for the Eastern Mediterranean</td>
</tr>
<tr>
<td>GCC</td>
<td>Gulf Cooperation Council</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<tr>
<td>HPFS</td>
<td>Health Professionals Follow-Up Study</td>
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<tr>
<td>IMB</td>
<td>Information-Motivation-Behavioural-Skills Model</td>
</tr>
<tr>
<td>MeSH</td>
<td>Medical Subject Heading</td>
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<tr>
<td>MoH</td>
<td>Ministry of Health</td>
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<tr>
<td>NCD</td>
<td>Non-communicable diseases</td>
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<td>NGOs</td>
<td>Non-governmental organisations</td>
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<tr>
<td>NHENS</td>
<td>National Health Examination and Nutrition Survey</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OR</td>
<td>Odds ratio</td>
</tr>
<tr>
<td>PBC</td>
<td>Perceived behavioural control</td>
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<tr>
<td>PEA</td>
<td>Performance-enhancing agent</td>
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<tr>
<td>PPP</td>
<td>Public–private partnership</td>
</tr>
<tr>
<td>PRISMA</td>
<td>Preferred Reporting Items for Systematic Review and Meta-Analysis</td>
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<tr>
<td>RCT</td>
<td>Randomised controlled trial</td>
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<tr>
<td>SCMs</td>
<td>Social Cognition models</td>
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<td>SCT</td>
<td>Social Cognitive Theory</td>
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<tr>
<td>SE</td>
<td>Standard error</td>
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<td>SES</td>
<td>Socioeconomic status</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>SDG</td>
<td>Sustainable development goal</td>
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<td>SDIL</td>
<td>Soft drinks industry levy</td>
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<td>SSBs</td>
<td>Sugar-sweetened beverages</td>
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<td>STEPS</td>
<td>STEPwise approach to Surveillance</td>
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<tr>
<td>SHIS</td>
<td>Saudi Health Information Survey</td>
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<td>SUN</td>
<td>Scaling Up Nutrition</td>
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<tr>
<td>TBT</td>
<td>Technical Barriers to Trade</td>
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<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
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<tr>
<td>TTM</td>
<td>Transtheoretical Model of Change</td>
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<tr>
<td>VAT</td>
<td>Value-added tax</td>
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<tr>
<td>US</td>
<td>United States</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
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<tr>
<td>USD</td>
<td>United States Dollar</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<td>UN</td>
<td>United Nations</td>
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<tr>
<td>WHA</td>
<td>World Health Assembly</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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<tr>
<td>YLDs</td>
<td>Years lived with disability</td>
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Chapter one: Introduction

1.1. Background
Sugar-sweetened beverage (SSB) taxation is becoming a policy of choice for governments as an intervention to reduce the consumption of sugar and, subsequently, decrease obesity and obesity-related diseases in the population. Policymakers worldwide are interested in implementing taxes on SSBs because there is evidence that taxation on SSBs reduces intake and generates revenue [1-5].

Per capita, Saudi Arabia has one of the highest SSB consumption rates in the world [6] and, in 2015, was ranked fifth after Chile, Mexico, the United States and Argentina [6]. At its 36th session in November 2015, the Supreme Council of the Gulf Cooperation Council (GCC), a political alliance of Arab Gulf monarchy states, agreed to apply taxation on harmful products, that include 100% taxation on energy drinks and tobacco, and 50% taxation on carbonated drinks. In December 2015, the Saudi Consultative Council\(^1\) agreed to impose taxes on the abovementioned harmful products. In January 2017, the Council Ministries\(^2\) agreed to add tax on these products, making the Saudi government the first GCC member to impose these excise taxes. This excise tax on SSBs is also the highest imposed; most countries imposed an average tax on SSBs between 10% and 20% [7]. In May 2019, the General Authority of tax in Saudi Arabia agreed to expand the 50% taxation to all SSBs.

The policy was a historical shift in the Saudi Arabian economy as taxation at any level had never been imposed previously. Following that, the tax environment changed rapidly. In the year that excise tax was introduced, a 5% value-added tax (VAT) on all products, with no exclusion, was introduced. The following year, a 2.5% tax on non-development empty land was implemented. In late 2020, VAT was increased to 15%.

\(^1\) the Saudi Consultative Council consists of 154 members appointed by the King

\(^2\) the Saudi Cabinet composed of 22 ministries appointed by the King, who acts as Prime Minister
These excise taxes were part of Saudi Arabia's 'Vision 2030' Fiscal Balance Programme [8] that, together with the National Transformation Programme 2020 [9], was part of Vision 2030 [10]. The Saudi Vision 2030 was adopted in April 2016 to address an urgent need for economic reform after oil prices plummeted in 2014 [11]. The operating model for the National Transformation Programme 2020 was to identify the strategic objectives of the participating government entities, to translate these into initiatives and to promote joint action towards their fulfilment. As part of the programme, the Ministry of Health (MoH) developed the Health Sector transformational plan [9]. This plan is composed of 15 objectives, one of which is to improve public health services by focussing on tackling obesity with a stated aim of reducing its prevalence by 1% by 2020 [9]. However, this is a small reduction that will be very difficult to measure with precision. This reduction would be achieved through the imposition of taxes on sugar-containing products and other strategies, resulting in the expansion in taxation to include all SSBs. The timeline for imposing this tax in Saudi Arabia is summarised in Figure 1.1.

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<td>GCC members agreed on imposing taxes on energy drinks</td>
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<tr>
<td>Vision 2030</td>
<td></td>
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<tr>
<td>National Transformation Program 2020, Vision 2030 Fiscal Balance Program</td>
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<tr>
<td>- Consultative Council agreed on imposing taxes on carbonated and energy drinks</td>
<td></td>
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<tr>
<td>Cabinet agreed on imposing taxes on carbonated and energy drinks</td>
<td></td>
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<tr>
<td>Government implemented 50% tax on carbonated drinks and 100% on energy drinks</td>
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<tr>
<td>General Authority agreed to expand taxes to include all SSBs</td>
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**Figure 1.1: Timeline for imposing taxes in Saudi Arabia.**

### 1.2. Obesity

Obesity is defined by the World Health Organisation (WHO) as ‘abnormal or excessive fat accumulation that presents a risk to health’ [12]. There are various tools that can be utilised to calculate an individual’s body fat to enable their classification as underweight, normal range, overweight or obese. One of the most common tools is body mass index (BMI), defined as weight in kilograms divided by the square of the
height in metres [12] (Table 1.1). A BMI of ≥25 kg/m² is classed as overweight/obese, and a BMI of ≥30 kg/m² is classed as obese [13]. The cut-off criteria in defining overweight and obese individuals are different between populations (e.g. for South Asian populations, the cut-off criteria are lower).

Table 1.1: The international classification of adults as underweight, overweight or obese according to their BMI.

<table>
<thead>
<tr>
<th>Classification</th>
<th>BMI (kg/m²)</th>
</tr>
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<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.50</td>
</tr>
<tr>
<td>Normal</td>
<td>18.50–24.99</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.00–29.99</td>
</tr>
<tr>
<td>Obese</td>
<td>≥30.00</td>
</tr>
</tbody>
</table>

A high BMI is a major risk factor for a number of non-communicable diseases (NCDs), including cardiovascular diseases (CVD, primarily heart disease and stroke), diabetes, musculoskeletal disorders (especially osteoarthritis) and some cancers (e.g. endometrial, breast, ovarian, prostate, liver, gallbladder, kidney and colon) [14].

1.2.1. Obesity burden

Globally, it is estimated that high BMIs contributed to 4 million deaths and 120 million disability-adjusted life years (DALYs) in 2015 [15]. Of these, CVD was the leading cause for both death and DALYs, with an estimated 2.7 million deaths and 66.3 million DALYs [15]. Worldwide, CVD related to obesity (BMI of >30 kg/m²) accounted for 41% of all BMI-related deaths and 34% of all BMI-related DALYs [15]. BMI-related issues due to diabetes accounted for 6 million deaths and 30.4 million DALYs [15]. Chronic kidney disease accounted for 18.0% and 7.2% of BMI-related DALYs at a BMI of 30 kg/m² or more and at a BMI of less than 30 kg/m², respectively [15]. Worldwide, high BMI also accounted for 3.6 million years lived with disability (YLDs) [15]. Diabetes was the leading cause of YLDs related to BMI, followed by musculoskeletal disorders and CVD [15].
In 2010, the Global Burden of Disease reported that the main attributable risk factor for NCDs in Saudi Arabia was a high BMI [16] and, in 2018, the WHO estimated that 73% of all deaths in Saudi Arabia were related to NCDs [17], as shown in Figure 1.2.

![Figure 1.2: Causes of death in Saudi Arabia in 2018. Source: Adapted from WHO, 2018 [17].](image)

Since the 1990s, high BMI has contributed to an excessive increase in YLDs. In 1990, for the younger population in Saudi Arabia (aged 15–49 years), high BMI was the third leading risk factor attributed to YLDs for both sexes combined [16]. In 2010, YLDs attributable to high BMI increased to second place, and in 2017, high BMI was the leading risk factor for YLDs [16]. Similar effects of high BMI on YLDs were observed among middle-aged and older Saudis (aged 50–69 years) for both sexes combined. In 1990, high BMI was the leading risk factor attributed to YLDs [16]. In 2010 and 2017, high BMI remained the leading risk factor attributed to YLDs, with increased effects on the YLDs [16]. Between 1990 and 2017, for all age groups and both sexes, YLDs attributable to high BMI increased by 41.3% [16].
1.2.2. Obesity trends

Globally, the prevalence of obesity has continuously increased in most countries and nearly tripled between 1975 and 2016 [18]. In 2016, the number of overweight adults was more than 1.9 billion; of that number, more than 650 million were obese [18]. In the same year, over 340 million children and adolescents aged 5–19 years were overweight or obese [18]. Using the Global Burden of Disease data, it is predicted that by 2025, almost 392 million children and adolescents will be overweight and obese [15]. The increasing rates of obesity for both sexes are the highest in the early adulthood age group [15]. Among all adult age groups, the prevalence of obesity is generally higher among women than men [15]. The peak prevalence of obesity in women and men is observed between the ages of 60–64 years and 50–54 years, respectively [15].

In Saudi Arabia, the most recent nationally representative study, The Saudi Health Information Survey (SHIS), was performed in 2013. The SHIS classified 28.7% of Saudi participants aged 15 years or older as obese and noted a higher prevalence among females (33.5%) compared with males (24.1%), not including migrants [19]. The SHIS was a collaboration between the MoH and the Institute for Health Metrics and Evaluation [19] with a focus on research in chronic diseases and associated risk factors. The sampling technique and framework of the SHIS were designed similarly to an earlier study conducted in Saudi Arabia in 2005 that used the WHO’s STEPwise approach to Surveillance (STEPS) [20] to allow for comparison. The STEPS in Saudi Arabia classified 36.2% of adults as obese and reported a higher prevalence among female adults (43.8%) versus male adults (28.3%). Various smaller studies have reported similar findings; there is a higher prevalence among women than men [21]. When comparing the two nationally representative surveys, both of which used similar sampling frames, methods and age groups, it was encouraging that the more recent study reported lower levels of obesity in both sexes, with a greater fall in women than in men (10.3% versus 4.2%). DeNicola et al. [13] claim that this overall reduction may be a result of the public health programmes implemented by the Saudi MoH over the last decade, most of which centred on awareness and behaviour change.
1.2.3. Economic burden of obesity

Globally, the yearly costs of obesity are estimated to be approximately 2 trillion United States Dollars (USD) due to the direct cost of health care services and the loss of productivity; this accounts for 2.8% of the world’s gross domestic product (GDP) [22]. For the Organisation for Economic Co-operation and Development (OECD) countries, the direct cost of overweight and obese healthcare is 425 billion USD annually, 8.4% of the total health expenditure, although this is highly heterogeneous between countries [23]. While the United States (US) spends nearly 14% of its health budget on obesity- and overweight-related care, Estonia spends less than 5% [23].

This cost burden is primarily due to treatment costs for other related diseases such as diabetes, CVDs, dementia and cancer, with 70% of all health expenditures on diabetes tied to the diagnoses of being overweight and obese [23]. Furthermore, being overweight reduces productivity, reduces the employment rate and increases early retirement and absenteeism. For OECD countries, obesity is estimated to reduce productivity by the equivalent of 54 million full-time workers; this is equivalent to a yearly average loss of 863 USD per capita, and nearly half of this amount is due to presentism [23].

No study has measured the economic burden of obesity in Saudi Arabia or other GCC member countries. Two studies have, however, measured the economic burden of NCDs, and one study focussed on diabetes. All these studies were conducted in Saudi Arabia.

Booz & Company, cited in the ‘Investment Case for Non-communicable Disease Prevention and Control in the Kingdom of Saudi Arabia’, [24] estimated the annual cost of five selected NCDs (CVDs, cancers, diabetes, neuropsychiatric conditions and chronic respiratory diseases) at 17.7 billion USD; this is 2.7% of the Saudi GDP [24]. Rasmussen et al. [25] estimated the indirect cost of NCDs by measuring the loss of productivity due to absenteeism and presentism, costing (on average) 1.28% and 4.5% of the GDP, respectively. The authors also predicted an increase in indirect cost, due to both absenteeism and presentism, from 5.7% in 2015 to 6.7% (as percentages
of the GDP) in 2030. In 2014, Mokdad et al. [26] estimated that the annual direct and future cost of diabetes in Saudi Arabia is USD 4.5 billion, rising to 7.2 billion USD if those who are undiagnosed progress and need diabetes treatment and 11.5 billion USD if those with glucose intolerance progressed to a diabetic diagnosis.

1.2.4. Aetiology of obesity and cultural norms

Simply put, obesity is a result of an imbalance between the energy content of food consumed (primarily driven by high-energy dense food) and energy expended (due to low physical activity or inactivity) [27]. However, Swinburn et al. [28] argued that the increased food energy supply explains the obesity epidemic. In addition, obesity is very complex and caused by the complex interaction of multiple factors such as genetics, ethnicity, sociocultural, psychological, environmental, political and economic factors [29]. For example, it is unknown whether obesity is the result of individual choices or social and environmental pressure and whether reducing its prevalence depends on individual decisions or on government action. Hawkes et al. [30] highlighted the importance of personal preference and interaction with the surrounding environment. The authors recognised the importance of the taste of food, the available food information, the social and cultural norms and the food environment as all affecting personal dietary preferences. Understanding the influences of these preferences is key to developing smart policies that manipulate personal dietary choices. These influences indicate that the market provides for people’s desires. Therefore, policies should aim to shift public behaviour by altering preferences.

The notion of holding individuals responsible for health-related behaviour is popular. However, to create and implement effective policies that support public health behaviour, governments need to recognise that the environment is a powerful influence on individual behaviour. In the last two decades, public health scholars have started to acknowledge the potential harm caused by the environment. Roberto et al.’s [29] paper in the second Lancet series on obesity acknowledged the effects of environmental influences on individual-level choices. It argued that obesity is primarily driven by environmental pressure that undermines an individual’s capacity to make
responsible choices about what they ingest. During the last two decades, governments have implemented insufficient and weak policies to address the complexity of the obesity problem; however, powerful commercial enterprises continuously demonstrate strong resistance to government policies.

Transnational corporation lobbies have shifted from being market-based to political [31] and now exert pressure on governments to reduce the policies applied to them and their products or reject them altogether, promoting regulations outside of governmental influence, such as the World Trade Organisation (WTO) and Trade and Investment Agreement [32]. Committees that oversee trade regimes at the WTO can raise concerns regarding measures enacted on domestic health policies that are meant to protect public health. The WTO has requested that countries consider implementing front-of-pack labelling to provide greater justification and more rigorous evidence for the effectiveness of such measures and to implement fewer trade restriction measures, such as education campaigns [33]. Transnational corporations have greater privileges in this agreement through investor-state dispute settlements that can interfere with the governmental regulation of the sales of harmful products [33]. As a result, politicians are either in a weak position relative to the food industry or their opinions may differ from population-based intervention policies. Politicians may believe that educational programmes and leaving the market alone to correct itself are sufficient to reverse the growing prevalence of obesity. In some cases, they may not consider the problem of obesity as urgent enough to justify tackling systematic drivers like the commercial determinants of public health via the implementation of policies or taxes on beverages high in sugar.

A sociocultural context shapes people’s eating behaviour (what they eat and how they use food for hospitality); this context is connected to values, religion, expectations, attitudes and social practices. Swinburn et al. [32] argued that studies of sociocultural values and dimensions reveal that these elements modify the acknowledged drivers and determinants of obesity: individuals are not isolated in the world, as they are part of a wider system. As a result, there are differences between obesity rates in different countries, and these rates are closely related to cultural differences in areas such as
body image perception, fashion, cuisine, social eating and the value placed on physical activity [32]. Commercial marketing targets and exploits these attitudes and values [34]. Thus, consumers are encouraged to increase their demand for poor quality food.

One of the factors limiting individual choices is the increasing availability of unhealthy food versus the diminishing availability of healthy food [35]. Increased fruit and vegetable prices may shift consumers from healthy eating to more inexpensive processed foods that are high in salt, sugar and fat [36]. Furthermore, ultra-processed foods and sugary drinks contain cheap ingredients, such as sugar, flours and oils, in addition to preservatives, colourings and flavourings [37]. Increasing revenue and profit margins are the food industry’s main objectives, and this has led to an increase in the production of processed and ultra-processed products [38]. These foods are usually energy-dense and void of nutritional value [37], and these products are designed to be tasty, cheap and have a long shelf-life (due to the preservatives). Such features, in addition to aggressive marketing by the food industry, have led to the excessive consumption of these processed and ultra-processed foods and have generated enormous profits [37]. This excessive intake has, in turn, led to an increase in the prevalence of obesity and other dietary-related NCDs [39]. Examples of ultra-processed foods are crisps, sugary drinks, instant noodles, biscuits and confectionery items.

In recent decades, the beverage industry has contributed significantly to the obesogenic environment through its global marketing strategies [40] with extensive campaigns that have been extremely successful at popularising their brands [41]. The industry has improved the accessibility of unhealthy foods through this extensive advertising and strong product distribution system. Beverage companies also employ tactical marketing strategies by embedding their brands into national cultures [41]. Although beverage companies have publicly committed to avoiding targeting children aged 12 and below, numerous advertisements appear during family shows. In addition, the carbonated drinks industry strategically places vendors to ensure convenient access to their products [41] and intentionally targets its marketing
activities towards racial minorities and lower-income individuals [42]; therefore, these individuals are more vulnerable to developing diseases associated with obesity [42].

1.3. PhD rationale
SSB taxation is not the only policy option to reduce consumption; there are other options that may be considered (discussed in Chapter 2). Combining these interventions must be considered to reduce the consumption of SSBs as there are multiple factors that may influence SSB consumption [81].

Several quantitative studies in the GCC, discussed in Chapter 4, have investigated the factors that influence SSB consumption. However, quantitative studies may not allow for a meaningful interpretation and cannot investigate the determinants of SSBs empirically because they are based on predetermined questions. In addition, these studies did not investigate the effect of taxation on consumption and the attitude towards taxation since they were conducted before the tax was implemented. Therefore, this study aims to determine whether the Saudi government has addressed the determinants of SSB consumption through taxation.

1.4. Aims and objectives of this PhD

1.4.1. Aim
This PhD project explores whether the SSB tax imposed by the Saudi government addresses the factors that drive SSB consumption and whether it is likely to meet one of its objectives, the reduction in the prevalence of obesity. At a political level, this PhD attempts to describe the contextual factors that shape the political priority to impose taxes on SSBs and the barriers to other nutritional policies. At individual, social and environmental levels, this PhD strives to explore the drivers for SSB consumption among people in Saudi Arabia and how these levels drive individual behaviour, how taxation may affect consumption and the level of political acceptability to these levels.
1.4.2. Objectives

i. To understand the contextual factors around the development of the SSB tax,

ii. To identify the barriers to implementing dietary policies in Saudi Arabia,

iii. To explore the perceptions, attitudes and behaviours of Saudi Arabians to SSB intake,

iv. To investigate the availability of, the accessibility to and the exposure to SSBs in Saudi Arabia, and

v. To explore the perceptions, attitudes and experiences of Saudi Arabians to their government’s use of (and the effectiveness of) a tax to reduce SSB consumption.

1.5. Overview of thesis

The following points are summaries of the chapters of this thesis:

- **Chapter 2** focusses on the relationship between sugar and health, SSB consumption patterns worldwide (particularly in Saudi Arabia) and the pathophysiology of SSB consumption in weight gain and the evidence supporting this relationship. Chapter 2 also presents how SSB consumption could be reduced and describes the international health agencies' calls for governments to intervene to reduce SSB consumption.

- **Chapter 3** provides an overview of the effectiveness of SSB taxation, its political context and criticism, considerations for its design and examples from other countries that have implemented a tax on SSBs.

- **Chapter 4** reviews the published studies to identify the determinants of SSB consumption and the drivers among people in the Middle East Gulf region. This chapter also identifies gaps in the literature pertinent to this region.

- **Chapters 5** provides the conceptual framework that informs data collection and analysis with justifications.

- **Chapter 6** presents the methods taken and the challenges encountered with justifications for the methods adopted.

- **Chapter 7** addresses the first and second objectives of the thesis by interviewing elite actors who have influenced food policies and by reviewing the relevant documents to explore the factors that drove the implementation of taxation on
carbonated and energy drinks in Saudi Arabia. This chapter explores how these elite actors perceived the obesity problem and taxation as the policy of choice to deal with it. Furthermore, it presents an overview of challenges and barriers to the implementation of other food obesity-related policies.

- **Chapter 8** addresses the third and fourth objectives by analysing the individual, social and environmental drivers of SSB consumption and the participants' perceptions of SSB alternatives.

- **Chapter 9** explores the same prior objectives by presenting the motivational factors to reduce the consumption or stop the consumption of SSBs. It also discusses possible strategies to reduce SSB consumption. In addition, this chapter discusses the fifth objective by presenting public attitudes towards the taxation of carbonated and energy drinks and towards the motivational factors to reduce or stop SSB consumption. Finally, this chapter discusses possible strategies to reduce or stop the consumption of SSBs.

- **Chapter 10** summarises the findings and how they compare with the work of others. The thesis concludes with several recommendations for the Saudi government aimed at reducing the consumption of SSBs based on the findings from this work.
Chapter two: Sugar and health

2.1. Introduction
This chapter provides an overview of the relationship between SSBs (more specifically sugar) and health. It also discusses SSB consumption in different countries, including Saudi Arabia, and it summarises the available evidence on the instruments available to reduce consumption.

2.2. Background
As evidence continues to grow, scholars agree that certain nutritional components of food can determine an unhealthy diet; these components include sugar, salt, different types of fats, energy content and micronutrients [43]. The US Department of Health and Human Services defines SSBs as any liquids sweetened with various forms of added sugars [44]. Therefore, the term SSB is not only confined to soft drinks and carbonated drinks but applies to all drinks with added sugar.

Three terminologies are frequently used in the literature to describe a population’s sugar intake: ‘free sugar’, ‘added sugar’ and ‘total sugar’. These terms primarily refer to the sucrose added to beverages and foods. The WHO defines ‘free sugar’ as all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus the sugars naturally present in honey, syrups and fruit juices [45]. The US Food and Drug Administration defines ‘added sugar’ as sugars that are added during the processing of foods (such as sucrose or dextrose), foods packaged as sweeteners (such as table sugar), sugars from syrups and honey and sugars from concentrated fruit or vegetable juices [46]. ‘Total sugar’ is defined as the sugars naturally present in many nutritious foods and beverages (e.g. milk and fruit) and any added sugars that may be present in those same products [46].

Due to the growing level of evidence that identifies sugar as a major cause for the increasing prevalence of obesity, a joint commission was formed between the WHO and the Food and Agriculture Organisation in 2002 to provide expert advice on diet, nutrition and the prevention of chronic diseases. This joint commission recommended
that energy intake via free sugars should be less than 10% of an individual's total energy intake [47]. In 2015, the WHO recommended restricting free sugar intake to no more than 10% of total energy intake; for oral health, it should be below 5% [48]. However, the WHO recommendations do not provide clear guidelines on the levels of sugar consumption. Therefore, the World Cancer Research Fund International [49] recommended that an individual's daily sugar intake should not exceed 50 g (equivalent to six teaspoons); an individual should consume less than 25 g for additional oral health benefits.

The American Heart Association (AHA) blames sugar for an increase in the prevalence of obesity in the US. The AHA advises that sugar consumption should be below the cut off recommended by the WHO: less than 6 teaspoons, 25 g or 100 kcal of sugar per day for women and no more than 9 teaspoons, 36g or 150 kcal for men. The WHO Regional Office for the Eastern Mediterranean (EMRO), of which Saudi Arabia is a part, developed a policy statement in response to the WHO's sugar guidelines[50]. Based on increased levels of obesity in the Middle East region, the EMRO recommended an even lower sugar intake of less than 5% of an individual's overall energy intake; this is equivalent to less than 35 g per day for women and children and less than 50 g per day for men.

2.3. Sources of sugar

The data showing the dietary composition in relation to sugar in Saudi Arabia or in any other member of the GCC are not available. However, studies from other regions have attempted to determine the main sources of sugar consumption. A systematic review on the sources of sugar intake in European countries revealed that sweet products (e.g. cakes, cookies, chocolate, confectionaries and ice cream) were the biggest contributors to sugar intake in Europe [51]. Beverages were the main contributor of added sugar consumption in adults, mostly in the form of soft drinks, but with up to 5% in the form of fruit nectars. In Canada, the major source of added sugar consumption was found to be confectionaries among children aged 1–8 years, while soft drinks were the main source of added sugar in older age groups, including adults [52].
Australia, the majority of added sugar consumption comes from SSBs [53]. Similarly, in the USA, soft drinks and fruit drinks constitute most of the added sugar, followed by milk-based desserts (e.g. ice cream and sweetened yoghurt) [54]. These studies indicate that SSBs are one of the main sources of added sugar in multiple countries, especially among adults.

2.4. Sugar-sweetened beverage consumption pattern

During the past decade, SSB consumption has increased markedly in most countries [6]. In countries with the highest intake, SSBs are considered a substantial source of energy intake [55]. For example, 7% of the total energy intake was consumed through SSBs by children and youth in Mexico in 2012 [56]. In the USA in 2010, 6.9% and 8% of the energy intake was consumed through SSBs by children and youth, respectively [57]. In the USA, the consumption levels of SSBs are considerably higher among economically disadvantaged and ethnic minority groups [58]. Based on several national and sub-national dietary surveys and the Food and Agriculture Organisation of the United Nations (UN), the global average daily consumption of SSBs for adults is estimated to be 137 ml (95% uncertainty interval: 88–211 ml) [59]. This was the highest in upper-middle-income countries at 189 ml, followed by 140 ml in lower-middle-income countries; it was the lowest in both high-income and low-income countries at 121 ml [59]. In general, the consumption of SSBs is higher among younger age groups and males.

Among high-income countries, Saudi Arabia is one of the top four countries of SSB consumption per capita [6]. According to the SHIS [60], 27% of the population reported that they drank SSBs daily, with an average daily consumption of SSBs among male adults of 131 ml and 98.8 ml among female adults [60]. Consumption varied by geographical location, sex and economic status and was the highest among low-income households (<5,000 Saudi Riyals, USD 1,333), those with a lower education level, males and those under the age of 40 years (See Appendix 1 for full details). However, the average consumption pattern of SSBs among adults in Saudi Arabia, according to the SHIS, is slightly lower than the average consumption pattern of the
world, even though it is considered one of the countries with the highest consumption, according to sales data [6].

One way to assess the SSB consumption pattern in Saudi Arabia is by using sales data. The consumption between 2010 and 2018 was estimated based on published sales data from Euromonitor’s international database [61]. The off-trade sales of carbonated drinks in Saudi Arabia increased to 2.4 billion litres (by 21.4%) between 2010 and 2016 [61]. During the same period, the off-trade sales volume of juice and energy drinks also increased to 878 million litres (by 2%) and 80 million litres (by 10%), respectively [61]. The off-trade sales appeared to drop by 20% in 2017 and by 23% in 2018; this coincided with the imposition of the tax in 2017 [61]. Moreover, the off-trade sales volume of energy drinks plummeted by 27% in 2017 and fell by an additional 37% in 2018 [61]. In contrast, the imposed taxes on both carbonated beverages and energy drinks, regardless of sugar content, coincidently shifted consumers away from the taxed products towards juices (juice sales subsequently benefitted). Consequently, the off-trade sales volume of juices in 2017 and 2018 declined by only 1.4% and 3.4%, respectively. The sales trends are summarised in Figure 2.1. In 2017, the drop in off-trade sales of all products was accompanied by more than 1.9 million non-Saudi nationals leaving the country. Therefore, it is difficult to attribute this massive drop in sales to behaviour changes towards carbonated and energy drinks because of the taxes; it may have been due to the change in the Saudi Arabian population.
2.5. Pathophysiology of sugar-sweetened beverages in weight gain

The adverse health effects of SSBs are linked to several psychological and physiological reasons. In relation to the role of SSBs in weight gain, individuals may partially compensate for their energy intake from SSBs [62]. When SSBs are added to an individual’s diet, the energy intake from other sources may be reduced but not in levels that are equivalent to the energy obtained from SSBs [63-70]; this leads to weight gain. Two mechanisms may account for this incomplete compensation of SSB consumption; individuals consume SSBs regardless of hunger or fullness feelings, and SSBs fail to induce a fullness feeling equivalent to their caloric content [62]. The potential causal pathways between SSB consumption and adverse health outcomes may be explained by one or a combination of the following mechanisms:

- In comparison with solid food, liquid generally induces a lower mechanical fullness sensation and a more rapid gastric emptying and orofecal transit times because of the lack of chewing and lower orosensory response [71, 72].
- Liquid calories have a limited ability to induce a satiating hormone response, including an attenuated release of glucagon-like peptide 1 and a lower ghrelin suppression [71].
- SSBs provide a lower fullness sensation when compared with isocaloric beverages containing milk or other sources of protein [72, 73].
SSBs may activate the pleasure centre in the brain; this may undermine standard satiety signals and motivate energy intake independent of energy need [72, 74].

The caffeine content of many SSBs has the potential to induce the consumption of caffeine-containing products and lead to dependence effects [75].

The high glycaemic load and index in SSBs could lead to postprandial hyperglycaemia and, as a response, a rapid release of insulin; a significant drop in sugar levels follows, leading to suddenly reduced levels of energy and increased levels of hunger [55].

2.6. Evidence supporting the association between sugar-sweetened beverages, obesity and related diseases

During the last two decades, several studies have examined the association between SSB consumption and health outcomes (primarily obesity, diabetes and oral health). In most of these studies, a positive association was demonstrated between SSB consumption and adverse health effects [64, 65].

Two interventional studies on children and adolescents suggested that substituting the sugar in SSBs and other sweet drinks had an impact on reducing weight. An 18-month randomised controlled trial (RCT) [69] was conducted on 641 primarily normal-weight children, aged 4–11 years, who regularly drank SSBs. The children were recruited from eight elementary schools in an urban area near Amsterdam. The participants were randomly assigned to one of two groups; one group received sugar-free beverages, and the other group received sugar-containing beverages providing 104 kcal per drink. The study team developed custom SSBs and sugar-free beverages that tasted and looked essentially the same and distributed them to the schools every week, labelled with the participant’s name. Teachers were asked to check if the children consumed their assigned drinks during break time. At the end of the follow-up period, the average weight increase for the children assigned to the sugar-free group was 6.35 kg. The average weight increase for the children in the sugar-
containing group was 7.37 kg: a difference of 1.02 kg (95% confidence interval (CI): −1.54 to −0.48). These results indicate that replacing sugary drinks with sugar-free alternatives among children led to less weight gain. However, 21% of the participants assigned to the sugar-free group were aware that their drinks did not contain sugar. This may have diluted the effect. Similar findings were reported from an RCT [70] conducted over one year among 224 overweight and obese adolescents who regularly consumed SSBs. The study randomly assigned the participants into two groups. The intervention group received a home delivery of non-caloric beverages every two weeks, motivational phone calls, three home visits and instructions to drink only the delivered beverages and not to buy or consume caloric drinks. The control group did not receive any beverages or instructions as to what drink they should consume. The study’s authors reported a significantly lower increase in BMI and weight in the intervention group compared with the control group (−0.57, p = 0.045) and (−1.9 kg, p = 0.04), respectively. Overall, both RCTs demonstrated that SSBs are a likely risk factor for obesity in children and adolescents and that replacing sugary drinks with non-caloric beverages could lead to less weight gain (rather than a weight loss).

Three cohort studies from the US examined the impact of SSBs on diabetes and obesity [66-68]. This first prospective study [66] was performed between 1991 and 1999 on 51,000 women with an eight-year follow-up. This study reported that, after adjusting for lifestyle and dietary confounders, weight gain did not change in women with stable consumption (low or high consumption patterns of SSB did not have an effect). However, women who increased their consumption from one sugar-sweetened soft drink per week to one or more per day increased their weight by a mean of 4.49 kg (standard error [SE] = 0.19) from 1991 to 1995 and 4.20 kg (SE = 0.22) from 1995 to 1999. On the other hand, women who decreased their consumption lost weight at an average of 1.34 kg and 0.15 kg over the two periods, respectively. In addition, women consuming one or more SSBs per day were at a relative risk of type 2 diabetes of 1.83 (95% CI: 1.42–2.36, p < 0.001) compared with those who consumed less than one serving of this type of beverage per month. The study also demonstrated that women who consumed fruit punch were at a high relative risk of developing diabetes
of 2.00 (95% CI: 1.33–3.03; p < 0.001) compared with those who did not consume fruit punch.

The second cohort study conducted from 1995 to 2001 aimed to describe food and beverage consumption at baseline and through follow-up and examine the incidence of type 2 diabetes and associated factors [67]. The participants were 59,000 African American women aged 21 to 69 years at baseline from all regions of the US. After adjusting for the confounding variables (including other dietary factors), the authors reported that those who consumed two or more soft drinks per day had a 24% (95% CI: 1.06–1.45) higher incidence of diabetes compared with women who did not consume soft drinks. Additionally, women who consumed at least one sweetened fruit drink per day had a 31% (95% CI: 1.13–1.52) greater risk for developing diabetes compared with non-SSB consumers.

The third large cohort study [68] examined the associations between SSB consumption and the incidence of type 2 diabetes among 40,389 healthy men aged 40 to 75 years recruited from the Health Professionals Follow-Up Study. The study reported that there were 2,680 incident cases over 20 years of follow-up and demonstrated a positive association between developing diabetes and increased levels of consumption with a hazard ratio of 1.24 (95% CI: 1.06, 1.45; p < 0.01) after adjusting for confounders (including other dietary factors).

Overall, these three cohort studies demonstrate that SSB consumption may lead to diabetes and an increase in weight. As with all cohort studies, there are some limitations related to the generalisability of the results. All three studies were based on self-reported dietary questionnaires and weight measurements; this may have led to underreporting and underestimating of poor health outcomes. Those with worse outcomes may be more likely to report a lower weight than their actual weight or under-report the use of a ‘bad’ diet. Furthermore, the incidence of diabetes in the three studies may have been under-reported; the studies only included confirmed and diagnosed diabetes. This may have diluted the association between SSBs and adverse health outcomes. Nonetheless, the consistency of the positive association in
different populations, as well as the findings from the RCTs, provide confidence in the findings. There is the potential for a replication of these results in other populations.

The association between SSB consumption and adverse health outcomes was highlighted in several systematic reviews. In one performed by Gibson (2008) [63], the author reported on 44 studies that examined the association between SSBs and alterations in BMI and weight gain. Of these studies examined, 15 of 23 cross-sectional studies, 8 of 17 prospective studies and all four RCTs reported a relationship between SSBs and changes in weight and BMI. A meta-analysis performed in 2013 by Malik et al. [64] included 32 studies (20 in children and 12 in adults) that evaluated the relationship between weight gain and SSB consumption and reported that, in both children and adults, a positive association was found between SSBs and weight gain. In 2013, Morengan et al. [65] conducted a systematic review and meta-analysis of the relationship between sugar intake and body weight in adults and children. Of the 38 cohort studies and 30 RCTs identified, a positive association was reported between weight and sugar intake in adults. Specifically, the RCTs of the adults with ad libitum diets (that is, with no strict control of food intake) estimated that a reduction in sugar intake led to a reduction in body weight of 0.80 kg (95% CI: 1.21–−0.39, p < 0.001); an increase in sugar intake resulted in an increase in body weight of 0.75 kg (95% CI: 0.30–1.19, p < 0.001). This systematic review was funded by the WHO and was one of the central reviews that guided the WHO to release new guidelines for sugar consumption in 2015.

2.7. Interventions to reduce sugar-sweetened beverage consumption

As the growing level of evidence supports a link between SSBs and adverse health outcomes, governments have started to implement several interventions aimed at reducing SSB consumption [62]. These approaches may be categorised as environmental or behavioural [76, 77].

Environmental interventions target the environment in which individuals make the choices through policies that focus on changing the physical environment and
providing a conducive environment for individuals within a defined geographical area, setting or possibly both [76, 77]. Behavioural interventions are intended to change the consumption patterns of individuals through raising levels of awareness, knowledge, motivations, skills and ability and through social and individual preferences [78, 79]. It is not always clear how to differentiate between environmental and behavioural interventions. Marketing interventions, for example, aim to influence individual preferences by changing the environment that individuals encounter. Both approaches ultimately aim to change the pattern of unhealthy food and beverage intake [76, 77]. The environmental approach has a more significant effect on the population and is more cost-effective compared with the behavioural approach [76, 77]; however, it is difficult to gain political agreement for its implementation and is challenging to evaluate rigorously [76].

2.7.1. Environmental approach
A systematic review [62] published in the Cochrane Review aimed to assess the effects of environmental interventions, excluding taxation, on SSB consumption, as discussed further in Chapter 3. The review classified the included studies according to the NOURISHING framework [80] that consists of seven environmental and three behavioural intervention areas. The framework was developed by the World Cancer Research Fund and is consistent with other frameworks used in the WHO Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013–2020 [81] and the INFORMAS food environment benchmarking network [82]. The review also assessed the level of certainty in rating the evidence using the GRADE framework, based on the authors’ assumptions (from a very low to a high level of certainty).

The study contained 58 studies (22 RCTs, three non-RCTs, 14 controlled before–after studies and 19 interrupted time-series studies) and a total of 1,180,096 participants. Based on the findings (see Figure 2.2) of the included studies, the authors suggest that there are several effective and scalable population-level interventions that address the high consumption of SSBs. However, the certainty of the confidence
effects for most of the interventions is low to moderate, and the actual effects of these interventions may be substantially different. The authors suggest that, regardless of the high uncertainty in the available evidence, policymakers should consider these interventions to address the high consumption of SSBs and continuously review and evaluate them until new evidence emerges at a population level. Based on the finding of the review, possible effective interventions are:

- Nutrition labelling (e.g. traffic-light and nutritional rating score labelling)
- Limiting the availability of SSBs and providing small prizes for the selection of healthier beverages in schools
- Price increases on SSBs
- Healthier default beverages in children’s menus
- In-store promotions of healthier beverages
- Including incentives to purchase fruits and vegetables and restricting the purchase of SSBs in government food benefit programmes
- Improving access to healthy beverages choices in homes

One of the central interventions not listed in the Cochrane Review but advised by the NOURISHING framework [80] is the regulation of advertisements. This includes restricting advertisements and other forms of commercial promotion. Many countries have applied advertisement restrictions to specific communication channels and mainly television (e.g. the United Kingdom (UK), Ireland, South Korea and Iran [6]). In addition, Chile has implemented a new law to ban the marketing of beverages high in sugar or calories to children [83]. However, no available evidence for the effect of this approach exists.
### Interventions to reduce the consumption of SSB compared to no or alternative intervention: Effects on direct and indirect measures of SSB intake

<table>
<thead>
<tr>
<th>Intervention type</th>
<th>Certainty of Evidence</th>
<th>Impact on SSB intake</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Labelling interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.1 Traffic-light labelling</td>
<td>✯✯✯</td>
<td>▼▼▼▼</td>
</tr>
<tr>
<td>A.2 Nutritional rating score shelf-labels</td>
<td>✯</td>
<td>▼▼</td>
</tr>
<tr>
<td>A.3 Menu-board calorie labelling</td>
<td></td>
<td>▼ △ □</td>
</tr>
<tr>
<td>A.4 Emotion labelling</td>
<td>▿</td>
<td></td>
</tr>
<tr>
<td><strong>B Nutrition standards in public institutions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.1 Reduced availability of SSB in schools</td>
<td>✯✯</td>
<td>▼ ▼ ▼ ▼ ▼</td>
</tr>
<tr>
<td>B.2 Improved access to drinking water in schools</td>
<td>✯✯</td>
<td>▼ ▼ ▼ ▼</td>
</tr>
<tr>
<td>B.3 Small prizes for the selection of healthier beverages in school cafeterias</td>
<td>✯✯</td>
<td>▼ ▼ ▼ ▼</td>
</tr>
<tr>
<td>B.4 Improved placement of healthier beverages in school cafeterias</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.5 Fruit provision in schools</td>
<td>✯</td>
<td>▽</td>
</tr>
<tr>
<td><strong>C Economic tools</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.1 Price increases on SSB</td>
<td>✯✯✯</td>
<td>▼ ▼ ▼ ▼</td>
</tr>
<tr>
<td>C.2 Financial incentives to purchase low-calorie beverages implemented through supermarket loyalty cards</td>
<td>✯✯</td>
<td>▽ ▽ ▽</td>
</tr>
<tr>
<td>C.3 Price discounts on low-calorie beverages in community stores</td>
<td></td>
<td>▽</td>
</tr>
<tr>
<td>C.4 Taxation of SSB</td>
<td>Not included in this review</td>
<td></td>
</tr>
<tr>
<td><strong>D Advertisement regulation</strong></td>
<td>No studies found</td>
<td></td>
</tr>
<tr>
<td><strong>E Whole food supply interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.1 Voluntary food and beverage industry initiatives</td>
<td>✯</td>
<td>▼ ▽ ▽</td>
</tr>
<tr>
<td><strong>F Retail and food service interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.1 Healthier default beverages in children’s menus in restaurants</td>
<td>✯</td>
<td>▽</td>
</tr>
<tr>
<td>F.2 In-store promotion of low-calorie beverages in supermarkets</td>
<td>✯✯</td>
<td>▽</td>
</tr>
<tr>
<td>F.3 Healthier vending machines in workplaces and schools</td>
<td>✯</td>
<td>▽ ▽</td>
</tr>
<tr>
<td>F.4 Urban planning restrictions on new fast-food outlets</td>
<td></td>
<td>▽</td>
</tr>
<tr>
<td>F.5 Restrictions to the number of stores selling SSB in remote communities</td>
<td></td>
<td>▽</td>
</tr>
<tr>
<td><strong>G Action across sectors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1 Trade and investment liberalisation in low- and middle-income countries</td>
<td></td>
<td>▽ ▽</td>
</tr>
<tr>
<td>G.2 Food benefit programs with incentives for buying fruits and vegetables and restrictions on SSB</td>
<td>✯✯</td>
<td>▼ ▼ ▼ ▼</td>
</tr>
<tr>
<td>G.3 Food benefit programs without incentives for buying fruits and vegetables and restrictions on SSB</td>
<td></td>
<td>▼ ▼ ▽ ▽</td>
</tr>
<tr>
<td>G.4 Multi-component community campaigns focused on SSB</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H Home-based interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.1 Improved access to low-calorie beverages in the home environment</td>
<td>✯✯✯</td>
<td>▼ ▼ ▼ ▼</td>
</tr>
<tr>
<td>H.2 Provision of active video-gaming equipment to teenagers</td>
<td></td>
<td>▽</td>
</tr>
</tbody>
</table>

**Footnotes:**
1. Certainty of evidence based on our GRADE ratings. Symbols used: ✯: very low certainty evidence; ✯✯: low certainty; ✯✯✯: moderate certainty; ✯✯✯✯: high certainty. *Each triangle represents one study. Symbols used: ▼ = Decrease in direct or indirect measures of SSB intake, 95% CI excludes 0; ▽ = Increase, 95% CI includes 0; ▽ = Increase, 95% CI excludes 0; ▽ = a study reporting zero effects, or which report that no effects, or no statistically significant effects were observed without reporting quantitative results; ▽ = Includes one RCT with three comparisons, each depicted by one triangle. *Studies reporting on sugar-sweetened milk.

**Figure 2.2:** The direction of reported effects of environmental interventions on SSB intake. Adapted from Philibbsorn et al. (2019) [62]: Environmental interventions to reduce the consumption of sugar-sweetened beverages and their effects on health.
2.7.2. Behavioural approach

Behavioural interventions act on interpersonal factors such as social norms and networks of social support and on intrapersonal factors such as preferences, attitudes and skills [62]. These interventions are generally mentioned by different respected entities to stop or reduce the consumption of unhealthy food and beverages within several frameworks. Within the NOURISHING framework [80], three interventions are recommended to target unhealthy food and beverages: awareness-raising, counselling and skill-building. The counselling interventions are excluded from this review because these interventions occur in health care settings and target at-risk individuals rather than the whole population. A population approach aims to benefit the whole population with more significant benefits [84].

Several governments have launched public awareness campaigns. Evidence indicates that public awareness campaigns are effective at reducing the consumption of unhealthy foods and drinks if several modes of communication are used over a sustained period of time [85]. However, few studies have investigated these campaigns specifically regarding SSB consumption. A street intercepts survey [86] evaluated the Choose Health LA Sugar Pack campaign that aimed to increase public knowledge of sugar in drinks. The survey included 1,041 participants and reported that more than 60% of the respondents who saw the campaign were likely or very likely to reduce their daily intake of sugary drinks. Another online survey [87] from Australia, among 150 Aboriginal and Torres Strait Islander adults, evaluated the Aboriginal SSB advertisement as part of the government-funded LiveLighter campaign. The study reported that 60% of the participants who had seen the advertisement reported that they consumed fewer SSBs compared with 48% of those who had not seen it.

Various behavioural interventions have been conducted to build skills through school, home or community settings, including interactive classroom activities,
lessons or distributing messages to parents highlighting the importance of replacing SSBs with other healthy alternatives. Several systematic reviews have evaluated these behavioural interventions that aim to reduce the consumption of SSBs, as shown in Table 2.1.

### Table 2.1: Summary of the systematic reviews evaluating behavioural interventions to reduce the consumption of SSBs.

<table>
<thead>
<tr>
<th>Author (years)</th>
<th>Target population</th>
<th>Types of studies</th>
<th>Main finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdel Rahman et al. [78], 2017</td>
<td>4–17-year-olds</td>
<td>16 RCTs</td>
<td>School-based: Seven studies reported a statically significant reduction in SSB consumption, and five did not report any changes. Home and community: Two studies reported a reduction in SSB consumption, and two did not report any changes.</td>
</tr>
<tr>
<td>Avery et al. [88], 2015</td>
<td>2–18-year-olds</td>
<td>5 RCTs</td>
<td>All included studies reported a statistically significant reduction in SSB intake.</td>
</tr>
<tr>
<td>Lane et al. [89], 2016</td>
<td>3–18-year-olds</td>
<td>15 RCTs and 6 quasi-experimental designs</td>
<td>11 of 21 studies reported a statistically significant reduction in SSBs intake.</td>
</tr>
<tr>
<td>Vézina-Im et al. [90], 2017</td>
<td>12–17-year-olds</td>
<td>36 RCTs and non-RCTs</td>
<td>20 studies explored the effectiveness of behavioural interventions in reducing SSB consumption. It showed that the</td>
</tr>
<tr>
<td>Author (years)</td>
<td>Target population</td>
<td>Types of studies</td>
<td>Main finding</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>educational/behavioural interventions and the six interventions that were both educational/behavioural and legislative/environmental were almost equally effective in reducing SSB consumption.</td>
<td></td>
</tr>
</tbody>
</table>

Overall, the studies that evaluated behavioural interventions were not consistent in effect; this may be due to a few reasons. First, there were different interventions (with different durations); those that were sustained over a longer period reported a reduction in SSB consumption compared with those that had a shorter period of follow-up [78]. Second, the study setting played a role in determining the level of success in reducing SSB consumption [78]. Interventions based in schools appeared to be more successful in reducing consumption than community- and home-based interventions. Finally, the type of interventions delivered likely impacted the results [78]. Combining several interventions (e.g. providing educational materials in the form of booklets, tip cards and fact sheets that promote the reduction of SSB consumption and giving lectures in schools) may be why the educational settings were more successful [78].

Crucially, behavioural interventions that embrace education and raise skills have focussed on individuals. However, public health programmes should aim to improve the health of groups (families, communities and the entire country’s population) and not only focus on individuals [91]. Furthermore, focussing on target groups and not including the whole population might lead to an increased level of inequalities between populations. Geoffrey Rose's model, shown in Figure 2.3 [91], emphasises the benefits of a population-based approach compared with only targeting a specific group. Overall, the population-based...
approach aims to shift the distribution of risk factors for the whole population [91]. In the model, the curve on the left describes how the risk is shared among the whole population so that a greater proportion of the population is exposed to a lower risk of disease. As a result, the health gains are more massive as risk is reduced in more people.

![Diagram of risk distribution](image)

**Figure 2.3:** High-risk approach or individual approach versus population approach in reducing risk.
Adapted from Rayner et al. (2017) [91]: An Introduction to Population-level Prevention of Non-Communicable Diseases, Oxford University Press.

### 2.8. Global commitment to population approach

With the growing body of evidence regarding the impact of environmental elements on obesity in recent years, international organisations and academics have urged governments to initiate wide-scale actions. Nevertheless, economic instruments (i.e. taxes) have only emerged in the last ten years [92].

The WHO released several documents calling on member states to increase measures against NCDs and obesity and to address their determinants [81, 93, 94]. These documents have been continuously updated on a regular basis. Additionally, action against the determinants of obesity, diabetes and other NCDs accelerated after the 2011 political declaration by the UN General Assembly on the prevention and control of NCDs [95]. This declaration emphasised the fact that the incidence of NCDs could be reduced if governments offered evidence-
based, cost-effective interventions for the whole population. In response to the UN’s declaration, the World Health Assembly (WHA) launched a global monitoring framework in 2013 addressing NCDs and their risk factors and stipulating nine goals to be accomplished by 2025 [81]. The WHA has since endorsed the ‘WHO NCD Global Action Plan’ [81] that was designed and developed to provide strategies and policy options so that member states can achieve the nine voluntary targets. For the first time, the WHO also explicitly introduced food taxes and later published a separate document as part of the Action Plan called ‘Best Buys’ (a collection of interventions to prevent and control diabetes and other NCDs) [96].

Another example of commitment among the international communities in addressing NCDs is through sustainable development goals (SDGs); these have a focus on reducing NCD-related premature deaths by one-third by 2030. It is expected that through targeting NCDs within the SDG framework, governments, consumers and industries will be motivated to improve dietary health.

The AHA report [97] was one of the earliest international papers to stress the importance of fiscal policies contained within government population policies in tackling NCDs and their associated risk factors. The AHA issued a scientific statement on behalf of several organisations, highlighting the importance of a population-health approach in improving physical activity and diet and restricting smoking. In addition, it offered a framework to advocacy groups and policymakers to translate evidence into action. The document summarised the emerging evidence regarding the effectiveness of the following items: labelling/consumer information; media and educational campaigns; subsidies, taxation and economic incentives; environmental changes; approaches in schools and the workplace; and direct mandates and curtailments. Governments should promote healthy diets and increase levels of public awareness, enabling people to make healthy choices. Another popular categorisation for these measures, among public health scholars and public policy scholars interested in food policies, is to divide them
into ‘hard’ and ‘soft’ policies. Soft policies include educational programmes and voluntary actions, both of which are strongly backed by key government officials who believe in allowing the consumer market and commercial industry to self-correct. However, voluntary policies receive heavy criticism because of their lack of accountability mechanisms [8]. ‘Hard policies’, on the other hand, are motivated by an interest in public health and enforced by the law. Examples of these, other than the taxation of SSBs, include requiring the food industry to add warning labels to unhealthy products and placing restrictions on marketing [9, 10]. These interventions have been found useful in changing behaviour [11]. Combining these interventions should be considered to reduce the consumption of SSBs because there are multiple factors that may influence the consumption of SSBs [81].

### 2.9. Chapter summary

This chapter presented evidence of how SSBs could contribute to obesity. The main sources of sugar intake were summarised, and the SSB consumption patterns in several countries were discussed (in which SSBs were one of the main sources of sugar). During the last two decades, evidence has emerged that highlights the association between SSBs and obesity. As a result, many international health agencies have emphasised the need to limit the consumption of sugar, and SSBs are the main source of this. Finally, the evidence on how SSB consumption could be reduced was presented. The evidence suggests that both environmental and behavioural interventions could be used to reduce consumption. However, the evidence emphasises the importance of population-wide environmental interventions where the aggregated benefits generated are higher than those from individual behavioural interventions (as suggested by Geoffrey Rose’s model). As a result, many international health agencies have called on governments to implement environmental population health approaches to tackle obesity and its determinants. The next chapter discusses the taxation policy and the evidence for its impact on the consumption of SSBs.
Chapter three: Taxation policy

This chapter provides an overview of SSB tax design, summarises the experience from countries that have implemented a sugar tax and discusses the evidence for the effectiveness of SSB taxation, its political context, acceptability and criticism.

3.1. Background

Over the last two decades, multiple recommendations have been proposed to tackle obesity through dietary interventions, including economic instruments ranging from subsidies for healthy diets or taxes on unhealthy foods, educational programmes based on behaviour change, food labelling and restricting the marketing of unhealthy foods. These interventions are designed and implemented to reduce exposure to unhealthy diets or increase the intake of healthy diets. Economic instruments have gained high publicity among public health scholars because they are based on the population approach [98-100]. One such instrument is the imposition of a tax as a means of reducing the prevalence of obesity [85, 101]. Taxes are critical for changing the food market as consumers reassess their food-purchasing choices if the prices increase due to taxation [98, 99]. This reassessment of choice versus price at the purchase point is more likely to affect people with lower incomes as they spend a larger proportion of their income on food in comparison with other social groups and value lower-priced food because it enables them to spend more on other commodities [43]. Based on an increasing body of evidence, many countries have imposed an SSB tax over the last four years to reduce consumption.

3.2. Considerations for Sugar-Sweetened Beverage Tax Design

Forty-five countries or jurisdictions have responded to the increased costs of dietary-related diseases by imposing taxes on SSBs [102]. Backholer and Baker [1] argued that governments apply SSB taxes because (1) increasing the price of SSBs could lead to a reduction in their consumption, in turn generating health benefits for the whole population; (2) it is a strong message to consumers that
SSBs are not healthy products; (3) taxes generate revenue for governments; and (4) well-designed taxes will incentivise the industry to reformulate their products and reduce the amount of sugar they contain.

There are various methods for imposing taxes on SSBs [103]. The first consideration is whether governments place taxes on products or specific ingredients [103], and they must measure the value of each option during implementation. Product-based taxation is much easier to initiate and does not add to administrative burdens [103]. However, consumers may shift to high-sugar alternatives such as juices and nectars when they are available [104]. Alternatively, imposing taxes on ingredients is more effective and includes all products without exemption [103]. This may generate greater health benefits because the prices on all added-sugar products will be increased, resulting in no alternative tax-free beverages with added sugar. Nevertheless, this adds a substantial administrative burden.

When designing taxation, governments consider the type of taxation to be implemented; there are two types that might be imposed on SSBs [103]. These are VAT and excise tax. VAT is a percentage of the price added on top of the product price and is applied at the sales point, while excise tax is applied to producers. However, producers usually transfer the amount of tax to consumers to alleviate the pressure, with excise tax sometimes being added on top of VAT. This taxation is typically per unit and tiered according to volume or product price. Governments usually impose this type of taxation when they need to raise revenue, and it tends to be applied to products that have no alternatives (e.g. petrol). In Saudi Arabia and other Gulf countries, however, this type of taxation is often implemented on all soft drinks and energy drinks, regardless of sugar content, at specific rates. The excise tax has a greater impact when it is applied to the volume or sugar content at a fixed rate, regardless of the product price, to incentivise manufacturers to reformulate and lower the volume of sugar in their products [1].
Finally, when considering imposing taxes on SSBs, governments should leave a window for imposing extra taxes over time [105]. While the amount of VAT applied can change over time, an excise tax is linked to volume intake or sugar content and is not related to the price of products. An excise tax is more useful to incentivise manufacturers to reduce the sugar content in their products than VAT. However, when the inflation rate reaches the point at which all prices are increased, governments should consider a gradual increase in excise taxes [106]. An example of a well-designed taxation policy is available in Section 3.4.

3.3. Examples of countries that have implemented sugar taxation
Public health scholars have strongly recommended that excise tax be imposed at a flat rate of 20% on SSBs [107]. However, many governments follow the Mexican design for sugar tax: one peso per litre volume, equivalent to a 10% tax. Berkeley, California, was the first city in the US to successfully pass a vote to impose a tax on SSBs across the whole city at a rate of one cent per ounce, equivalent to 10% [1].

After the announcement of the UK’s SSB tax in 2016, which was implemented in April 2018, there was a huge shift in the design of SSBs [1]. The design was composed of a two-tiered mechanism whereby SSBs with 5–8 g per 100 ml of added sugar would be taxed at 18 pence per litre; those containing more than 8 g of added sugar per 100 ml were to be taxed at 24 pence per litre [1]. Many governments have since followed the UK’s two-tiered tax mechanism that uses different rates. France is one country that followed suit, imposing various tiered tax mechanisms in 2018. The first was applied at a flat rate of €7.16 per 100 litres and included all types of sugar and artificially sweetened beverages. This new mechanism was announced in the 2018 budget and imposed an excise tax at the same rate as that previously imposed on SSBs containing 5–8 g per 100 ml. However, the taxation doubled for those SSBs containing 8–10 g of sugar per 100
ml and tripled when it exceeded 10 g per 100 ml. There was no taxation on beverages that did not exceed 5 g of sugar per 100 ml [1].

3.4. The Effectiveness of Sugar-Sweetened Beverage Taxation

In recent years, various academics, civil societies and health institutions from multiple countries have accelerated the widespread global application of a taxation policy on SSBs by robustly evaluating and widely presenting and highlighting the harmful impact of SSBs on the health of the general public.

Making the decision to implement this type of taxation policy is not easy as it is influenced by different interest groups (e.g. consumer groups, government agencies and food industry lobbyists) [108]. However, with the limited data, it is too early to judge whether an SSB tax influences the health outcomes at the population level [2]. Nevertheless, the reduction in sales of SSBs in countries and areas where they have imposed taxes on sugar could lead to potential long-term health benefits [2-5]. While the evidence supporting the impact of a sugar tax on health, specifically on obesity, is still ongoing, there is growing real-life evidence from regions where taxes have been implemented that tracks both purchasing habits and health outcomes. However, the impacts of taxation have been evaluated in limited settings because these studies require intensive data from the setting where pre-tax and post-tax sales and consumption patterns are available for comparison [2]. Studies from Mexico, Barbados and Berkeley in California on the taxation of sugar have been cornerstone frameworks for other evaluation studies [2].

Mexico implemented a 1 peso (equals 0.050 USD) per litre excise tax on SSBs on 1 January 2014. After one year of tax implementation in Mexico, Colchero et al. [109] evaluated the beverage purchase trends before and after the tax was imposed. The authors used the data from the purchases of an unbalanced panel of 6,253 households, providing 205,112 observations in 53 cities (in 29 states) between January 2012 and December 2014. The authors reported that there was
a sales reduction average of 6% (−12 mL/capita/day), and the reduction increased by 12% by December 2014 when compared with the pre-tax level. The reduction was prominent among low socioeconomic households; it reached an average of 9% and, by the end of the study period, was up to 17% when compared with the pre-tax trend. At the same time, there was an increase in the purchase of untaxed beverages by 4% (36 mL/capita/day), such as bottled plain water. Another study [3] used the same data and the same model, but a time period of four years from January 2012 to December 2015, and reported a 9.7% reduction in the purchase of SSBs by the end of the second year in comparison with the pre-tax trend. The average reduction over the four years was 7.6%. Among individuals with the lowest socioeconomic status (SES), the reduction in the purchase of the SSBs was higher than in the other groups. The study reports that SSBs purchased among these individuals decreased by 18.8 ml and 29.3 ml per capita per day in 2014 and 2015, respectively.

Another study conducted in Mexico examined nine years of sales data and reported a similar reduction in the purchase trend after the tax implementation [110]. This study reported a 7.3% reduction in SSB sales and a 5.2% increase in plain water sales [110].

To evaluate the effect of the tax introduced in Berkeley, study investigators analysed pre- and post-sales data gathered from point-of-sale scanners at supermarket checkouts in the city and six control supermarkets in the adjacent cities [111]. They reported a substantial reduction (21%) in SSB consumption in Berkley and a moderate increase (4%) in the adjacent cities. At the same time, the consumption of water increased by 63% in Berkeley and by 19% in adjacent cities. Falbe et al. [112] investigated the impact of SSB taxation in low-income neighbourhoods in Berkeley versus the cities of Oakland and San Francisco after one year of the tax being implemented. They reported a 9.6% reduction in sales in Berkeley and a 6.9% increase in Oakland and San Francisco. In and outside of Berkeley, there was an increase in non-taxed beverages by 3.5% and 0.5%,
respectively, mainly driven by water sales. The authors also reported a reduction in the average transaction by 0.018 USD after tax. The study’s authors concluded no significant difference in SSB consumption between the low- and high-income neighbourhoods in Berkeley, although it is worth noting that the baseline SSB consumption was below the national average.

A study from Barbados examined the effect of SSB taxes on sales compared with other types of beverages by using the electronic points of sales from major supermarket chains between January 2013 and October 2016 [4]. Study investigators reported a reduction in average weekly sales of taxed SSBs in comparison with the expected sales before the tax implementation by 4.3% (95% CI: 3.6%–4.9%), mainly driven by a reduction in soft drinks sales of 3.6% (95% CI: 2.9%–4.4%). Furthermore, there was an increase in non-SSB sales of 5.2% (95% CI: 4.5%–5.9%), driven mainly by bottled water at an average of 7.5% (95% CI: 6.5%–8.3%). Interestingly, there was an increase in the sales of lower-priced SSBs; this may reflect that some individuals may have substituted premium-brand beverages for lower-priced ones once they were taxed. The extent of brand down-switching increased by 6.5%.

Real-life studies showed a reduction in sales, but this does not necessarily equate to reduced consumption; the sales of drinks are not the same as the consumption of sugar. Even if people are consuming fewer SSBs, they might be substituting this source of sugar with another type. In addition, only the short-term effects are noted in these studies; it remains to be seen what the effects would be over medium- and long-term periods. Furthermore, the reduction in sales does not necessarily reflect a reduction in the obesity prevalence in the populations from which study participants have been drawn. At this time, the effects of SSB taxation on health impact can only be examined by modelling studies.
In 2013, Escobar et al. [113] conducted a systematic review to investigate the effects of sugar taxes and the increase in the prices of SSBs on the potential impacts (e.g. consumption levels, weight and BMI). The review included nine studies published between 2000 and 2013; six of them were from the US, and one each were from Mexico, Brazil and France. The high heterogeneity of the studies because of the wide range of the study designs, the various populations and the data sources made it difficult for the authors to make any conclusions on the association between SSB price increases and weight. The authors concluded, however, that the increase in SSB prices was associated with reduced consumption, and the higher the price, the greater the reduction. Another systematic review [114] of eleven modelling studies, published in 2016, reported promising results, indicating reductions in weight following an increase in price; further weight reductions were noted among individuals in a low socioeconomic group.

A retrospective cohort study of 6,537 men and 5,324 women, using the Monitoring the Future Surveys in the US, examined the extent to which food prices were associated with health outcomes [115]. Study investigators estimated that a 1 USD increase in the price of soft drinks was associated with a decrease in the incidence of obesity for men and women by 10.8% and 28.1%, respectively. Fletcher et al. [116] used the National Health Examination and Nutrition Survey (NHENS) between 1989 and 2006 to investigate the potential for soft drink taxes to combat rising levels of child and adolescent obesity through a reduction in consumption. The authors assumed that the results of the tax on SSBs on behaviour would be like the changes in the state tax over time. The study reported that a 1% increase in the price of SSBs could lead to a minor reduction in weight (of 0.009%). This modest reduction appeared to be because children tend to offset their reduced consumption of SSBs with an increase in the consumption of other high-density energy beverages (e.g. milk).
Another modelling study used grocery purchase data (reported by Nielsen Homescan Panellists between 1998 and 2007 [Nielsen, 2007]) to estimate the beverage demand elasticities in response to a 20% tax-induced price increase of caloric sweetened beverages; the estimated changes of individuals’ daily beverage consumption reported in the 2003–2006 NHANES were also applied [117]. After a 20% price increase on SSBs, the study reported a potential reduction in energy intake for children by 43 calories per day, or a 4.5-pound reduction in weight over a year; this reduction could reduce the prevalence of children that are overweight (from 32.3% to 27.0%) and children that are obese (from 16.6% to 13.7%). The study also reported similarly promising results on adults with an average reduction of 37 calories per day, or 3.8 pounds of body weight over a year. This could lead to a decline in overweight adults (from 66.9% to 62.4%) and obese adults (from 33.4% to 30.4%). Another modelling study used data from a single year (obtained from the 2006 Nielsen Homescan panel) to investigate the impact of beverage taxes [118]. The study reported that 20% and 40% taxes on SSBs could generate a reduction in beverage purchases by 7 and 12.4 kcal/ per person and a reduction in weight by 0.32 and 0.59 kg/y per person, respectively.

An additional modelling study examined the association between a 20% added tax and the potential cost-effectiveness, health gains and financial impacts in Australia, based on the Australian Health Survey 2011–2012 and on disease epidemiology based on a study of the US burden of diseases, injuries and risk factors in 2010 [119]. The assumption of the study was grounded upon the fact that a reduction in SSB consumption could potentially affect BMI and nine diseases related to obesity. A 20% added tax would potentially lead to health-adjusted life years gains of 175,300 (95% CI: 68,700–277,800) and healthcare cost savings of 1,733 million Australian dollars (95% CI: 650 million– 2,744 million) over the lifetime of the Australian population. A simulation modelling project in Canada reported that a 20% ad valorem excise tax on SSBs, over the course of 25 years, could possibly prevent 700,000 cases of patients who are
diagnosed as overweight or obese and over 200,000 cases of diabetes; it could also delay 13,000 deaths and avert almost 500,000 DALYs [119].

One of the indirect benefits of SSB taxation is reformulation [120]. Removing the sugar while keeping the same taste could be technically challenging and risky because if the properties of the beverages change, consumers may switch to alternatives provided by competitors [121]. A well-designed tax would encourage beverage manufacturers to reduce sugar content in their products. For example, a recent study by Scarborough et al. in the UK [120] explored the impact of the Soft Drinks Industry Levy (SDIL) on price, product size and number of soft drinks with sugar levels greater than 5 g per 100 mL in the marketplace between September 2015 and February 2019. The number of available drinks that were in the high levy category when the SDIL was announced was reduced by three (95% CI: −6–12).

3.5. Political context, acceptability and criticisms
While evidence supporting taxation is promising in reducing SSB consumption, governments are sometimes reluctant to impose taxes on SSBs, or they may delay them. It is, therefore, important to understand the political context and policy enablers of SSB taxation.

One of the facilitators for implementing a tax on SSBs is that it is another source of financial revenue for governments, in addition to the possible health benefits generated as a result of reduced consumption. Backholer and Baker [1] emphasised the role of financial reform and financial stress (and the need for new tax revenue streams) in imposing taxation on SSBs. For instance, the Mexican and South African governments imposed taxation on SSBs during a time they went through major financial reforms. In Hungary, the policy was adopted when the government faced a substantial financial crisis [122, 123]. The authors
suggest that making the financial gain from the taxation of SSBs obvious to decision-makers could be an essential strategy for boosting support [1].

Hagenaars et al. [1], on the other hand, argued that there are two reasons behind the rapid spread of SSB taxation in Europe (in comparison with the USA). The first is the high level of fiscal decentralisation in the USA. The second is the political environment and government ideology. In the USA, where the country is dominated by two political parties with two different ideological backgrounds, the federal government failed to impose taxation on SSBs, and a tax has only been imposed in the states where the Democratic party dominated [124]. On the other hand, where the political parties are more fragmented (as is the case in Europe), there is room for debating and framing such a policy.

The debate over the fiscal measures implemented on SSBs among the media, scholars, policymakers and beverage industry and between the supporters and opponents of the measures have affected progress towards imposing taxes [125]. The beverage industry initiated some key steps to oppose most health regulations (especially taxation) to alter the debate results. In 2015, emails leaked between senior officials of Coca-Cola revealed their plans for a coordinated war against public health policies [41]. Beverage firms have already implemented several of the steps mentioned in their internal documents [27]. For example, the industry is setting up anti-tax campaigns. In 2009, when a proposal for soda tax emerged in the US, the beverage industry invested 60 million USD to fight it, and that fund has remained high to the present day [41]. Between 2011 and 2015, Coca-Cola spent 6 million USD on average each year [126]. Similarly, PepsiCo invested 3 million USD for lobbying in the industry’s favour [126]. It is also notable that the beverage industry has financed journalism conferences to apply influence on media content concerning the numerous factors of obesity.

Another important strategy employed by the industry is manipulating the scientific evidence that links SSBs with obesity [127]. A systematic review [128] published
in 2017 investigated the source of bias in research that examined the relationship between SSBs and health risks between 2001–2013. The review included 133 articles: 16 systematic reviews (four were funded by the industry), 57 cross-sectional studies (eight were funded by the industry), 46 prospective studies (three were funded by the industry) and 14 intervention studies (none of these were funded by the industry). Of the industry-funded studies, only 7% of the studies were judged to be of good quality, and the remainder were of poor quality. Additionally, industry-funded studies were overwhelmingly more likely to reach 'weak/null' conclusions compared with independent studies regarding the adverse effects of SSB consumption on health.

The beverage industry has also diverted the focus to physical activity as a solution for the growing prevalence of obesity. For example, Coca-Cola financed scientists at various universities in the US to set up an organisation named Global Energy Balance Network, promoting physical activity to balance the effect of an unhealthy diet [129]. Ranie et al. [130] reported that the low publicity of SSB taxation among policy influencers in Alberta and Manitoba (Canada) might be related to the influencers being contacted by the SSB industry to support physical activities and soft measures (e.g. labelling and public nutrition education) over taxation. While exercise is excellent for health, evidence suggests that dietary restriction has significant advantages over exercise as a weight-loss tool [131].

A common criticism raised by the industry and others who are against SSB taxation is its potential regressive income effects [100, 132]. Specifically, that individuals with lower SES would pay a larger percentage of their income towards taxation in comparison with those in high-income groups. However, evidence shows that the burden of diet-related diseases is higher among lower SES groups and ethnic minorities [65, 133]. Lower SES individuals tend to have poorer quality of diet (including high SSB consumption) [134, 135]. Furthermore, the food and beverage industry has heavily targeted the neighbourhoods of these disadvantaged groups with advertisements and created a food environment with
increased levels of processed and ultra-processed products, one of these being SSBs [134, 135]. As a result of this environmental manipulation, economically disadvantaged groups tend to consume more SSBs compared with more economically advantaged groups [135]. Due to the higher consumption of SSBs and greater sensitivity to price changes, SSB taxation may be expected to have a greater impact on people with lower SES [114] and could, in that sense, be regressive. It could also, however, play an important role in addressing the health disparities among the lower SES groups.

To gain public trust, SSB tax revenue should be promoted as another source of revenue to fund and improve healthcare services and prevention services; the health benefits of SSB taxation in reducing consumption and improving public health should also be promoted [136]. João Breda, programme manager for nutrition, physical activity and obesity for the WHO's Regional Office for Europe, highlighted the need to reinvest such revenue in health by stating, 'We need to try to find ways to guarantee that the revenue from taxing unhealthy products is reinvested in health-related initiatives' [137]. This has, indeed, been the case in some countries. For example, the UK and Hungarian governments announced that SSB taxation revenue would be spent on school sport and health-related projects, respectively [138]. Furthermore, in Mexico, the taxation policy was part of a greater strategy to improve the food environment and change the dietary pattern, both of which influence diet-related health and, in turn, could reduce inequalities [139]. Such programmes will target the whole community and lead to modifying dietary habits to healthier options. However, not all governments have or reported that they will reinvest the revenue from taxation to improve the healthcare system, introduce subsidies for healthy diets or build the capacity for physical activities [138].
3.6. Chapter summary

This chapter presented how taxation on SSBs became a favoured policy option to reduce SSB consumption in many countries. Academics, civil societies and health institutions have accelerated the widespread global taxation on SSBs by robustly evaluating and widely presenting the positive public health impact of SSB taxation. This chapter also presented the considerations for governments on the design of these taxes. These included a tax at a fixed percentage of the product’s price added to the final price or a tax applied to the volume or sugar content at a fixed rate, regardless of the product price. The latter design has been more useful to incentivise manufacturers to reformulate to a lower sugar content in products.

This chapter also presented the debate around taxation that has influenced the progress towards imposing taxes on SSBs. Beverage industries play a significant role in pushing the debate away from SSBs and towards physical activity and other soft measures. Moreover, the tax on SSBs has been criticised by its opponents because it could be regressive. Making room for debate, stressing the financial gain from taxation and reinvesting the revenue back into the public, particularly into the healthcare system, may improve public acceptance of this taxation.

While taxation on SSBs has shown promising results to reduce consumption through a reassessment of choice versus price at the purchase point and to affect the affordability of purchase power, other factors could influence consumption. The next chapter summarises the evidence from the literature on the determinants for SSB consumption among the GCC and the attitudes and acceptability of the taxation.
Chapter four: A systematic review of the determinants and the drivers of sugar-sweetened beverage consumption in the Gulf Countries

4.1. Introduction
This chapter summarises the evidence from a systematic review of the literature on the determinants and drivers of SSB consumption restricted to the GCC population (i.e. Saudi Arabia, Oman, United Arab Emirates, Qatar, Bahrain and Oman). This restriction was applied because these populations share many characteristics such as socio-cultural values, economic levels, climates and political systems; these characteristics make them different from the wider middle east region and rest of the world. In addition, the members of the GCC, including Saudi Arabia, have signed a treaty to impose taxes on SSBs. By identifying the determinants and drivers of SSB consumption, the governments, civil societies, think tanks and academics in the region could utilise this evidence by promoting more holistic prevention policies. There is no known previous systematic review that has investigated the determinants and drivers of SSB consumption in the Gulf countries or other parts of the world with no age restriction.

4.2. Method

4.2.1. Data sources
I conducted a search on the following databases: PubMed, the Excerpta Medica dataBASE (Embase) and PsycINFO up to 1 May 2019.

The PubMed database is considered one of the leading databases in the medical field due to its inclusive selection process of studies from different medical journals. The PubMed database is searchable using Medical Subject Heading (MeSH) terms and keywords. It covers the literature available in the Medical Literature Analysis and Retrieval System Online (Medline) database and PubMed Central [140]. The EMBASE database emphasises studies published in European journals [141] and can be searched through keywords and Emtree (MeSH plus
The PsycINFO database provides literature related to the psychological, social, behavioural and health sciences dating from 1806 to the present. PsychINFO provides access to a wide range of journal articles, books and dissertations [143].

4.2.2. Search strategy
I used the following keywords for the search strategy:

- (Sugars OR Sweetening Agents OR Dietary Sugars OR Dietary Sucrose OR Sugar sweeting beverages OR Energy drink OR Soft drink)
- (Kuwait OR Saudi Arabia OR United Arab Emirates OR Qatar OR Oman OR Bahrain OR Gulf states OR Gulf countries OR Gulf Cooperation Council Countries)
- (Determinant OR Determinants OR Correlation OR Correlations OR Correlated OR Correlates OR Relation OR Relations OR Relationship OR Relationships OR Relate OR Related OR Relates OR Factor OR Factors OR Predict OR Predicted OR Prediction OR Predictive OR Predicts OR Predictor OR Associate OR Associates OR Associated OR Influence OR Influences OR Influencing OR Influenced)

The search process considered the synonyms for each keyword and the suffix variations. The search results of the keywords were combined with the search results of the ‘MeSH term’. Similar search terms were combined using the Boolean expression ‘OR’. The search outcomes of the main keywords were combined using the Boolean expression ‘AND’. The search strategy was checked by an expert librarian to ensure its comprehensiveness. The results of the database searches were managed using Endnote X8 software. Details about the search process for each database are available in Appendix 2.
4.2.3. Inclusion and exclusion criteria of the included studies

The inclusion criteria of this review were as follows:

- Any RCT or observational study (qualitative or quantitative studies) that investigated the determinants and the drivers of SSB consumption among people living in the Gulf countries;
- Only included full-text original studies;
- Only studies conducted among the population of the Gulf countries (no restrictions were imposed on the study population in terms of gender or age);
- Any study that was conducted among the general population or a sub-population without an effect on the decision to consume SSBs to make the conclusion more generalisable to the general public.

The exclusion criteria of this review included:

- All review articles, letters to editors and commentaries;
- Conference/meeting abstracts or proceedings and protocols;
- Studies that focussed on SSB consumption among specific study populations such as patients with chronic diseases, patients with metabolic disorders or obese patients (their decisions to consume SSBs might be influenced by their conditions).

4.2.4. Data collection and analysis

4.2.4.1. Selection of studies

The selection process of included studies was summarised by implementing the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines (Figure 4.1) during the search process. First, duplicates were removed using the Endnote software. Next, the titles and abstracts and excluded studies not fulfilling the eligibility criteria were screened. The full texts of the remaining studies were assessed to check eligibility.
Records identified through database searching (n = 571):
PubMed (n = 303)
EMBASE (n = 256)
PsycINFO (n = 12)

Records after duplicates removed (n = 521)

Records screened (n = 521)

Non-relevant records excluded (title/abstract) (n = 502)

Full-text articles assessed for eligibility (n = 19)

Full-text studies excluded, with reasons (n = 5):
- Abstract (n = 1)
- Conference proceeding (n = 4)

Studies included in the review (n = 14)

Figure 4.1: PRISMA flow diagram for the selection process of the studies covered in this review.
4.2.4.2. Data extraction and management

The collected information included the following:

1. Study characteristics: the authors’ names, publication year, country, source of data or setting, measure used to evaluate sugar intake, study population, sample size and participants’ demographics (age and gender);
2. Outcome of interest: determinants and drivers of SSB consumption;
3. Inclusion and exclusion criteria of the study.

4.2.4.3. Quality assessment

I employed the Agency for Healthcare Research and Quality methodology checklist for assessing the quality of the cross-sectional studies [144]; it was the only method used for all included studies in this review. This tool is composed of 11 questions about the comprehensiveness/appropriateness of the methodology of the included studies. Each question could be assessed as ‘yes’, ‘no’ or ‘unclear’. Based on this, each ‘yes’ question was given a score of one, and each ‘no’ question was given a score of zero. ‘Unclear’ questions were also given a score of zero. The maximum achievable score was eleven. Further details on the quality assessment tool used in this systematic review are available in Appendix 3.

4.3 Results

The search process of the three databases generated a total of 571 articles. After the de-duplication of the identified articles, a total of 521 articles remained for screening. The screening step excluded a total of 502 articles that were deemed irrelevant based on the inclusion and exclusion criteria from the title and the abstract. After reading the full text, the remaining 19 articles were assessed according to the inclusion/exclusion criteria. In the eligibility step, a total of five articles were excluded for the following reasons: abstract (n = 1) or conference proceeding (n = 4). A total of 14 articles met the inclusion criteria and were included in the systematic review. Through a narrative synthesis of the determinants and the drivers, all reported determinants or drivers of SSB consumption were presented and grouped by combining similar exposures according to the levels of the socioecological model. The socioecological model [145, 146] was employed because it is the most comprehensive theoretical model that
covers all determinants and drivers (individual, social and environmental determinants) [147]. It is worth noting that it is often not possible to categorise some factors as purely individual or social; there is often an overlap. For example, it is difficult to determine if being lonely or having many friends are characteristics under the social or the individual domain. The mentioned characteristics are individual characteristics; however, what drives these characteristics might be under the social context. Given that all included studies are cross-sectional surveys with questions that were predetermined before the study was conducted, the information is scarce, and it is not clearly defined if these are individual characteristics or if they have a social context.

4.3.1. Description of studies
Each of the 14 included articles was quantitative in nature (13 cross-sectional questionnaires and 1 interview survey), with participants aged from 6–35 years. Most of the studies were conducted in Saudi Arabia (12 of 14), and two studies were conducted in Kuwait. Nine of the 14 were school-based studies; three were conducted at universities, one in a gymnasium and one in a nutrition centre. Most included studies did not define the type of SSBs that were being investigated; only four aimed to investigate energy drinks. A summary of the included studies is provided in Table 4.1.
<table>
<thead>
<tr>
<th>Author, country (Year)</th>
<th>Measure used to evaluate consumption</th>
<th>Study population*</th>
<th>Inclusion criteria</th>
<th>Study aim/objectives</th>
<th>Product investigated</th>
<th>Main findings: determinants and drivers of consumption</th>
</tr>
</thead>
</table>
| Honkala et al. Kuwait (2006) [148] | Self-administrated questionnaire | 2,312 school children 5th–7th grade (male and female) aged between 11–13 | Children attending government intermediate schools | To assess how frequently school children report consuming sweets, soft drinks and cakes and whether life and school satisfaction and self-esteem factors are associated with consumption | Sugar products including soft drinks | Determinants  
  a. Being Kuwaiti  
  b. Family financially well-off  
  c. Having friends, being self-confident  
Drivers  
• Need to stay awake, improve performance, enjoy taste |
| Alshosha n et al. Saudi Arabia. | Self-administrated questionnaires and 24-hour food recall | 112 female participants attending private nutrition medical centre | Saudi non-pregnant women | To explore knowledge, attitudes and practices toward caffeine and nutrition as predictors of caffeine consumption | Caffeine beverages including soft drinks | Drivers  
• Perceived as hard to limit  
• Perceived safe |
<table>
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<tr>
<th>Author, country (Year)</th>
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<th>Product investigated</th>
<th>Main findings: determinants and drivers of consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2007) [149]</td>
<td>mean age 26.0 (SD 1.85)</td>
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</table>
| Collison et al. Saudi Arabia (2010) [150] | Self-reported questionnaire 9,433 school children aged 10–19 (male and female) | Not mentioned | To examine the dietary patterns that may affect anthropological factors of male and female Saudi school students and to determine the prevalence of any nutritional trends that may impact health outcomes in the future | SSBs and added sugar in hot beverages | Determinants  
• Gender (males)  
• BMI (obese)  
• Poor dietary choices  
• Poor sleep time |
| Al-Hazzaa et al. Saudi Arabia | Self-reported questionnaire 2,808 adolescents in secondary schools (male and female) | All students in the selected classes who were free of any | To report on the prevalence of physical activity, sedentary behaviours and dietary habits among Saudi adolescents and to examine the interrelationships among these SSBs including soft beverages, doughnuts, cakes, sweets, chocolate and energy drinks. | | Determinants  
• Gender (males)  
• Age (age 14 was the lowest for males, then consumption increases) |
<table>
<thead>
<tr>
<th>Author, country (Year)</th>
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<th>Study aim/objectives</th>
<th>Product investigated</th>
<th>Main findings: determinants and drivers of consumption</th>
</tr>
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<tr>
<td>(2011) [151]</td>
<td>mean ages: males 16.7 (SD 1.1), females 16.5 (SD 1.1)</td>
<td>physical health problems</td>
<td>factors using representative samples drawn from three major cities in Saudi Arabia</td>
<td>with no significant effect of age thereafter) - longer screen time - poor dietary habits</td>
<td></td>
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<tr>
<td>Alsunni and Badar Saudi Arabia (2011) [152]</td>
<td>Self-reported questionnaires</td>
<td>412 University students (male and female) mean ages: males 21.4 (SD 2.0), females 21.2 (SD 2.1)</td>
<td>Not mentioned</td>
<td>To determine consumption patterns of energy drinks as well as perceived benefits and side effects</td>
<td>Energy drinks</td>
<td>Determinants - Gender (males) Drivers - Spending time with friends - Perceived benefits Reasons for use: hospitality, to keep awake, for better driving, for better performance in sports, nice taste, as an</td>
</tr>
<tr>
<td>Author, country (Year)</td>
<td>Measure used to evaluate consumption</td>
<td>Study population*</td>
<td>Inclusion criteria</td>
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<tr>
<td>Honkala et al. Kuwait (2012) [153]</td>
<td>Self-reported questionnaire</td>
<td>1,292 School children 5th–7th graders (male and female) mean age 13 (SD 1.0)</td>
<td>Not mentioned</td>
<td>To determine levels of daily consumption, possible associated background factors and association with other health-related habits</td>
<td>Sugary Drinks (soft drinks), sweets and cakes/pastries</td>
<td>experiment and to quench thirst.</td>
</tr>
</tbody>
</table>
| Al-Hazzaa et al. Saudi Arabia | Self-reported questionnaire | 2,906 adolescents in several secondary classes | All students in the selected classes | To evaluate the associations between obesity measures and several lifestyle factors, including physical activity, | Sugar-sweetened drinks (including soft drinks), doughnuts/cakes, sweets, | Determinants  
• Nationality (Kuwaiti)  
• Rich, lower education family  
• tried smoking, longer screen time, poor sleep time |
<table>
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<tr>
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<th>Product investigated</th>
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<tr>
<td>(2012) [154]</td>
<td></td>
<td>Schools (male and female) mean ages: males 16.7 (SD 1.1), females 16.5 (SD 1.1)</td>
<td>sedentary behaviours and dietary habits</td>
<td>chocolates and energy drinks</td>
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</table>
| Musaiger and Zagaoog Saudi Arabia (2013) [155] | Self-reported questionnaires distributed to students in classes and explained to them by a qualified nutritionist | 1,061 school children aged 12–19 years (male and female) | Not mentioned | To explore the knowledge, attitudes and intake of energy drinks among adolescents | Energy drinks | Drivers  
- Taste and flavour  
- The perception of need to provide energy  
- Perceived as reasonably priced  
- Advertisements |
<table>
<thead>
<tr>
<th>Author, country (Year)</th>
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<th>Study aim/objectives</th>
<th>Product investigated</th>
<th>Main findings: determinants and drivers of consumption</th>
</tr>
</thead>
</table>
| Aluqman y et al. Saudi Arabia (2013) [156] | Interview questionnaire | 600 Secondary school students (females) mean age 17.0 (SD 1.0) | Not mentioned | To explore the prevalence of consumption, pattern of use and knowledge about energy drinks | Energy drinks | Drivers  
- To increase vitality and alertness  
- Consumption levels of close family and friends |
| Al- Hazzaa et al. Saudi Arabia (2014) [157] | Self-reported questionnaire | 2,886 secondary school students (male and female) mean ages: males 16.5 (SD 1.0), females 16.8 (SD 1.1) | Students without any major health condition | To explore the associations of dietary habits with physical activity and screen time relative to gender | Sugar-sweetened drinks including soft drinks and energy drinks | Determinants:  
- Gender (males)  
- Physically active  
- Longer screen time  
- Science and prep faculty |
<table>
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<tr>
<th>Author, country (Year)</th>
<th>Measure used to evaluate consumption</th>
<th>Study population*</th>
<th>Inclusion criteria</th>
<th>Study aim/objectives</th>
<th>Product investigated</th>
<th>Main findings: determinants and drivers of consumption</th>
</tr>
</thead>
</table>
| Murad and Rafeeq Saudi Arabia (2016) [158] | Self-reported questionnaire | 548 university students (male and female) mean age is 19.9 (SD 2.1) | Not mentioned | To collect consumption data of energy drinks, identify potential problems, assess level of awareness of contents, benefits and harm and assess possible behavioural changes after the study | Energy drinks | Determinant:  
• spending time with friends  
Driver:  
• perceived benefit and reasons, enjoy taste |
| Al Nozha and Elshatara t Saudi Arabia (2017)[159] | Electronic self-administered questionnaire | 316 gym users aged 18–35 years (male) | Participant s who had used the gym for ≥6 months and were able to speak, write and understand | To identify the knowledge, awareness, beliefs and attitudes of gym users about the negative health consequences of using performance-enhancing agents (PEAs) and the relationship between these factors and use of these agents | PEAs (including energy drinks) | Drivers:  
• No risk in consuming  
• need to achieve goals  
• price reasonable  
• ease of access |
<table>
<thead>
<tr>
<th>Author, country (Year)</th>
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<th>Product investigated</th>
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</tr>
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<tbody>
<tr>
<td>Alsubaie Saudi Arabia. (2017) [160]</td>
<td>Self-reported questionnaire</td>
<td>725 school children aged 7–12 years (male and female)</td>
<td>Not mentioned</td>
<td>To assess the consumption and correlates of sweets, carbonated beverages and energy drinks.</td>
<td>Sweets, carbonated beverages and energy drinks.</td>
<td>Determinants: - Age, BMI and gender did not significantly affect SSB consumption</td>
</tr>
<tr>
<td>Author, country (Year)</td>
<td>Measure used to evaluate consumption</td>
<td>Study population*</td>
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<tr>
<td>Al Otaibi and Kamel Saudi Arabia (2017) [161]</td>
<td>Self-reported questionnaire</td>
<td>414 university students (male and female) mean age 21.2 (SD 2.2)</td>
<td>Disease-free students and non-pregnant females</td>
<td>To identify health-risk behaviours associated with SSB consumption</td>
<td>Sugar-sweetened beverage</td>
<td>Determinants • gender (males) • poor dietary habits and sleep time</td>
</tr>
</tbody>
</table>

* In the Gulf region, secondary school students in 10th–12th grade are 16–18 years old.
4.3.2. Determinants and drivers of SSB consumption

4.3.2.1. Individual domain

One of the main themes generated from the review is the individual drivers for SSB consumption. Mechí et al. [162] claimed that individual factors (e.g. personal characteristics and experiences) may affect behaviour. The effect of experiences is influenced by the perceived benefits and the related activity, both of which might lead to habit formation. The main individual determinants of SSB consumption that emerged through this review are summarised as follows:

a) Gender, age and body mass index

Five studies reported on the relationship between gender and SSB consumption, all of which were conducted in Saudi Arabia, and agreed that males appear to consume more SSBs than females [150-152, 161]. Three of the five studies [150, 151, 154] were conducted among school students and the remaining two [152, 161] among undergraduate university students.

Two studies reported on the association between age and SSB consumption [151, 160]. Both studies reported no significant differences relative to age and intake of SSBs. However, Al Hazzaa et al. [151] demonstrated that SSB consumption increases after the age of 14 among male participants.

The association with BMI was reported in three studies [150, 154, 160] with inconsistent results. All three studies were among school children. The first study, conducted by Al-Hazzaa et al. [154], reported that obese males and females were more likely to have a lower intake of all sugary products, including SSBs, doughnuts, cakes and sweets (not just SSBs) compared with their non-obese counterparts. The second study, conducted by Alsubaie et al. [160], reported that the consumption of SSBs did not significantly differ by BMI. However, the third study, by Collison et al. [150] reported a positive correlation
between BMI and SSB consumption in boys but not in girls (r = 0.10 and 0.09, respectively, p < 0.001).

b) Nationality
The association between nationality and SSB consumption was reported in two studies [148, 153]. Both studies were conducted in Kuwait among 11–13-year-old school children. Both studies reported that Kuwaiti children were more often frequent consumers of SSBs than non-Kuwaiti children, although the nationalities of the non-Kuwaiti children were not mentioned.

c) Financial status of the family and their education
The same studies that explored the association with nationality also reported on the relationship with the family’s financial status [148, 153]. Both studies reported that good financial status was associated with greater SSB consumption, although income categorisation was not defined. It was also not clear whether this was an independent association or if it was associated with Kuwaiti nationality.

One of these studies reported that there was an association between the education level of the parents and the SSB consumption of children. Honkala et al. [153] reported that parental lower educational levels (non-university degrees) were associated with higher levels of SSB consumption.

d) Knowledge
The influence of subject knowledge on SSB consumption was reported in three studies [149, 158, 159]. The field of the study and knowledge deficit of the participants were factors associated with increased SSB consumption. The effect of field of study on SSB consumption was reported in one study in Saudi Arabia, conducted by Murad and Rafeeq [158]. This study was conducted on university students in Rabigh (King Abdulaziz University) and reported that students in science and preparatory faculty students consumed more energy drinks compared with the other students (p < 0.001).
A knowledge deficit and the belief that SSBs are safe and without associated risk were reported in two studies [149, 159]. The first study, by Al Nozha and Elshatarat [159], reported that the consumption of PEAs, including energy drinks, may be influenced by study participants’ beliefs that there is no risk to their health in consuming these products. Similar findings were reported by Alshoshan et al. [149]. Their study reported that caffeine-containing product consumption, including ‘Pepsi’, was perceived as safe. This perception was positively associated with participants’ level of consumption.

**e) Perceptions of sugar-sweetened beverages**

Six studies reported that there is an association between the level of SSB consumption and the attributable perceptions of SSBs [149, 152, 155, 156, 158, 159]. All studies were conducted in Saudi Arabia: two were among school children [155, 156], two among undergraduate university students [152, 158], one among participants attending a private nutrition clinic [149] and one among gym users [159].

The association between the perceived needs and benefits of using energy drinks and the level of consumption was reported in two of the studies [158, 159]. Murad and Rafeeq [158] observed a significant moderate correlation (r = 0.39, p < 0.001) between the perceived benefits and reasons for consuming energy drinks (e.g. studying, long-distance driving, improving performance and quenching thirst). This study also reported that the most common reasons for male participants to consume energy drinks are studying and driving; for female students, the most common reasons were enjoyment and studying. Similar findings were reported by Al Nozha and Elshatarat [159]. This study reported that the perceived need to achieve goals in enhancing sport performance and bodybuilding and to enhance body image and body performance affect the consumption of these products.
The list of perceived benefits has also been explored in some studies. Aluqmont et al. [156] reported that 25.6% of students used energy drinks to increase vitality, and 20.8% used them to be alert. Alsunni and Badar [148] reported that the most common perceived benefits for both genders were the ability to stay awake longer, to improve physical and mental performance and to increase alertness.

The influence of SSB taste and the feeling of enjoyment upon consumption were reported in two studies [148, 158]. Alsunni and Badar [148] argued that the main drivers for SSB consumption among university students were the taste and the feeling of enjoyment. Another study conducted among male and female university students from Jeddah city, by Murad and Rafeeq [158], reported that the main reason for drinking SSBs was the enjoyment of the taste. Enjoying SSBs is one of the factors that will lead to frequent consumption [163].

Feeling the need for SSB consumption and the difficulty in suppressing that need were reported in one study conducted by Alshoshan et al. [149]. This study indicated that consuming beverages containing caffeine, including Pepsi, was perceived among participants as difficult to stop. The study also reported that having this attitude was positively associated with increased levels of consumption.

Two studies from Saudi Arabia reported that the price of energy drinks was perceived to be reasonable [155, 159]. Musaiger and Zagzoog [155] revealed that the majority of adolescents (54% male and 68% female) believed the price of energy drinks was reasonable. A similar finding was reported in another study conducted by Alnozha and Elshatarat [159] among gymnasium users. It is worth noting that both studies were conducted before the tax implementation in Saudi Arabia on carbonated and energy drinks.
f) Associated behaviour

Different behaviours were associated with increased SSB consumption in the included studies (i.e. smoking, watching television or playing video games, increased physical activity, poor dietary habits and late bedtime or fewer sleeping hours).

The relationship between smoking and SSB consumption was reported in one study in Kuwait by Honkala et al. [153]; this study was conducted among 13-year-old school children who were asked if they had ‘ever tried smoking’. The study reported that answering yes to ‘ever tried smoking’ was positively associated with the daily consumption of SSBs (p < 0.001).

The association between screen time (such as television watching, computer use and playing video games) and SSB consumption level was reported in three studies [151, 153, 157]. All studies were conducted among school children; two were from Saudi Arabia [151, 157], and one was from Kuwait [153]. All three reported a positive association between screen time and the level of SSB consumption.

The first study, by Al-Hazzaa et al. [151], reported that more than two hours a day of screen time was significantly positively associated with higher SSB consumption and higher energy drink intake among both sexes. Similar findings were reported by another study conducted in Saudi Arabia [157]; longer screen time (above 3 hours per day) was significantly associated with higher consumption of SSBs (odds ratio [OR]: 1.51; 95% CI: 1.20–1.90) and energy drinks (OR: 1.69; 95% CI: 1.14–2.49), compared with those who had less screen time. The Kuwaiti study by Honkala et al. (2012) [153] reported that television watching (≥4 hours per day; p = 0.016) was positively associated with the daily consumption of soft drinks when compared with those who watched less than four hours per day.
The association between the level of physical activity and SSB consumption was reported in one study by Al-Hazzaa et al. [157]. This study indicated that participants with a higher level of physical activity were significantly associated with a higher level of consumption of SSBs when compared with participants with a lower physical activity level (adjusted OR = 1.44; 95% CI: 1.08–1.93).

The association between dietary habits (e.g. skipping breakfast, eating fast food and eating snacks with high energy density) and the consumption of SSBs was reported in three studies [150, 151, 161]. All agreed that having these dietary habits was positively associated with higher SSB consumption.

The first study, conducted by Collison et al. [150], reported that SSB consumption was positively associated with poor dietary choices among school children. Additionally, the consumption of fast food, savoury snacks, iced desserts and sugar all correlated with higher SSB consumption. Similar findings were reported in a study conducted among school children by Al-Hazzaa et al. [151]; fast food consumption exhibited a high positive correlation with increased SSB and energy drink consumption. The third study, by Al-Otaibi and Kamel [161], was conducted among undergraduate students. They reported that when energy drinks were consumed once or more per week, there was an association with skipping breakfast and eating fast food.

The association between daily sleep hours and the consumption of SSBs was reported in three studies [150, 153, 161]. All studies reported that a late bedtime, shorter daily sleep hours and longer daytime sleep were associated with higher SSB consumption.

The first study, by Collison et al. [150], reported that daytime sleep (≥1 hours) correlated positively with SSB consumption among school children in Saudi Arabia. Another study, by Honkala et al. [153], among school children in Kuwait, reported that a late bedtime (around/after midnight) was positively associated with the daily consumption of SSBs (p = 0.013). The third study, by
Al Otaibi and Kamel [161], reported that the consumption of energy drinks among male undergraduate students in Saudi Arabia was associated with lower daily sleep hours (less than seven hours per day).

\textit{g) Life satisfaction}

The association between life satisfaction variables (i.e. feeling lonely, happy or unhappy) and SSB consumption was reported in one study conducted by Honkala et al. [148] among school children in Kuwait. This study reported that the consumption of SSBs was associated with life satisfaction variables. Having more than three close friends and enjoying being with classmates were also associated with a higher level of consumption. This study also reported that children who always felt self-confident, were accepted by their peers or thought of themselves as good looking also consumed SSBs more frequently. However, the children who felt nervous daily or felt they were too thin also seemed more likely to be frequent consumers of these products.

\textbf{4.3.2.2. Social domain}

The second theme generated from this systematic review is the social domain. The only factors in this domain are peer influence and family influence.

The association between peer and family influence and SSB consumption was reported in three studies [152, 156, 158]. All three studies were conducted in Saudi Arabia among secondary or undergraduate students. The first study, by Alsunni and Badar [152], reported that spending time with friends was the most important reason for high levels of SSB consumption and that friends tend to inspire each other to use SSBs for the first time. Another study, conducted by Murad and Rafeeq [158], reported similar findings; friends inspire each other to first use SSBs.

The third study, by Aluqmany \textit{et al.} [156], reported that the SSB consumption levels of close friends and family members have a positive influence on the level of SSB consumption.
4.3.2.3. Environmental domain

The effect of the environment on SSB consumption is the third main theme to emerge from this systematic review. This includes the areas where people live, their accessibility to SSBs and industry marketing strategies. The main environmental determinants are as follows:

a) Ease of access

The accessibility of SSBs at home, the workplace and in social settings was perceived as a significant factor in the increased consumption of SSBs [164]. One study by Al Nozha and Elshatarat [159], among gym users aged 18–35 years in Saudi Arabia, reported that easy access to PEAs (including energy drinks) is a factor that boosts the consumption of this type of product. The study did not mention how participants accessed the PEAs.

b) Product marketing

The exposure to advertisements and other forms of marketing activities are factors associated with the consumption of SSBs [165, 166]. Only one study in the region reported on the role of advertisements in SSB consumption. [155] This study, conducted by Musaiger and Zagaog [155], did not mention the effect on the consumption of SSBs among school children aged 12–19 years in Saudi Arabia; it only concluded that advertising is one of the main sources of information and stimulus for consuming SSBs.

4.4. Discussion

This review highlights that SSB consumption in people from the GCC is associated with factors operating at individual, social and environmental domains, all of which are compatible with the socioecological model [145, 146]. Most determinants identified in this review were under the individual domain; one was under the social domain, and two were under the environmental domain.
The individual domain determinants and the socio-demographic characteristics, including gender (males), the SES of parents (good financial status, no university degree) and nationalities (Kuwaiti versus non-Kuwaiti), were positively associated with SSB consumption level. However, the association between age and consumption level was not consistent. These contradictory results may have been because the studies were presenting two different age groups. In the first study, the lowest intake was among 14-year-olds, after which it increased. In the second study, the participants were all under 14, so an age relationship was not determined. If there was an association with age among the 7–12-year-old children, it might have been too small to pick up in the study.

Conflicting findings were reported regarding the association with BMI. The first study reported a higher consumption with higher BMI; the second study reported lower consumption with higher BMI, and the third study reported a lack of association. While it is expected that higher BMI may be associated with higher consumption, it is unclear why one study reported the reverse. It may be that obese participants, or their parents, were attempting to reduce the consumption of sugary and unhealthy products. It may also be that a socially desirable response was provided by those participants. The third study reported no evidence for an association; this may have been due to a small sample size and the lack of ability to detect an association if one existed.

Some behaviours were positively associated with SSB consumption levels (e.g. smoking, longer screen time, poor sleep habits, poor dietary choices and high physical activity). The extent to which these associations are independent of each other or due to confounding, however, was not examined in the studies and remains unclear.

Different attributable perceptions affecting SSB consumption were reported in the included studies, such as a perceived need to consume, certain benefits attributed to SSBs, safety, low cost and the difficulty in stopping consumption. The included studies also reported several drivers of consumption, such as
enhancing mental and physical performance, staying awake and alert and enjoying the taste. The degree of life satisfaction among school children was also associated with the consumption level.

These individual domain determinants and drivers are in line with the findings reported from studies conducted in non-GCC countries and highlight the importance of individual characteristics and perceptions in the variation of consumption behaviour [167-176].

While evidence from other regions in the world emphasises the importance of socio-environmental determinants and drivers [177-179], these factors were not fully investigated in the GCC studies. Within the social domain, peer and family influence (including stimulation for the first use) and peer and family consumption behaviours were associated with increased consumption of SSBs. Within the environmental domain, the ease of SSB accessibility was positively associated with consumption. However, there was no mention in these studies of where the SSBs were accessed or the role that availability and accessibility in or outside of the home, workplace, university/school or the neighbourhood played. The role of marketing and advertisements of SSBs was reported as a primary source of information and stimulus for SSB consumption. However, none of the articles included in this review reported on the type of advertisements or marketing strategies that may have influenced consumption.

4.5. Strengths, limitations and risk of bias in the included studies
This is the first review to report on the determinants of and drivers for SSB consumption among people living in the Gulf countries without restrictions on age, gender or population. The review, therefore, forms the basis for current knowledge about SSB consumption in that region.

However, there are several limitations relating to this evidence and the nature of the data presented in the included studies. First, the quality of the included studies was weak to moderate, achieving quality assessment measures that
ranged between 2 and 7 (the possible maximum score was 11). All included studies had a sample size of 300 or more participants except one (sample size of 112). The source of information was clearly defined in all studies, as was the information on whether participants were consecutively enrolled. The inclusion and exclusion criteria were clearly defined in only four of the 14 studies. In addition, the time period over which the participants were enrolled in the studies was only included in 8 of the 14.

Second, only three studies summarised the participants’ response rates and the completeness of the data collection. None indicated (if applicable) whether the evaluators of subjective components of the study were masked to the other aspects of the status of the participants. None of the studies described any assessments undertaken for quality assurance purposes, how confounding was assessed and/or controlled or how missing data were handled in the analysis. Further details about the quality assessment for the included studies are given in Appendix 4.

Third, all included studies were cross-sectional surveys that did not provide an in-depth understanding of the determinants of SSB consumption, given that the questions were already predetermined by the investigators. Gelo et al. [180] argued that quantitative studies utilise an inadequate definition of measurement, considering that measurement is simply the assignment of numbers to objects and events according to specific rules. Therefore, cross-sectional surveys cannot empirically investigate the determinants of SSB consumption.

Finally, most studies were among participants aged 6–35 years. In fact, most studies were among school children and university students. It is difficult, therefore, to generalise the findings to the entire GCC population.

In terms of limitations of the review, this review only included studies published in English. All scientific and indexed journals in the region are only publishing English version articles. For promotion purposes, academics in the region are
only publishing their articles in indexed journals. For this reason, only English published articles were included. Furthermore, not including review articles, letters to editors and commentaries was another limitation in this review (they were not included in this review because they were not original studies). This review did not include conference/meeting abstracts or proceedings, and protocols were also excluded from this review because they were not extensively peer-reviewed and lacked important methodological or results information. In addition, there was a fear of duplication of these conference abstracts in other scientific journals.

4.6. Chapter summary and conclusion
This chapter highlighted the determinants and drivers of SSB consumption in the GCC. However, information was sparse due to the low to medium quality of the published studies, their cross-sectional nature and the difficulty in generalising their findings to the GCC population. Finally, all included studies were conducted and published before the introduction of SSB taxation in the region. Therefore, it is unclear what might currently shape the choices made by consumers. The next chapter presents the study design of this PhD project.
Chapter five: Study methodology

5.1. Introduction

In the previous chapter, the published studies that demonstrate what influences the consumption of SSBs in the Gulf region were presented. The studies in the systematic review showed that the consumption of SSBs was influenced by three main domains: individual, social and environmental. However, some methodological weaknesses and gaps were noted. The first gap was that no study investigated the drivers of consumption after the taxation was implemented on carbonated and energy drinks. Since all studies were conducted before the tax implementation, the subsequent change in SSB prices could have shifted the general public's attitudes towards the drivers. In addition, no study investigated the effect of the tax on carbonated and energy drinks on consumption and how the industry reacted to influence SSB consumption after the taxation was implemented. Finally, all studies conducted in the GCC region were quantitative in nature; this may not allow for a meaningful theoretical interpretation because of the ambiguity of variable information and the fact that behaviour attributes were only measured quantitatively [181]. Gelo et al. [180] argued that quantitative studies utilise an inadequate definition of measurement, considering that measurement is simply the assignment of numbers to objects and events according to specific rules. Therefore, future studies that utilise the qualitative approach are needed to determine the factors that drive the consumption of SSBs among adults; they are also needed to determine the effect of taxation on SSB consumption and the attitudes of the public towards the tax.

This chapter presents the study paradigm, the philosophical assumptions within qualitative research that drive that approach and the theoretical frameworks employed in this thesis. In addition, the main strengths and weaknesses of several theoretical approaches are presented as a process to select an appropriate framework to explore whether the SSB tax imposed by the Saudi government addresses the factors that drive SSB consumption.
5.2. Research paradigm

A paradigm is the basic design that organises the research overview [147, 182]. It is a set of philosophical assumptions that guide the process of the research by how data should be collected and analysed [147, 182]. A qualitative case study approach was utilised for this research based on the philosophical assumptions that were applied in the study. These assumptions were applied to the research by determining the researcher's view of the reality (ontology), how the researcher knows the reality (epistemology), the value stance taken by the researcher (axiology) and the procedure taken by the researcher in the study (methodology) [182]. The ontological issue of the study refers to the nature of reality and its characteristics. Within qualitative studies, the reality is varied and reported as themes in the study findings [182, 183]. Researchers who employ a qualitative approach use the epistemological assumption, in which the researchers try to get closer to the participants and the context being studied [182-184]. Consequently, it becomes important to conduct the study in the field where the participants live and work (their context) to understand what the participants are saying [182]. The evidence generated is based on the subjective experience of the people. All researchers bring their values with them to the study. However, qualitative researchers declare their values in the research by admitting their position on the research question; this is one of the qualitative research characteristics [182]. By reporting their 'positionality' in relation to the context and setting of the research, the qualitative researcher admits that their values drive the nature of the information gathered [182, 184]. Among the aspects included in the researcher's positionality are their social position, their personal experiences and their political and professional beliefs [182].

Within social and behavioural science (the main core of this thesis), the dominant paradigm that supports most theories and research is positivism [182]. The central feature of positivism is based on the theory being tested through empirical deduction methods and through the systematic observation of phenomena for verification or confirmation [182]. Part of positivism is
postpositivism; this recognises that all causes and effects are driven by multiple perspectives from participants rather than believing in a single reality [182]. Postpositivists are known for being logical, reductionist, empirical and led by cause and effect; they base their reality on prior theories [182]. This thesis utilises a belief system grounded in postpositivism by employing a social science theoretical lens to understand why the Saudi government prioritised taxes on SSBs and the possible reasons for the slowness in enforcing other food obesity-related policies.

Another dominant paradigm that emerged within social and behavioural science is interpretivist [182]. This paradigm is employed in this thesis, in addition to postpositivism, to understand the drivers of SSB consumption among the Saudi population and their attitudes towards the implemented taxation. Within this paradigm, researchers attempt to understand individuals and the context in which they live [182]. Subjective meanings are developed from individual experiences towards certain objects [183]. They are formed through numerous interactions and through historical and cultural norms that operate in individuals' lives. Rather than starting with a prior thesis (as in postpositivism), examinations are generated, and patterns are developed inductively [182]. Supporters of this paradigm argue that before a study starts, organisations and the explanation of any incidents should be exhibited by the process of exploration rather than fitted within designated conceptual categories [182]. Within this paradigm, data are collected by methods such as standardised questionnaires. Predetermined response categories have a limited place in this paradigm. This paradigm has been frequently displayed within the social and behavioural sciences to answer specific research questions and shift the focus from the positivist paradigm [147, 182].

The research paradigm acts as an approach for the research that constitutes a theory, application or instrument; it also acts as a model for solving a problem and for providing coherent scientific research [182]. In other words, the research paradigm provides a roadmap of how the research in social and
behavioural science should be conducted [147]. Consequently, using the appropriate paradigm will give clear insight on how to answer the research question and the overall procedure to be considered [147]. This helps to recognise and construct an appropriate research design. Based on the research paradigms of this thesis, a qualitative case study approach was utilised to answer the aim of this PhD project through the socioecological framework.

5.3. Qualitative approach
Qualitative methods in research rely on textual data to understand human actions within a context; this is different from quantitative methods that rely on numerical data for a description or to test a predominant hypothesis [182, 183, 185]. Qualitative research emphasises people's experiences and is suited to determine people's attitudes, perceptions, facilitators and barriers regarding the place or events being studied; connecting these meanings allows for the determination of people's understanding of the world around them [183]. Qualitative methods are flexible and innovative and allow the researcher to capture the interrelations of complicated issues (e.g. policy processes and behavioural determinants of health) and produce discursive descriptions [185].

However, the qualitative research approach has been widely criticised for being subjective and for being exposed to a high level of bias in data collection, analysis and interpretation [182, 185]. One of the most robust approaches to enhance qualitative research and dilute the level of subjectivity and bias is to be explicit in the way that data have been collected and analysed, along with the use of triangulation [182, 185]. Triangulation includes the utilisation of different sources of data and several disciplinary perspectives to understand the case rigorously and to evaluate the integrity drawn from one source of data to another [186]. In this thesis, several forms of data were combined, as follows:
1- In-depth interviews with the stakeholders involved in the process of SSB taxation;
2- Document reviews to identify the facilitators of the SSB tax and the barriers to other possible instruments to reduce the consumption of SSBs;
3- In-depth interviews and focus groups with a sample of the Saudi population to identify the determinants of SSB consumption;
4- Nonparticipant observation to identify the environmental factors that influence SSB consumption.

Detailed information on the methods utilised in this thesis is presented in the next chapter; in addition, the reasons for choosing each form of data collection tool and the challenges and opportunities of those tools are presented and discussed.

5.4. Case study approach

Over the last couple of decades, attention has been paid to the case study approach due to its ability to explain political and social phenomena within a contextual condition [187]. There are several definitions [187, 188] for this approach, all of which share the same following concepts:

(1) It is suitable for the exploration of a complicated situation where the problem is not well defined and where competing and different interpretations exist;

(2) The explored case or phenomena should be bounded by time and place;

(3) The explored case demands multiple sources of evidence and data for the empirical investigation;

(4) It can explain the behaviour with a political and economic emphasis.

The case study approach has been widely criticised because of its unmanageability and generalisability [188]. Regarding the unmanageability,
Scott and Russel [188] argued that researchers should instead keep a clear form of analytical approach at the centre of their studies to manage the collected data (this is presented in Section 5.5). Although case studies infrequently rely on a representative sample, this approach allows researchers to more subtly observe social and economic events and their impacts [187]. One of the advantages of the case study approach, like many other approaches in qualitative research, is that it allows the researcher to redefine the case if the characteristics were not clearly defined at the beginning of the research period [182, 187]. Based on this issue, the researcher could also redefine the methods and theories used to investigate the case. The process of changing the case occurred in this thesis; the question of this thesis was changed several times to specify the knowledge that needed to be explored. At the beginning of this PhD project, the main aim was to identify the political reasons for imposing the tax on carbonated and energy drinks. However, more was needed to grasp the big picture, particularly because Saudi Arabia is an absolute monarchy system with no political presentation from any party or democracy. Government officials present their perceptions and frame the problems and the solutions from their perspective. Adding another view to the project (the perceptions and attitudes of the population) was necessary to obtain a broader picture of how people frame the problem and the solution.

Regarding the generalisability criticism (i.e. the ability of the study results to be observed in other contexts [187]), scholars are reluctant to generalise the results from a single case study because the contexts of all cases are different. Expanding the number of cases explored within the same study could advance the research level and may lead to the generalisability of the study [188]. Researchers are required to select representative cases to be investigated within the same project [187, 189]. Social science asserts that researchers must use the multiple case study approach and select the included cases purposefully from different sites or from different programmes within a single site to explore the issue [182]. Yin [187] suggested that the multiple case study approach requires the researcher to replicate the same procedure within each
case. Walt and Gilson [189] also suggested that investigating a similar issue within the same context could generate a more concrete proposition on the cases selected to be investigated.

The idea of comparison was considered for this thesis in the exploration of whether the SSB tax imposed by the Saudi government addresses the factors that drive SSB consumption (the aim of this PhD project). Comparison would diversify the results of this study and would allow for the duplication of the results in other similar contexts. Two comparative case studies were utilised. The first comparison was aimed at understanding the political reasons for the Saudi government to impose taxation and a scoping review of the barriers to the implementation of other food obesity-related policies. The second comparison aimed to understand the drivers of SSB consumption among low-, mid- and high-socioeconomic groups of the Saudi population and their attitudes towards the imposed taxes on SSBs.

The next section in this chapter discusses the theoretical models that guide data collection and analysis, as suggested by Scott and Russel [188].

5.5. Theoretical model
A theory is a set of concepts, definitions and prepositions that systematically interrelate to explore and predict events or situations [147, 190]. Accordingly, theories can be employed to understand the determinants of behaviour and then used to develop and design interventions for changing the behaviour [191]. Theories can be used to determine why people are not following the advice of public health scholars or to pinpoint what needs to be identified before developing and organising interventions. Consequently, theories define behaviours and propose methods to accomplish behaviour change [147]. Explanatory theories help to describe and identify why the problem exists [147]. They also help to predict individual behaviours within a defined context [147]. In addition, they guide change by defining the modifiable risk factor for
the behaviour. The determinants of health behaviours can be explained by using theories; theories can explicitly describe the frameworks needed to expand the understanding of the behaviour being studied [190, 192]. Understanding the underlying factors that influence behaviours could lead to developing interventions that change undesired behaviours [147, 192]. Therefore, theories that may explain and predict the underlying factors of behaviours could lead to effective interventions, even when they are not always as useful as they were originally intended to be [193].

5.5.1. Behaviour change theories
Theory-based studies have shown more power in understanding the determinants of behaviour than non-theory-based ones [147, 190, 194]. As part of these theories, there are behaviour change theories that have been shown as inherently important in determining the factors that influence behaviour [194, 195]. Behaviour change theories are used in psychology, anthropology, sociology and economics. Four behaviour change theories are most commonly used in the literature [196]: the theory of planned behaviour (TPB), the transtheoretical model of change (TTM), the social cognitive theory (SCT) and the information-motivation-behavioural-skills model (IMB). These four theories are part of the social cognition models (SCMs).

The SCMs focus on modifiable risk factors that are assumed to mediate the relationships between factors and health behaviours [192]. One important set of factors is the thoughts and feelings of individuals towards a particular behaviour; these are often referred to as health cognitions [193]. This set of feelings and attitudes that are assumed within the models combine in different ways to determine behaviour. Michie and West [197] argued that the SCMs are not fully comprehensive to understand behaviour and claimed that the COM-B model is one of the most comprehensive models to capture the broad spectrum of determinants that influence behaviour.
In the next section, the key concepts of the most common applied frameworks within the behaviour change theories (i.e. TPB, TTM, SCT, IMB and COM-B) are summarised.

5.5.1.1. Theory of Planned Behaviour

The TPB has been widely applied to the understanding of behaviours. It illustrates the factors that define an individual's decision to act on a particular behaviour [192] (see Figure 5.1). The TPB suggests that the essential determinants of behaviour are based on two components: the intention to engage in that behaviour and the perceived behavioural control over that behaviour. The intentions within the TPB express an individual motivation or conscious strategy or decision to devote effort to achieve the behaviour [192]. Perceived behavioural control (PBC) is an individual's probability that the implementation of the behaviour is within their control and confidence; this, in turn, allows the individual to achieve that desired behaviour [192].

![Figure 5.1: Theory of Planned Behaviour adapted from the Handbook of Behavioral Medicine [192].](image)

In the TPB, the intention is assumed to be defined by three constructs: attitudes, subjective norms and PBC [192]. An individual's attitudes towards the desired behaviour are the overall evaluations of the positivity or negativity of the behaviour [192]. Subjective norms are an individual's beliefs that are influenced by individual motivations to be involved in the desired behaviour...
PBC is considered to affect both intentions and behaviour because individuals rarely intend to do the desired behaviour if the individual cannot perform. On the other hand, believing that individuals can possibly succeed can enhance effort and maintain persistence, and this increases the chances that a successful performance will occur [192]. Attitudes are based on the perceived outcomes of behaviour [192] and on two components: how likely the outcome is to occur when an individual changes the behaviour and the evaluation of the outcome to see if it deserves the required changes. It is assumed that an individual mind will operate at a limited of consequences when considering a behaviour. A subjective norm is the belief in the approval or disapproval of others, with only a limited number of referents in mind, as to whether the individual should engage in a behaviour; it is also weighted by the motivation to acknowledge other beliefs regarding the change in behaviour [192]. PBC is based on the control beliefs required to perform the behaviour successfully (e.g. whether one has the necessary resources). PBC is weighted by the perceived importance of each facilitator or inhibitor to the desired behaviour [192]. These factors include both internal and external control factors [192]. The internal control factors include information, personal deficiencies, skills, abilities and emotions. The external control factors include opportunities, dependence on others and barriers. It is assumed that individuals consider a limited number of factors and weigh them against each other when considering behaviour [192].

The TPB has been successfully applied to understand a variety of behaviours. For example, in a meta-analysis of the TPB, Armitage and Conner [198] reported that attitude, subjective norms and PBC represented 39% of the variance in intention across 154 applications and both intentions, and PBC accounted for 27% of the variance in behaviour across 63 applications. Intentions appeared to be the most solid predictors of behaviour; attitudes were the strongest predictors of intentions. However, a systematic review did not observe strong evidence to verify the effectiveness of TPB-based interventions for dietary changes. Another systematic review conducted by
Oluka et al. [199] assessed questionnaire-employed TPB; they noticed that there were several mistakes reported in several variables and in the method of development of the questionnaires. Both reviews suggested that studies that utilise TPB did not show strong evidence to support behavioural changes (in particular, changes in dietary behaviours). In addition, methodological issues may have been present in their studies.

5.5.1.2. Transtheoretical Model of Change
The TTM or stages model assumes that psychological determinants may change over the stages of behaviour change [162, 195]. Behaviour determinants change in a sequential style, building from one stage to another. A significant assumption of this view of the stages is that different cognitions may be essential determinants at different stages in improving health behaviour [162, 195]. TTM is composed of the following five stages [192]:

1. Pre-contemplation (thinking about change);
2. Contemplation (aware of the need to change);
3. Preparation (intending to change shortly and taking action in preparation for a change);
4. Action (acting to change);
5. Maintenance (of the new behaviour).

The action stage is characterised by active efforts to change the behaviour; after six months of holding steady with the changed behaviour, the individual moves into the maintenance stage [192]. This stage is characterised by attempts to prevent relapse and to consolidate the newly acquired desired status. To move between stages, individuals apply specific open and hidden cognitive activities [162].

Although the TTM is widely applied in the health behaviour field, the evidence supporting it is modest [192]. Sutton [200] concluded that sequential movement through the stages within the TTM is logically flawed and based on arbitrary periods that have not been fully supported. Sutton [200] also claimed
that the TTM has shown to be challenging in supporting the key prediction that there are different determinants of behaviour change in different stages [200]. Another critique is that there is no evidence that assures the positive effects of the TTM interventions other than the simple fact that the interventions have been used to change the behaviour [192]. A systematic review of the effectiveness of TTM interventions applied to health-related behaviours does not generally provide support for it [201]. West [202] reviewed stage models in relation to smoking and suggested that work based on the TTM should be rejected. Therefore, current research findings do not support the added complexity and increased cost of stage-based interventions compared with other behaviour change theories.

5.5.1.3. Social Cognitive Theory
In SCT, the behaviour is determined by three factors: goals, outcome expectancies and self-efficacy [162, 192]. Goals are strategies to achieve and can be considered as purposes to implement the behaviour [192]. Outcome expectancies are divided into physical, social and self-evaluative, based on the nature of the outcomes desired [197]. Self-efficacy is the belief that an individual's behaviour is under self-control or not, and it is usually assessed through the degree of certainty that the individual has to perform the behaviour even in the presence of various obstacles [191]. Recently, Bandura [203] adjusted SCT by adding socio-structural factors (see Figure 5.2). These factors contribute to the barriers or opportunities associated with a particular context in that they facilitate or inhibit the performance of the behaviour; they also influence the behaviour through a change in the goals [203]. In addition, these factors inform the self-efficacy of the individual (the degree of awareness of individuals for the surrounding barriers and opportunities). This part of the adjusted model includes the environment as a significant influence on behaviours.
Figure 5.2: Social cognitive theory after the adjustment. Adapted from the Handbook of Behavioral Medicine [192].

SCT has been successfully employed for predicting and changing various behaviours. However, several studies that applied SCT have usually only assessed one component of the model, self-efficacy, rather than all of the components [204]. Self-efficacy, along with intentions, have been found to be the most relevant predictors of multiple behaviours in a diverse range of studies [204].

5.5.1.4. Information-Motivation-Behavioural Skills Model

Individuals within the IMB model only perform the desired behaviour if they expect there is a net gain from it [205]. Individuals within this model weigh three main constructs to change a behaviour: knowledge, motivation and skills. The first construct focusses on an individual's knowledge of the benefits that would result from performing the behaviour [205]. The second construct is the motivation to change the behaviour and is composed of an individual's attitudes and subjective norms of the desired behaviour [205]. The third construct is the behavioural skills that represent the essential skills needed to perform the desired behaviour, in addition to self-efficacy [205]. Figure 5.3 shows the relationship between the three constructs in performing the desired behaviour. The figure also shows that only knowledge or motivation may be
sufficient to change the behaviour without building the needed skills. However, building the required behavioural skills needs motivation and knowledge [205].

Three studies evaluating the effectiveness of interventions employed this model; the results of these studies indicate that the level of evidence is not concrete for sustained changes [206-208]. Further limitations are found within this model. It assumes that the decision-making process within individuals is based on rational factors. However, individuals are not always rational in their decisions; their emotions influence them [209]. Another criticism of the model is the lack of specificity of the three constructs [209].

5.5.1.5. COM-B Model

The COM-B model is a diagnostic tool to understand behaviour. It provides a broad understanding of the behaviour by examining the underlying cause [210]. This model suggests that the behaviour of an individual is the result of the engagement between three primary conditions: opportunity, capability and motivation, as demonstrated in Figure 5.4 [210]. Opportunity represents the outside factors that facilitate a person to engage in a specific behaviour. The two types of opportunities are 1) physical (created by the environment) and 2) social (attributed to the culture). Capability represents the individual’s ability to engage physically and psychosocially in the desired behaviour. The physical
The component is the strength to undertake the behaviour, and the psychological element involves holding adequate knowledge about the desired behaviour. Finally, motivation involves intellectual activities that stimulate and direct behaviours. There are two kinds of motivation: 1) automatic (emotions and habits) and 2) reflective (planning, decision making, etc.) [210]. Note that the COM-B model is a comprehensive yet simple model that is known to be most helpful in understanding behaviour, not for changing it [211].

**Figure 5.4: The COM-B model adopted from The Behaviour Change Wheel [211].**

Figure 5.4 demonstrates the association between the three constructs and the behaviour. In the figure, any change in any element of the COM-B model could lead to an alteration in the other elements (a change in Opportunity or Capability could lead to a change in the level of Motivation that, in turn, will change the desire to alter the behaviour) [211]. To illustrate this point, an individual is sufficiently motivated to lower the intake of food with high sugar. However, most of the retailers that surround this person’s neighbourhood only offer high-sugar foods and beverages. The reason why the COM-B model is very popular in analysing behavioural patterns is because of its ability to assess a particular behaviour within specific environmental and social contexts [211].
Various fields have used the COM-B model. It has been used in several qualitative studies for identifying enablers and barriers to behavioural alterations in multiple areas. The extensive usage of this model suggests that the research community largely supports this theory, implying that it is a comprehensive tool that helps capture a broad range of behaviours.

The COM-B model analyses the desired behaviour (a singular behaviour in need of changing) regardless of what covariations might currently exist [210]. The problem with the COM-B model is that the target behaviour is an action in which capability is not a concern; it also gives reflective motivation a significant role [210]. This problem sometimes appears because automatic motivational factors are working against the behaviour (e.g. lack of reward or punishment and lack of cues to take action) [210]. Furthermore, the physical and social opportunities have a limited role in determining the change [210]. Therefore, the COM-B model limits the role of the context, as do many other behaviour change theories, and it gives individual cognitions the upper hand in determining the desired behaviour. A further limitation in the COM-B model is that it defines which tool should be used for a particular behaviour; this neglects the demand for flexibility, variability and change according to the type of behaviour, the type of intervention or even the type of individual, including how that individual feels, thinks, looks, behaves or responds at any particular time [212]. Ogden argued [212] that the COM-B model is neither feasible nor desirable to clarify and describe the variety of people’s behaviour. Another limited ability of the COM-B model is its inability to determine the drivers of behaviour.

The most used behaviour change theories, in addition to the COM-B model, are likely not the most efficient theories to capture the complexity of behaviour due to the following reasons:

1. They ignore the context (social, environmental and political) that could influence the behaviour and focus on individuals as key determinants
of the behaviour, limiting the understanding of what could influence the behaviour [195, 210].

2. Most of the behaviour change theories that are utilised to predict health behaviours assume that the included cognitions (e.g. attitudes) remain constant between their measurement and the opportunity to act. However, this is not always the case; cognitions and intentions may change with time, and such change contributes a critical limitation on their capability to predict behaviour [195].

3. Behaviour change theories fail to consider the explicit effective influences on behaviour, and they do not usually specify the best means to change such cognitions [197].

Based on the reasons above and the notion needed to understand the social causation of the consumption of SSBs and the environmental effects on the consumption, the behaviour change theories were not considered appropriate as a framework to guide this thesis.

5.5.2. Socioecological model
As the knowledge within various disciplines has progressed, the ecological paradigm has been included in them; this has primarily occurred in sociology, psychology and public health [147]. The richness of the ecological models in public health is based on solid traditional disciplines in the social and psychological sciences. In the late 1970s, a socioecological framework was proposed by Bronfenbrenner [145] that recognised both the effect of society and environment on individual behaviour. The difference between the socioecological model and other behavioural theories and models is that the socioecological model recognises that the political and environmental factors (including the physical, social, distal and proximal factors) could be described as objective or subjective [213] in influencing behaviour. On the other hand, behaviour change theories and models focus on individual characteristics and skills before focussing on the proximal social influences (e.g. friends and family) [147].
The socioecological model provides a framework for understanding public behaviour within the surrounding context [147]. The behaviour in the socioecological model is affected by multiple levels of influence. The model divides the environmental influences into four levels of influence: microsystem, mesosystem, exosystem and macrosystem (defined in Table 5.1).

Table 5.1: The definition of each level of influence according to Bronfenbrenner

<table>
<thead>
<tr>
<th>Influence</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsystem</td>
<td>‘Microsystem is the complex of relations between the developing person and environment in an immediate setting containing that person (e.g. Home, school, workplace, etc.)’ [145].</td>
</tr>
<tr>
<td>Mesosystem</td>
<td>‘Mesosystem comprises the interrelations among major settings containing the developing person at a particular point in his or her life’ [145].</td>
</tr>
<tr>
<td>Exosystem</td>
<td>‘Exosystem is an extension of the mesosystem embracing other specific social structures, both formal and informal, that do not themselves contain the developing person but impinge upon or encompass the immediate settings in which that person is found, and thereby influence, delimit, or even determine what goes on there. These structures include the major institutions’ [145].</td>
</tr>
<tr>
<td>Macrosystem</td>
<td>‘Refers to the overarching institutional patterns of the culture or subculture, such as the economic, social, educational, legal, and political systems, of which micro-, mesosystem, and exosystems are the concrete manifestations’ [145].</td>
</tr>
</tbody>
</table>

McLeroy et al. [146] proposed a model based on Bronfenbrenner’s model [145]. The framework was explicitly designed to be used for the creation of public health activities. McLeroy et al. argued that the Bronfenbrenner model did not sufficiently specify guidance to identify the problems. The
socioecological model proposed by McLeroy et al. [146] is an approach used to describe public health challenges. Public health issues are complex and cannot adequately be explained, understood and addressed through a single level of analysis. The model was composed of several layers that influence individual health behaviour. This model [146] includes intrapersonal influences, interpersonal influences, institutional or organisational factors and community and public policies. **Table 5.2** lists the layers and describes each of them.

**Table 5.2: Description of the layers proposed by McLeroy et al.**

<table>
<thead>
<tr>
<th>Layer of influence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td>The characteristics of an individual that influence the behaviour (attitude, knowledge, motivation and beliefs) [146].</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td>Family, friends and peers who shape personal identity [146].</td>
</tr>
<tr>
<td><strong>Organisational</strong></td>
<td>Regulations, rules, policies or informal structures within an organisation that promote or prevent an uptake of the recommended behaviour [146].</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>The formal or informal norms and the standards within individuals, groups and organisations [146].</td>
</tr>
<tr>
<td><strong>Public policy</strong></td>
<td>Regulations, rules, laws and policies generated by the government either at a local or national level to support healthy practices and to prevent or detect diseases at an early stage [146].</td>
</tr>
</tbody>
</table>

### 5.5.2.1. Common principles among various ecological models

The Bronfenbrenner model [145], McLeroy et al.’s model [146] and other ecological models commonly propose five levels of influence; each one of these levels is composed of several factors that influence individuals’ behaviour. These levels are intrapersonal, interpersonal, organisational and institutional, community and public policies [196]. Sociocultural and physical environment factors can be applied at different levels [214]. The inclusion of
several levels of influence on health behaviour is what distinguishes the ecological models from the other theories that only focus on one or two levels of influence on health behaviour [215]. One essential feature of the ecological models is the inclusion of the physical and social environment. The environmental factors may influence other levels by manipulating, promoting and preventing specific behaviour at the individual and interpersonal levels. The key to having a successful strategy is investing in building a public policy that supports the environment at the level of individuals, society and the whole structural system.

Influences at various levels are interactive [196, 216]. These interactions at different levels work together to develop individual behaviour [145, 146, 192, 196, 216]. For example, the SES of the neighbourhood might lead to a change in the food environment, and the existing food environment might also affect individual choices [192]. Concurrently, participants in the setting will modify their surroundings through actions taken individually or structurally in the system [192]. The environment is a complex system, and institutions, organisations and workplaces are part of this complex system [146]. Therefore, research activities should take into consideration the interdependencies of these agencies to have a better understanding of the behaviour.

One of the vital strengths of the socioecological model is to tackle public health issues at multiple levels; this provides opportunities to broaden the options for intervening. [147]. It is also believed that individually directed interventions have poor continuation results in changing the behaviour; in contrast, the environmental policies can solve this issue and make a persistent impact on behaviour [217]. In addition, expanding studies to include a wide range of influence levels could direct the government to include multiple-level interventions that cover different levels of influence [147].
5.5.2.2. Usage of ecological models in different programmes

Currently, the socioecological approach is used in multiple public health activities. Multiple levels of interventions were a central strategy to tackle many pressing health problems. The socioecological perspective of health behaviour is widely presented in official public health documents. These documents, for example, are the Healthy People 2020 goals and objectives [218, 219], the Institute of Medicine reports on health behaviour [220], the WHO [221] strategy on diet, physical activity and health, the WHO Framework Convention on Tobacco Control and the Australian National Prevention Health Strategy [222].

The success in reversing the epidemic of tobacco use makes multiple government agencies and health groups interested in using the socioecological model to modify the obesity epidemic by implementing interventions at different levels [223]. The WHO [221] and the Institute of Medicine [224] believe that the ecological model could be used to mitigate the pressure of obesity, and that requires environmental change with government support. This calls for the meaningful use of the socioecological model among researchers and practitioners. The purpose of using the socioecological model among practitioners and researchers is to ensure that individual behaviour is not isolated and is correlated within a multilevel context. Therefore, understanding the multilevel context should lead programmes to implement and design effective strategies. Based on the notion of this PhD and that it requires an understanding of various perspectives and how those perspectives might affect the consumption of individuals, the socioecological approach was chosen to guide this PhD from data collection to analysis.

However, one of the weaknesses in the socioecological model is that it does not specify the variables within each level [147]. It is not a predicting model; it acts as a broad frame for other theories. To solve this issue, another framework (from public policy theories) was embedded within the socioecological framework to analyse the policy level of the socioecological framework. Other levels within the framework were used to organise the data collection and then analyse them inductively. There are three approaches to
combine theories, according to Cairney [225]: the ‘complementary approach’, the ‘synthetic approach’ and the ‘contradictory approach’. The complementary approach utilises various concepts or theories to create a range of perspectives to explain the outcomes [225]. The synthetic approach produces a theory or a hybrid theory, and the contradictory approach attempts to link each theory to its research agenda [225]. This thesis embraces the complementary approach because it aims to describe different understandings of the world. It is flexible in comparing multiple perspectives and in recognising their different intellectual origins. The use of several theories in this thesis provides the following advantages:

1. It provides a more profound understanding of the question that needs to be answered.
2. It allows the researcher to use multiple lenses with more than one perspective; this, in turn, shows the comparative benefits of each theory.
3. The question is answered in several ways.

5.5.3. Policy analysis

Policy theories and frameworks are applied to guide the policy analysis and to enable researchers to understand the reasons for why the policy process happened instead of describing what happened [189, 226]. Policy theories and frameworks were embedded within the socioecological model to enable this thesis to investigate the first and second objectives of this PhD project by understanding the contextual factors around developing SSB taxation and identifying the barriers to the implementation of other dietary policies in Saudi Arabia. Therefore, the socioecological model helps to describe why the Saudi government imposed taxes on SSBs and prioritised this instrument over other possible instruments to reduce the consumption of unhealthy diets. Theories are more precise than frameworks in describing the relationship between factors, understanding causality and bringing pieces of fragmented knowledge together [226].
There are several theories applied to social and political science that explain the process of policymaking at various levels of government and the contextual factors that influence the policy process. All these theories attempt to analyse the policy process with an emphasis on some factors or units over others. In the following section, the two main theories on public policy are presented.

5.5.3.1. Punctuated equilibrium theory
The punctuated equilibrium theory [202, 227] argues that within a long period of stability, most policies were introduced incrementally but were sometimes interrupted by explosions of rapid transformation. This theory is based on two central concepts: the policy image and the policy venue [227]. The policy image is mainly interested in how the problem and its solution are perceived and portrayed. The policy venue refers to how the decisions were taken regarding a particular issue. This theory is also interested in the level of power between actors or organisations and how they compete to control the decisions over a particular issue. While a group of actors or organisations might control the policy venue, other competitors might gain power with new policy images and drive for changes [227]. Consequently, the policy process is not always linear and stable, and changes might happen based on power.

It has been proven that this theory can correspond closely to analyse international efforts to control infectious diseases. Shiffman et al. [228] employed this theory at a global level and found that changes are correlated when the following three conditions merge:

- The dominant perception of the disease as a threat to national security;
- The ideas that interventions through vaccine can control its transmission;
- The sharing of concerns regarding battling the disease that resulted in a transnational coalition.
These conditions do not always exist in fighting obesity or in imposing taxation as an instrument to tackle it. For this reason, this theory was not considered for this thesis.

5.5.3.2. Multiple streams theory

One of the most common theories in public policy is the multiple streams theory by Kingdon [226] that represents three independent flowing streams. These are problems, policies and politics (shown in Figure 5.5). The problem stream refers to how policymakers have perceived the problem as a public matter that requires the government to act upon the issue [226]. The policy stream represents the ideas and technicalities of how the problem could be solved [226]. The political stream, on the other hand, operates separately from the other two streams [226]. The political stream is influenced by a particular event such as a political transition, changes in the government or social pressure and results in changes in the national mood [226]. These three streams usually operate independently; however, they merge or intersect at times and form 'policy windows' (the moment when the problem is introduced to the government agenda with possible alternative policies to act).

![Diagram](Image)

Figure 5.5: Kingdon's multiple streams theory adapted from Making Health Policy [229]
The empirical findings related to the policy level within the socioecological model are associated with the multiple stream theory. One of the main concerns related to this theory is that it does not explicitly include the role of the actors or the institutions in the policy process. However, Kingdon argued that even though the role of institutions was not explicitly emphasised within the theory, the political stream covers the role of institutions and policy venues [230]. Furthermore, he pointed out the critical role that individual actors have called ‘policy entrepreneurs’ [230]. The use of the multiple streams theory has increased in recent years, including in food labelling in Australia and New Zealand [231], in school food policies in the Philippines [232] and in a range of policies related to obesity in Brazil [233]. Accordingly, this theory appropriately fits within the policy level of the socioecological model to analyse why the Saudi government has imposed the SSB taxation and within the scoping review on the barriers of other food obesity-related policies.

5.6. Chapter summary
In this chapter, the selected study approaches to answer the overarching question of this PhD thesis were presented. Based on the nature of the research question and the objectives of this thesis (besides the gaps in the knowledge in the published studies in the Gulf region), a qualitative case study approach was chosen. Furthermore, as a process to select an appropriate study framework to explore the overarching question of this thesis and to address the subset objectives, several theoretical approaches and their main strengths and weaknesses were presented. As a result, it was determined that behaviour change theories are not the most efficient theories to capture the complexity of the behaviour, particularly because they focus only on the cognition to change the behaviour and ignore the context that could influence the behaviour.

Hence, using a framework that captures the individual, social, environmental and political factors that influence individual behaviour is necessary. The only
framework that could capture all mentioned factors is the socioecological framework. One of the weaknesses of the socioecological framework is that it does not specify the variables within each level. For this reason, the multiple stream theory (from public policy theories) was embedded within the socioecological framework to analyse the policy level of the socioecological framework and address the first and second objectives of this PhD project (to understand the contextual factors around the development of SSB taxation and to identify the barriers to the implementation of other dietary policies in Saudi Arabia). Other levels within the framework were used to organise the data collection and then analyse the data inductively. This is presented in the next chapter.
Chapter six: Study methods

6.1. Introduction
In the previous chapter, the methodological approach employed to answer the overall research question of this PhD project was described. Furthermore, the strengths and weaknesses of possible frameworks, models and theories were presented that influenced which one was selected as appropriate for this PhD project. The socioecological model was chosen as the general framework for this PhD. To address the first two objectives of this PhD, the multiple streams theory was embedded within the socioecological model.

This chapter presents the methods and data collection process used to conduct this PhD project. The analytical approach that was utilised to analyse this PhD project for meaningful results, together with the ethical considerations required during data collection and analysis, are explained. The researcher’s position is reflected upon as to how it might affect the result of this PhD project. The main strengths and weaknesses in the methods employed for this PhD project are discussed.

6.2. Data collection and ethical approval
I collected the data over two periods:

1. May–August 2018: Key policy actors involved in the taxation of SSBs were interviewed. Key documents relating to the formation of the SBB policy were analysed.
2. September–December 2019: In-depth interviews and focus group discussions with a sample of the Saudi population were conducted, along with observations of the environmental factors that influence the consumption of SSBs.

Collecting data over two separate time points allowed the researcher to build on findings from the first round and redefined the case to provide a more
comprehensive picture of the problem and the solution. Both data collection rounds were used to increase the depth of the collected information rather than rely on a single approach to the multidimensional issue to answer the overarching question of this PhD project. Based on Yin's belief that a case study requires several sources of information and forms to define the case that the researcher needs to build, multiple sources and forms of data collection were utilised. These forms and sources used to collect the data included in-depth interviews of the stakeholders involved in the SSB taxation process, a documentary analysis for a deeper understanding of why the Saudi government-imposed taxes on SSBs, in-depth interviews and focus group discussions with a sample of the Saudi population and non-participant observation of the environmental factors that influence the consumption.

Both data collections were approved by the Ethics Committee at UCL and by the MoH in Saudi Arabia. The first data collection was approved by Ethics Committee at UCL on 1 May 2018 (Reference number 13267/001), and it was approved by the MoH in Saudi Arabia on 12 April 2018 (Reference number 18-190E). The second data collection was approved by the Ethics Committee at UCL on 5 November 2019 (Reference number 16651/001), and it was approved by the MoH in Saudi Arabia on 25 August 2019 (Reference number 2019-0110M). See Appendix 5 for both ethical approvals.

In the following sections in this chapter, the justifications for utilising these methods to answer the overarching question and objectives of this PhD project and the challenges acquired with each method are explained.

6.3. Scoping review of documents
Documentary data is less influenced by researchers in comparison with other more commonly used qualitative research data (e.g. interviews and observation) and is normally produced before attempting the research project [234]. Documentary data may also reveal a piece of new information that is not
available in other forms of data [234]. Therefore, a document review was utilised as a parallel form of a data collection method alongside interviews of elite actors to understand the contextual factors around the development of SSB taxation. In addition, documentary data ensures that the generated results from the interviews can be supported textually and triangulated.

The documentary analysis in this PhD was an ongoing and iterative process that considered the policy documents and organisation reports that are relevant to understanding the facilitators' factors supporting SSB taxation and the industry’s comments on the taxation. In addition, an attempt was made to look at the government barriers to implementing other food-related policies.

I employed several strategies to review, synthesise and interpret the documents related to understanding the SSBs taxation's contextual factors. Possible documents were screened for by searching the website engine 'Google' with a combination of several words ('tax' or 'sin tax' or 'selective tax', and 'Saudi Arabia', or 'Gulf Cooperation Council' and 'carbonated and energy drinks' or 'PepsiCo', or 'Coca-Cola' or 'Red Bull' or some big local corporations). Government websites and media centres were searched for possible documents and information to analyse. The media centres of beverage corporations in Saudi Arabia were screened for documents, as well (i.e. PepsiCo and Coca-Cola). In addition, the citations of published documents were reviewed. Some stakeholders directed the researcher to read some published materials. Some unpublished materials (e.g. emails and documents) were provided during the researcher’s field visits to relevant institutions. Appendix 6 shows a detailed list of the included documents in the analysis.

Several limitations were observed during the collection of the relevant documents. First, the lack of transparency and documentation in Saudi Arabia made it challenging to collect relevant documents. No related documents were found describing government barriers and challenges to implement food-related policy interventions; this affected the researcher’s ability to examine
the government's nutrition-related policy barriers in the documents. Second, the bottlers for major soft drinks (Coca-Cola and PepsiCo) are not listed in the market shares and have no legal obligations to describe their activities or challenges to the stock shareholders. To overcome these limitations, documents were reviewed from international organisations (the WHO, the WTO, the International Monetary Fund and McKinsey & Company) and included in the analysis for further insights on the context of economic reform and food-related policies. This strategy proved to be sufficient to understand the context of economic reform and the facilitators to impose taxes on SSBs; however, it was not sufficient to understand the barriers to food-related policies. The barriers to food-related policies were covered primarily through interviews.

6.4. Interviews and group discussion

There are several methods of collecting data for qualitative research [182, 183, 185]. One of these is the interview; this method aims for a deeper understanding of the issue from the perspective of a single individual [182, 183, 185, 235]. Individual interviews provide an in-depth understanding and further insights [182, 183, 185, 235] and focus on gaining rich information from the individual's perspective and experiences [182, 183, 185, 235]. Interviews can be conducted in various ways. The most popular forms of interviews are structured and semi-structured. Structured interviews do not allow a variety of answers, while a semi-structured technique can explore each included participant’s knowledge of the research question [182, 183, 185, 235]. In the first round of data collection with elite actors, who have the power to influence the problem and the solution, semi-structured interviews were conducted. This form allowed the interviewer (the author of this thesis) to be flexible; ideas were brought up and adjusted while the participants spoke, with an emphasis placed on the central research question. The aim was to understand the policy problems, agenda-setting process, the policy content and the process taken to impose the taxation policy. Another aim was to assess the role of each
interviewee in the policy process. This form of data collection helped explore the political reasons for applying a tax on carbonated and energy drinks and with the scoping review on the barriers to implementing other dietary food policies.

In the second round of the data collection, an attempt was made to understand the social world of the participants, their experiences, their perspectives and the contextual factors that influence SSB consumption. This included how they perceive SSB consumption, judge it, understand it and talk about it in terms of their personal or shared meanings [182, 183, 185, 235]. For these reasons, semi-structured interviews were conducted with a sample of the Saudi population that focussed on answering the following items: what are the facilitators of SSB consumption and their attitudes towards the taxation of these beverages. The focus group discussion technique was utilised, in addition to semi-structured interviews, to obtain information on shared social norms, meanings and experiences [235-237]. In a focus group discussion, individuals interact with each other within the group; there is less interaction with the facilitator (the author of this thesis) than in an in-depth interview. Participants listen to each other’s comments and present their points of view. This method is particularly good for topics where discussion helps participants conceptualise the case and take the level of thinking to a more profound one. This discussion between participants can yield verbal content and a natural reflective setting that shows how people might interact in everyday life [185]. Combining individual interviews with focus group discussions developed an understanding of the participants’ lived experiences, identified social norms around SSBs, utilised group dynamics to increase the depth of data and explored how participants interacted when discussing SSB in a group setting. Overall, combing both individual interviews and focus group discussions enlarged the breadth and depth of the collected data [238]. Furthermore, the findings generated in each method were triangulated to enhance the validity of the findings [239].
6.4.1. Sampling frame

6.4.1.1. First round of data collection

During the first round of interviews, a group of elite actors was purposefully selected who had power and influence on the taxation policy and other food-related policies. The sampling frame of the selected actors was identified before the start of the first-round field trip based on scoping reviews of the possible people involved in the taxation policy and on personal knowledge of the context of Saudi institutions. Subsequently, the researcher (the author of this thesis) looked for all possible institutions involved in food policies to identify all probable actors from various institutions to reduce the level of bias in the results of the research and increase the depth of the understanding of the context around SSB taxation and other obesity-related food policies. After that, personal contacts were utilised to invite key staff from these institutions or to suggest names related to SSB taxation or food-related policies to take part in the research (snowballing) [182, 183, 185, 235]. These strategies were used to identify all possible actors involved in SSB taxation and obesity-related food policies.

Nineteen elite actors were identified and invited to participate through emails, telephone calls, messages to their social media accounts and in-person invitations; fourteen of these actors were interviewed. The individuals employed at two governmental institutions (the Ministry of Finance and the General Authority of Tax) and three corporations either refused or did not respond to my invitation to participate with no reason given. The three corporations that did not participate in this study were two local beverages companies and ‘Nestle’. Nestle and one of the local beverage corporations were interested in taking part in this study when contacted; however, both corporations did not respond after the intended questions were shared with them. Table 6.1 shows the list of the 14 people interviewed and their organisations.
Table 6.1: List of elite actors who participated in the individual interviews.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Health (n = 5)</td>
<td>• Deputy Minister of Health for Public Health</td>
</tr>
<tr>
<td></td>
<td>• Director of Health Programmes</td>
</tr>
<tr>
<td></td>
<td>• Director of Physical Activity and Balanced Diet</td>
</tr>
<tr>
<td></td>
<td>• Director of School Health department</td>
</tr>
<tr>
<td></td>
<td>• Family medicine consultant at School Health department</td>
</tr>
<tr>
<td>Saudi Food and Drug Authority (n = 3)</td>
<td>• Director of General Standards for Food</td>
</tr>
<tr>
<td></td>
<td>• Key staff from the General Standards for Food department involved in many food policies</td>
</tr>
<tr>
<td></td>
<td>• An advisor for the Saudi Food and Drug Authority from King Saud University</td>
</tr>
<tr>
<td>Ministry of Economy and Planning (n = 1)</td>
<td>• Director of government initiatives</td>
</tr>
<tr>
<td>Ministry of Commerce (n = 1)</td>
<td>• Representative of Ministry Commerce in taxation policy in the government meetings</td>
</tr>
<tr>
<td>Jeddah Chamber of Commerce (n = 1)</td>
<td>• Director of Jeddah Chamber of Commerce</td>
</tr>
<tr>
<td>Consultative Council (Parliament) (n = 1)</td>
<td>• Member of the Saudi Consultative Council within the health committee</td>
</tr>
<tr>
<td>Health Council of the Gulf Cooperation Council (n = 1)</td>
<td>• The former director of this entity</td>
</tr>
<tr>
<td>Civil society (n = 1)</td>
<td>• Director of the Kayl association for combating obesity</td>
</tr>
</tbody>
</table>

6.4.1.2. The second round of data collection
During the second round of data collection to explore the reasons for SSB consumption and the attitudes towards the taxation of these beverages, data
from men aged 18–40 years were collected. Men were chosen as the consumption of SSBs is much higher among males under 40 compared with women or older age groups [60]. Women were excluded for practical reasons; Saudi Arabia is a conservative country, and as a male researcher, there are challenges in accessing them for research. Those who have been diagnosed with diabetes were also excluded as they have very specific factors that influence their sugar intake, including medical advice, and their inclusion is beyond the scope of this study. Only Saudi nationals were included. Although non-Saudis represent almost one-third of the country’s population [240], they represent diversity in culture and cultural norms, and that is beyond the scope of this study.

During the second round of data collection, a combination of purposeful criterion and maximum variation sampling techniques were used [241]. A purposive sampling strategy was utilised to capture cases with rich information for in-depth investigation [183]. The logic behind using a criterion sampling strategy was to examine and investigate the cases that met a predetermined criterion and to ensure sufficient data to compare them. This study set income as the main criterion because the SHIS [60] reported that the consumption of SSBs was higher among low-income groups than in mid- to high-income groups. Although Saudi Arabia is a World Bank high-income country, 35% of Saudi households were classed as having low income in the nationally representative SHIS [60]. The population was divided into two groups: low income and average to high income. The cut-off income to define the two categories was 5,000 Saudi Riyal (£1000) per household based on the SHIS definition [60].

Since SSB consumption is likely influenced by other factors besides income, maximum variation sampling was used in addition to criterion sampling to achieve a variation in factors that affect the case and to capture the central themes that cut across these population groups. Based on the literature, the key factors that are associated with SSB consumption are education, age and
BMI level [60, 241-243]. Within the sample, a range of education levels (university, college education or higher and high school or less), age groups (18–24-year-olds and 25–40-year-olds) and different body shapes (overweight or obese and normal weight) were included across both SES groups.

6.4.1.2.1. Study setting within the second round of data collection

The participants were recruited for in-depth interviews and focus group discussions from two sites in Mecca to address the third, fourth and fifth objectives of this PhD project. These objectives include exploring the perceptions, attitudes and behaviours of Saudi Arabians on their SSB intake, investigating the availability, accessibility and exposure to SSBs in Saudi Arabia and exploring the perceptions, attitudes and experiences of Saudi Arabians on their government’s use and effectiveness of a tax to reduce SSB consumption.

Mecca was chosen as a proxy of other cities because it is one of the most highly populated cities in Saudi Arabia (the third most populated with 1,534,731 residents [244]). This high population within Mecca ensured diverse attitudes and perceptions towards the drivers and taxation of SSB consumption. Mecca also contains the holy mosque for Muslims, which they visit to perform Umrah and at least one Hajj in their lives. These seasonal factors attract corporations to promote their SSBs. Such marketing strategies by the beverage industry have been shown in other areas in the world as a primary way to increase their sales. Many visitors have also decided to stay in Mecca and become Saudi citizens with different ethnicities and backgrounds. Therefore, conducting the study with participants from this city enlarged the depth of the information gathered to answer the overall question of this PhD project. The author of this thesis is also a resident of Mecca, so it was practical to conduct the study within Mecca due to personal insight into its neighbourhoods and access to the population; this facilitated the data collection and the interpretation of results.
Using two different sites in Mecca allowed for the easy and efficient identification and screening of people from different income groups; it also allowed the researcher to explore the environmental and social differences in these different neighbourhoods. The first site is called the ‘Alkhansah’ neighbourhood and is known for its old houses, high crime rate and poor governmental services. This is where the low-income group was recruited. Different sites were considered to recruit the low-income group for this study; however, informants suggested that the Alkhansah neighbourhood was the best place to recruit Saudi citizens with low income. Other neighbourhoods that are like the Alkhansah neighbourhood are known for being home to non-Saudi citizens. The second site is the ‘Almhamadiah’ neighbourhood. This area is occupied by mid- to high-income people and is where the mid- to high-income group was recruited for this study. Different sites were considered for the recruitment of the mid- to high-income group; however, the Almhamadiah neighbourhood has similar characteristics to the Alkhansah neighbourhood in that both sites are residential neighbourhoods. This made the comparison between them more appropriate.

Saudi Arabian social norms require that participants are identified through a known and trusted community member. ‘Imams’ (a religious man who leads the five prayers every day and the Friday prayers) are considered community leaders. There are at least six to eight mosques in each neighbourhood (Alkhansah and Almhamadiah), and attendance is high. The researcher asked for an introduction from the Imams in these mosques and approached potential participants at the end of prayers. This method is called ‘flow populations’, a technique in which the population of interest is sampled from a particular location or setting. The researcher primarily invited the participants to take part in the research after the ‘Friday prayer’, during the evening time, to ensure that the participants were not too busy with their business. The flow of the participants was high during these times.
A briefing note was distributed that clearly explained the aim and objectives of the study, the sample selection criteria, the required task from the participants and the information about the researcher, including contact details. Participants who agreed to take part in the research at the site were asked for their contact details, their demographic details and whether they were diabetic. In addition, an observation of body shapes, to determine if a participant was likely obese or not, was done. After that, a quota sheet was generated, listing the number of individuals to be selected with various body shapes, education and age groups. For practical reasons, interviews were conducted first, then checked to determine if the sample had the variation needed. If not, people were then selected based on the gaps in the quota sheet. Snowballing sampling was another strategy utilised to maximise participant recruitment. Participants who had already been interviewed were asked to identify a new participant within the research project's inclusion and exclusion criteria.

The participants who were gathered for individual interviews were not invited for the focus group discussion for two reasons. First, one of the goals of the focus group is to increase the richness of the data and adding the same participants does not support this goal. Second, the participants might be overwhelmed by the demands of the research and might drop out from the research project or not attend the group discussion.

Other sites and methods were considered for data collection (primary care centres and District Association member lists). These methods were excluded because of the potential for selection bias. A household screening was excluded as well because of feasibility issues; it might take a long time to recruit possible participants. In addition, people are not familiar with this form of participant recruitment unless it is a national survey that the government announced ahead of time.
6.4.2. Saturation and sample size
The gold standard to identify the number of participants is to reach a level of saturation [245, 246]. This is a point in data collection or analysis when the additional identified cases only add minimal evidence or when there is repetition in the gathered information [246]. The numbers required to reach saturation varies between studies, but qualitative researchers usually only require a small number of cases [245-247].

6.4.2.1 Sample size during the first-round field trip
According to Lilleker [248], the number of interviews must be a reasonable size and must be representative of the larger body of the institutions to increase the depth of the information of the event if the participants are policy elites. Because the first-round field trip aimed to conduct in-depth interviews with elite actors, the saturation level was reached after 13 participants were interviewed. In addition, those involved in the policy process of any policy at a national level are usually few. By using stakeholder mapping and identifying the institutions involved in the policy process of the taxation on SSBs, and by using the snowballing strategy, the researcher maximised the utility of the sample included in the interviews.

6.4.2.2. Sample size during the second-round trip
In a sample of homogenous participants (who share many similarities), as is the case in this project, between eight to 15 individual interviews and at least two focus group discussions are usually required to reach saturation [246, 247]. For this reason, 15 individual interviews and two focus groups were conducted from each neighbourhood. Each category, across both neighbourhood groups, contained a minimum number of cases required to cover the three variables (education, body shapes and age). The case numbers in individual interviews from both neighbourhoods are as follows:
- Education degree: 15 participants had a high school or lower degree, and another 15 had a university degree or higher.
• Body shape: 16 participants were either obese or overweight, and 14 participants were a normal weight.
• Age group: 13 participants were aged 18–28 years, and another 17 participants were aged 29–40 years.

Great consideration must be given to the composition of the participants in the focus groups to maximise the discussion among participants. The researcher sought to ensure that within each SES group, the various mentioned characteristics from age, education and BMI level were present [249]. There is no ‘best’ number of participants per group to conduct a discussion; however, based on qualitative researchers’ suggestions, it is at least two and usually between six and eight [249]. Six to nine participants were invited to each group discussion to have a viable number of participants in case some of the participants decided to cancel without notice; according to previous research, this number is most likely between two or three participants. The total number of participants in all four focus group discussions was 16 (each group contained five or three participants).

6.4.3. Instrument design
During the first round of data collection, the aim was to address the first and second objectives of this PhD thesis by understanding the contextual factors around the development of SSB taxation and by a scoping review of the barriers to implementing dietary policies in Saudi Arabia. Semi-structured interviews were conducted with elite actors using a design guided by a predetermined list of questions or topics to cover the main objectives of the study. The design was influenced by Ritchie and Spencer’s [250] framework and by the multiple stream theory [226]. It covered several contextual areas of the policy analysis ranging from the stakeholder’s knowledge of the problem to their involvement in the process [185, 235, 251]. Appendix 7 shows the topic guide and questions list.
During the second round of data collection, the aim was to address the third, fourth and fifth objectives of this PhD project by exploring the perceptions, attitudes and behaviour of Saudi Arabians on their SSB intake and on the availability, accessibility and exposure to SSBs in Saudi Arabia and by exploring the perceptions, attitudes and experiences of Saudi Arabians on their government’s use and the effectiveness of a tax to reduce SSB consumption. Semi-structured interviews and focus group discussions were conducted that focussed on capturing the lived experience of the participants. In the individual interviews, the topics and questions list were defined based on the socioecological model (asking about individual, social and environmental drivers of consumption). Some questions and topics were adapted from published articles to understand the determinants of SSB consumption in other regions in the world [176, 178, 179, 252-258].

Furthermore, during the drafting of the guide, two additional objectives were identified as important for exploration: (1) the motivational factors to reduce or stop SSB consumption and (2) the possible strategies that individuals or governments might take to reduce or stop SSB consumption. Both supplementary objectives were found to increase the depth of the information that could address the third, fourth and fifth objectives of this PhD project. The researcher had the opportunity and the flexibility (like in the elite interviews) to ask probing follow-up questions. Appendix 8 shows the questions list and the topic guide used in the individual interviews to understand the drivers of SSBs and the attitudes towards the imposed taxation.

In the focus groups, the primary goal was to engage the group members in a discussion around the pre-defined topics and framework. This is like the individual interviews; however, there were no pre-defined questions. The focus group discussions were started after almost 20 individual interviews were completed and covered areas that were not fully captured during those individual interviews. In addition, the beverage industry had increased their marketing activities after the taxes were imposed in several places around the
world [121]; therefore, included in the groups was a focus on the marketing strategies in Mecca as a possible factor that could lead to increased consumption. The point of the group discussions was to allow individuals to interact with each other within the group with less interaction from the researcher (compared with an in-depth interview) [182, 183, 185]. The participants listen to each other and present their own points of view [182, 183, 185]. This method is particularly suitable for topics where discussion helps the participants conceptualise the case and take the level of thinking to a more profound one [182, 183, 185]. This discussion between the participants can yield verbal content and a natural reflective setting that demonstrates how people might interact in everyday life [185]. The full benefits of group discussions are usually not achieved if the researchers use group discussion similar to individual interviews [259]. To overcome this obstacle, Colucci [259] suggested having the participants ‘do’ some activities and answer questions actively. In this study, two activities were used to engage participants in the focus group discussions: free listings and label generation.

A free listing exercise is a simple but powerful way to generate information to understand a cultural domain [259]. The participants were invited to write down the SSBs they consume on paper that was distributed to them before the start of the discussion. Then, the researcher discussed with the participants the reasons for the consumption of these drinks.

After 40–60 minutes, label generation was used. During this activity, participants were asked to generate a label as a statement or words to describe three pictures provided for them (the pictures were obtained from the internet) [259]. The participants were asked to comment on what they saw and to imagine being writers and writing a short statement about the pictures. The three pictures were employed to reflect on the beverage industry’s marketing strategies and the social effect on consumption. Participants were engaged and attempted to correct or add a point to other statements made by other participants in the discussion. Using these two activities in the focus group
discussions made the gathered data from the focus group discussion more enjoyable, successful and prosperous.

6.4.4. Interviews and focus group discussions procedures
During the first and second rounds of data collection, the individual interviews were conducted at a location selected by the participants. However, during the first round of data collection, all the interviews of the elite actors were conducted at their workplaces. During the second round of data collection, the interviews were conducted between the participants' workplaces, homes or mosques. The focus group discussions (done during the second round of data collection) were held in a place selected by the researcher; this place was either at a mosque or a place provided by the MoH.

The individual interviews during both data collection rounds had a similar procedure, as did the focus group discussions in the second round of data collection. Rather than explaining the process individually, the participants received the directions in a group. In the beginning, the following steps were taken to ensure that participants were fully aware of the project and their rights; the participants received a brief welcome and introduction about the aim and objectives of the study and were given a detailed information sheet about the project and their rights as a participant. This information sheet provided the participants with the contact numbers of the interviewer (the author of this thesis) and the researcher’s principal supervisors. The participants were informed that the information from the interview was strictly confidential and would be protected according to the University College of London regulations; however, they were notified that confidentiality was not fully protected during the focus group discussions because the participants were introduced to each other.

The participants from the first and second rounds of data collection were asked to sign consent forms. Then, participants were asked to verbally permit to
being audio recorded. As a result, all interviews and focus group discussions from both rounds of data collection were digitally recorded. In addition, handwritten notes were taken.

Participants received compensation for their time and any travel costs with a store voucher. This is a norm for research in Saudi Arabia and was a small amount, so it did not jeopardise the voluntary consent given. The store voucher was given as an acknowledgement for the time and effort to participate in the project and not as payment. Refreshments ('juices and water') were provided to participants during the focus group discussions.

The interviews with the elite actors during the first round of data collection lasted 30–60 minutes. The interviews and focus group discussions during the second round of data collection lasted 50–70 minutes and 90–120 minutes, respectively.

Both rounds of data collections were recorded digitally and then downloaded onto the researcher's personal computer for transcription. All notes were kept in the same form in a safe place.

6.5. Non-participant observation

The beverage industry plays a significant role in driving the consumption of SSBs by increasing SSB availability and through marketing activities. Scanning for the environmental factors that drive the consumption of SSBs among the Saudi population provided further insight and led to addressing the third and fourth objectives of this PhD project more profoundly. Participant observation is a useful method to understand the drivers of consumption in which the researcher observes the participant’s activities and records the observations; however, it was not an appropriate method for this study because it required the researcher to immerse themselves with the participant for a long time, and that was not feasible. In contrast, non-participant
observation in rapid ethnography is a common practice within the case study approach. During this practice, the researcher enters the social system to understand the phenomena in reaction to an event. Furthermore, during non-participant observation, researchers can undertake rapid reconnaissance fieldwork to obtain detailed descriptive information about a developing situation without being involved in what they observe. In this case, the developing situation was the imposed taxes on SSBs. Genzuk [16] suggests three methodological principles to perform observational studies: naturalism, understanding and discovery. These three principles aim to capture the characteristics of the setting, explain the reaction to the event and explain the flow of the event. Then, the researcher starts to link and synthesise the evidence.

Non-participant observation was used to collect data during the second round of data collection to address the fourth objective of this PhD project by investigating the availability, accessibility and exposure to SSBs in Saudi Arabia among the Saudi population. Two main locations were observed: the Almhamadiah neighbourhood and the Alkhansah neighbourhood. These two areas are the same areas where participants were recruited for the individual interviews and the focus group discussions, so the environmental factors that drive the consumption among participants could be observed. In addition, the environmental factors that drive the consumption at participants’ worksites were observed if the interviews were done at the participants’ workplaces.

In addition, the beverage industry marketing on the national sports channel was observed during the Saudi football league, as were the promotional activities of the beverage industry on Twitter. This allowed the researcher to observe the marketing in shops, restaurants, workplaces, on the television and on the most widely used social media platform in Saudi Arabia. Only Twitter was observed because it is one of the most important social media platforms in Saudi Arabia. According to the Ministry of Communications and Information Technology, Twitter is the main platform the Saudi population interacts with.
There are nine million active Twitter users representing 29% of the Saudi population.

6.6. Transcription and translation
After collecting the data, the first step involved converting the voice interviews to textual materials for analysis. The data was transcribed immediately (in Arabic) after the interviews and focus group discussions during both rounds of data collection. Doing this transcription allowed for a reflection on the findings (this is the first step in data analysis) [260]. Maintaining the transcriptions in the original language means that the participants exact words were not lost, and this is a key component of qualitative research; the use of exact words is crucial to describe the lived experience and perceptions of the participants. Cross-language translation has also been found to reduce immersion in the data, affecting analysis and interpretation [33]. However, to allow input from supervisors and for quality purposes, the first five interviews from the second round of data collection were transcribed in English. This was done until an agreement was reached on the topic guide, the format of the questions and the quality. After that, all interviews were transcribed in Arabic. This was not done during round one as a qualitative expert was not present on the supervisory team at that point.

6.7. Analysis
All collected data from both rounds of data collection (interviews and focus group discussion transcripts, documents and notes from the field trip) were uploaded to NVivo software (version 11 and 12, QRS). The same software was utilised to categorise and organise the data and to conduct a thematic analysis for the research.

The included data was divided into two sections for analysis. The first section was aimed to address the first and second objectives of this PhD project by
understanding the contextual factors around the development of SSB taxation and identifying the barriers to implementing dietary policies in Saudi Arabia. The two forms of data within this section included elite actors’ interviews and documents. The second section aimed to address the third, fourth and fifth objectives of this PhD project by exploring the perceptions, attitudes and behaviours of Saudi Arnabians of their SSB intake by investigating the availability, accessibility and exposure to SSBs in Saudi Arabia and by exploring the perceptions, attitudes and experiences of Saudi Arnabians on their government’s use and effectiveness of a tax to reduce SSB consumption. The data utilised in the second section were individual interviews, focus group discussions and non-participant observation. The two sections were analysed separately to answer the overarching aim of the thesis: whether Saudi Arabia has addressed the determinants of SSB consumption through taxation.

As mentioned in the previous chapter, the socioecological model [145] and multiple stream theory [226] (embedded within the socioecological framework) were utilised in this PhD project to guide the topic question. The theoretical guidance directed the analytical method in both sections. Multiple stream theory was employed in the first section [226], and the socioecological model was employed in the second section [145]. However, the same analytical approach was used in both sections and is summarised by the following points:

- The data collected from each method within each section were analysed separately.
- The themes and codes were identified inductively of each collection method.
- The mapping function of NVivo was used to check on the coding frame.
- All transcripts were checked by looking for missed codes and by verifying the high-density codes to make sure they were not over coded.
- The coding was checked where the themes had only one or two quotes to see if they could be merged.
• The lengths of the quotes were checked to verify that they captured the meaning.
• The names on all the transcripts were changed in the second round of data collection to reflect respondent characteristics and to make comparing within the codes easier.
• An abductive approach was used by matching the key themes in the applied theories with the themes identified in the findings of the datasets from the collected data for each section.
• The result of each section was a combination of similar themes generated from the data collected for that section. As a result of the data triangulation in each analysis section, the depth of the information and the evidence generated increased, and the credibility of the generated evidence was strengthened.
• The description function in NVivo was used to generate themes and their definitions that was shared with the supervisors (see Appendix 9).

For quality purposes, the supervisors reviewed the coding and discussed the findings and the frame to enhance the coding rigour and the conceptual thinking. Professor Zelee Hill, an expert qualitative researcher, also checked the coding for two interviews from each section that had been transcribed in English by using the coding stripe function of NVivo. Professor Hill also reviewed the coding frame at several points during the coding process and reviewed the quotes in the generated themes of the second section at the midway point of the analysis.

6.8. Reflexivity
As part of their research, qualitative researchers should make their positions clear from the research question and state how the results may be influenced by their position. It is essential to acknowledge that being a medical doctor and holding a master's degree in health policy influenced the author of this thesis.
opinions on the benefits of SSB taxation. Furthermore, being obese with a love for carbonated drinks made the researcher understand people’s feelings and opinions more easily. The researcher’s personal experience of consuming Pepsi every day while knowing what needed to be done to live longer and be healthier was a constant fight. The researcher’s background and knowledge allowed for an understanding that consuming SSBs is unhealthy and could be a possible reason (among other factors) for obesity. This is knowledge that many participants may not have had. However, the researcher’s knowledge and beliefs did not prohibit the consumption of Pepsi (an SSB). After the project began, the researcher realised multiple factors that drove him to have this unhealthy habit, and he started to understand what the participants’ spoke about regarding their attitudes and perceptions on SSB intake and what drove them to consume SSBs.

The researcher is accountable for the integrity of the research, and all backgrounds and feelings towards SSBs must be recognised to present the correct information and not be biased. It is challenging to be in the middle and not take one side or the other. However, full disclosure strengthens the research. As the literature points out, case studies are highly subjective [182, 185]. However, the quality of the analysis and the presented results depend on the skills, time and to what limit the researcher understands the context. Being a Saudi citizen from Mecca (‘insider’) made the researcher understand the context more efficiently (by reducing the time required to observe and understand the context). In addition, it helped the researcher easily understand the political context. Collectively, being an insider, a carbonated drinks lover and a medical doctor with a master’s degree in health policy helped with the researcher’s understanding of the Saudi context.

6.9. Chapter summary
In this chapter, the methods that were utilised for the data collection and analysis to answer the overarching question of this PhD thesis were presented. Based on the nature of the research question and the objectives of this thesis,
the project was split into two different sections. The first section aimed to address the first and second objectives of this PhD project by understanding the contextual factors around the development of taxation of SSBs and by a scoping review of the barriers to other food obesity-related policies. The most suitable methods for the data collection in the first section were elite interviews and document analysis. Fourteen semi-structured interviews were conducted with elite actors, and 13 documents were selected for analysis. Both methods were analysed separately using the abductive approach guided through multiple streams theory and then triangulated. The second section aimed to address the third, fourth and fifth objectives of this PhD project by understanding the drivers of SSB consumption among males from Mecca and by understanding their attitudes about SSB taxation. The most suitable methods for this section’s data collection were semi-structured interviews and focus group discussions with two different samples from Mecca and non-participant observation. Thirty people were interviewed; four discussion groups were conducted, and three months of rapid non-participant observation of the environmental factors that drive the consumption of SSBs were completed. All methods were performed across various SES groups (low- and mid- to high-SES groups). All methods in the second section were analysed separately using the abductive approach guided through the socioecological framework and then triangulated.

Both projects followed the UCL and the MoH ethics protocols for data collection. NVivo data management software was used to organise and categorise the data for the analysis. Using multibit sources of data collection with each section and triangulation enhanced the validity of the results. For quality purposes, supervisors reviewed the English versions of the interview sample. In addition, Professor Hill reviewed the codes and themes with the code intensity function within NVivo.
Chapter seven: Policy analysis

7.1. Introduction
This chapter addresses the first and second objectives of this PhD by understanding the process of policy making, the contextual factors that facilitated the development of taxation on SSBs and the challenges and barriers in the implementation of other dietary-related obesity policies. By understanding these facilitators and barriers, the reasons why the government implemented a tax on SSBs but have not utilised other instruments to reduce the consumption of unhealthy diets and SSBs are explored. This chapter first describes the political context at the time the taxation policy was formulated and introduced. Then, the multiple streams theory [226] is used to understand the process of policy making and to understand what facilitated the implementation of the taxation on SSBs. Finally, the challenges and barriers in implementing other obesity dietary-related policies are presented.

7.2. Political background
The political environment in Saudi Arabia was affected by the political transition that happened after the death of King Abdullah in January 2015. A new King was appointed, King Salman Bin Abdulaziz, who appointed his son Prince Mohammed Bin Salman as the Minister of Defence and chair of the newly established Council for Economic and Development Affairs. In addition, in April 2015, the King appointed Prince Mohammed Bin Salman as Deputy Crown Prince; in 2017, he was appointed the Crown Prince. Prince Mohammed Bin Salman has taken the lead in restructuring Saudi Arabia’s economy and expanding the political space by setting new goals and a new ideology (the introduction of Vision 2030) [10]. Through this, objectives were developed to determine the country’s direction for the ensuing decade. This transition to a new government altered government priorities and changed the process of government policy formulation and implementation.
7.3. Results

The multiple streams theory [226] was used to understand the facilitators to the implementation of a tax on SSBs and the barriers and challenges to implementing other food obesity-related policies. Three major facilitator themes were derived from the multiple streams theory: ‘political stream’, ‘problem stream’ and ‘policy stream’. Under the political stream, five categories emerged: ‘new government ideology’, ‘the presence of leading institutional actors’, ‘existence of leadership’, ‘government cohesion’ and ‘government power’. The subtheme of the problem stream contains two categories: ‘obesity problem’ and ‘financial problem’. The last subtheme comprises two categories: ‘financial gain of tax on carbonated and energy drinks’ and ‘health gains from tax on carbonated and energy drinks’.

Within the barriers and challenges to implementing other food obesity-related policies, six major subthemes were found: ‘lack of financial resources’, ‘lack of leadership’, ‘lack of cohesion’, ‘low level of engagement from civil societies in food-related policies encountered versus a high level of engagement from the food and beverage industry’, ‘public–private partnership’ and ‘WTO disputes and power’.

7.3.1. Facilitators to implementing taxation on carbonated and energy drinks

7.3.1.1. Political stream

The first stream within the multiple streams theory [226] is the political stream; this reflects the ‘political environment’, ‘political will’ and who ‘sets the agenda’. Within this theme, several subthemes were identified that influenced the tax on carbonated and energy drinks. These are a new government ideology, the presence of leading institutional actors, government cohesion, existence of leadership and government power.
7.3.1.1.1. New government ideology
The new government that arose as a result of the death of King Abdullah introduced a new ideology that acted as the basis for the government’s Vision 2030 [10]. Vision 2030 is based on three pillars: a vibrant society, a thriving economy and an ambitious nation, and its associated programmes set the policy agenda and demonstrate the political will to tackle specific issues. These pillars opened the political window for the taxation on SSBs. Specifically, within the first pillar, the government aims to enhance the quality of preventive health services; within the third pillar, the government is committed to diversifying and maximising economic resources.

‘It is a new ideology for the government. This new ideology became a roadmap for the government that desired to move away from the dependence on oil, similar to other European countries, so that tax is significant for the government’s economy. The Economic Council [Council for Economic and Development Affairs] chaired by the Crown Prince had a very significant role to introduce the tax’ (elite actor number 11).

The new government introduced several programmes to meet Vision 2030 objectives, two of which were directly related to taxation; the Fiscal Balanced Programme [8] and the National Transformation Programme 2020 [9]. Within the first programme [8], the taxation on carbonated and energy drinks was one of the government initiatives to diversify the economy. Within the latter programme, the Saudi government pledged to build its institutional capacity to fulfil the aims of Vision 2030 [10]. The operating model for the National Transformation Programme 2020 [10] was to identify the strategic objectives of each participating government entity, to translate these into initiatives and to promote joint action towards their fulfilment. The programme's objectives were associated with the year 2020. The National Transformation Programme 2020 [10] targeted obesity as one of the MoH primary prevention objectives and also introduced taxation on harmful products.
7.3.1.1.2. Presence of leading institutional actors

The leading institutional actors involved in the taxation policy process were identified by reviewing policy documents from the MoH, the Ministry of Finance, the Saudi Food and Drug Authority (SFDA) and through interviews. The literature suggests that in other settings, the policy process of taxation of SSBs is influenced by many actors (i.e. government agencies, academics, civil societies, private sectors, the media and the beverage industry) [31, 261, 262]. Participants and documents implied that the taxation policy process in Saudi Arabia was mainly influenced by government organisations.

From both documents and interviews, it was found that the agreement by the Supreme Council of the GCC in November 2015 to introduce taxes on harmful and luxury products was a key facilitator for introducing taxes on carbonated and energy drinks in Saudi Arabia. The Supreme council contains the highest government leaders of the GCC and is the highest GCC decision-making body. It is not clear from either the documents or the interviews the country that proposed this treaty, but Saudi Arabia was the first country that announced and implemented taxes on carbonated and energy drinks.

Following the agreement of the Council, a range of government actors were involved in developing the SSB tax policy in Saudi Arabia [263]. The Consultative Council agreed with the proposed policy in December 2016 to impose selective taxes on harmful and luxury products. Out of 150 members, 140 agreed to impose the taxes; only four members disagreed [264]. Following that, the Ministry of Finance and its implementing body, the General Authority of Zakat and Tax that is responsible for tax collection, defined the beverages to be included in the tax and finalised the legal and technical requirements [265].

It is not clear how the policy was developed or operationalised as both the MoH and the Ministry of Finance played a role. What is clear is that several
key ministries were supportive of taxation, and the MoH was one of the leading actors that pushed for the taxation on carbonated and energy drinks. It is not clear how or when the MoH started to push the agenda on taxation. However, according to key officials from the MoH and the Ministry of Commerce and Economy, the taxation on carbonated and energy drinks was proposed by the MoH before the agreement by the Supreme Council of the GCC in 2015.

‘Before the announcement of the Supreme Council of the GCC, I had attended several meetings with several government entities, and Ministry of Health representatives were always highlighting the importance of taxation on the carbonated drinks to reduce the prevalence of obesity and diabetes prevalence’ (elite actor number 13).

In the interviews, the MoH was described as the leading institution that developed the policy, and then they transferred it to the Ministry of Finance for implementation.

‘[The] Ministry of Health [was] working on the taxation project for almost two years before imposing taxation on carbonated and energy drinks. We recommended the tax implementation. Based on our recommendation, many governmental bodies started to work to legislate this policy such as [the] Ministry of Finance’ (elite actor number 2).

In the Ministry of Finance 2017 budgetary public statement [266], the taxation policy appears as one of the Ministry of Finance’s initiatives to generate non-oil revenues, and there was no mention of the MoH’s involvement.

‘In line with the Kingdom’s commitment to move towards achieving economic and structural reforms, strengthening its financial status, reinforcing sustainability and implementing development and service-related projects that are essential for economic growth, several reform
activities were announced in the Ministry of Finance’s statement last year…Reviewing fees and fines, introducing new fees…and [the] application of additional fees on soft drinks and harmful goods such as tobacco’ (Ministry of Finance 2017 budgetary public statement [266]).

Officials from the SFDA were surprised at not being involved in the development of the taxation policy and suggested that the taxation policy would have been better if the SFDA was involved in its development and design.

‘I was surprised that the Saudi Food and Drug Authority was not involved in the policy development process of the taxation on…soft [drinks] and energy drinks. The policy was not designed according to what international communities expected…which has made international [corporations]…challenge the policy and raise concerns within the WTO. I think if the Saudi Food and Drug authority had joined in designing the policy, it would have been designed better, and the policy would have included all SSBs and not only soft [drinks] and energy drinks’ (elite actor number 3).

However, the SFDA was involved in the taxation policy after the announcement because it is a point of communication between the WTO and the Saudi government and deals with the consequences of the policy.

‘After announcing the taxation on soft and energy drinks in Saudi Arabia, the Saudi FDA were invited to participate in reviewing the legal consequences of the taxation since the Saudi FDA is the point of communication with WTO and in expanding the taxation to include all SSBs’ (elite actor number 7).
7.3.1.1.3. Government cohesion

Cohesion is one of the main themes generated from the interviews. In this literature, cohesion relates to organised efforts from several stakeholders through articulating their interests, exercising their legal rights, making decisions, meeting their obligations and mediating their differences to tackle obesity and raise revenue [267].

As described above, many actors and ministries were supportive of taxation. The participants acknowledged that cohesive government action facilitated the initiation of the taxation policy on SSBs. The participants accredited Vision 2030 as playing a significant role in promoting joint government action in policy making processes. This cohesive approach to government is well documented in Vision 2030 both in the National Transformation Programme 2020 described above and in subsequent documents.

Several actors reported that there were regular cross-sectoral meetings before, during and after the tax was announced. Interestingly, the SFDA was reported as attending these meetings; this contradicted their reports of being involved only after the tax was implemented.

‘Recently, and one of the vision’s results, Saudi Arabia has moved forward to implement taxation on carbonated drinks and energy drinks. Almost two years ago, we had a huge challenge how we could create the team to implement taxation. It took almost two years of meetings between deputy ministers from [the] Ministry of Health, leaders in the [SDFA] and [the] Ministry of Finance’ (elite actor number 2).

7.3.1.1.4. Existence of leadership

The participants described that the presence of leadership within the new government had a significant impact on getting issues (e.g. obesity) on the agenda and accelerated the process of policy development to solve those
issues. The new leadership was believed to encourage government entities to identify policy issues and put them on the agenda and to accelerate the policy process to solve them. The MoH identified and prioritised obesity as one of the significant risks for the Saudi population. The participants believed that Prince Mohamed Bin Salman encouraged the Ministers, their departments and all government institutions to work together to reach the goals identified in Vision 2030 [10] and the National Transformation Programme 2020 [9].

‘With the presence of young leaders in the Saudi government on the top of the government like Prince Mohammed Bin Salman, who had clear objectives for the government and framework to achieve these objectives and the Vision 2030, which would accelerate the development in Saudi Arabia. Within each ministry in Saudi Arabia, there is a new department to achieve the Vision 2030; this department determines the objectives and goals, and one of the MoH objectives is to tackle obesity. MoH has clear objectives, and it’s their responsibility, with their partners, in front of the King and the Crown Prince to achieve them’ (elite actor number 5).

The participants described how the existence of strong government leadership had a critical role in generating support from all the government entities to solve the obesity problem.

‘For the first time, the government recognised diabetes and obesity as one of the biggest public health challenges…[The] Ministry of Economy and Planning put diabetes and obesity as one of the government objectives to tackle. The government[’s] new era had prioritised health with attention from the highest level of the government, King Salman’ (elite actor number 11).

The Minister of Health, who is also the chairman of the SFDA, is one of the champions in tackling the objectives determined in the National
Transformation Programme 2020. Some participants believed that the Minister of Health, Dr AlRabiah, had the advantage of being in the era of Vision 2030 and in the presence of the Crown Prince. Others believed that Dr AlRabiah had the advantage of being the Chairman of the SFDA Directors Board that had made the passing of new restriction policies much easier than before. With all the advantages that Dr AlRabiah had, all participants agreed that he is one of the government champions in tackling obesity and other prevention services determined in Vision 2030 and the National Transformation Programme 2020.

‘The Minister of Health, Dr AlRabiah, is very serious about achieving the government Vision. He is a real champion. The framework to achieve the government goal is obvious. Unfortunately, in the past, before the Economic Council and the presence of Minister of Health Dr Alrabiah, who is the chairman of the SFDA director boards, there were some delays in policies, besides other government entities were not interested in implementing the Saudi FDA recommendations.’

Dr AlRabiah’s commitment to tackling the social determinants of health was not only acknowledged by participants but also by Dr Tedros Adhanom, the Director-General of the WHO [268].

‘I’d like to acknowledge the leadership of the Minister of Health and his commitment to strengthening public health, and health systems, and in moving towards universal health coverage……[I'd also [like to] acknowledge the progress on another priority issue for WHO: non-communicable diseases, which are currently the top cause of death in the country. The Ministry of Health has established a national strategy devoted to addressing NCDs with a strong focus on prevention. Saudi Arabia has recently passed landmark legislation to tax sugary drinks and tobacco products – in line with WHO recommendations’ (Media centre – WHO EMRO).
7.3.1.1.5. Government power

All participants agreed that Saudi Arabia is a powerful country, and the government is strong, meaning that no local corporations could challenge the government in their regulations and interventions.

‘All soft drinks bottlers are owned by Saudi businessmen; no one has challenged the taxation policy or demand[ed] changes in the policy’ (elite actor number 1).

The participants did not articulate why the government has power over the local corporations, and this was not a topic the researcher explored due to its political sensitivity. However, Adam Haniah, in ‘Money, Markets, and Monarchies: The Gulf Cooperation Council and the Political Economy of the Contemporary Middle East’ [269], explored why Saudi Arabia and other members of the GCC are powerful countries. The author highlighted that the governmental power over the corporations in Saudi Arabia is related to how the government supports them and acts as a form of wealth accumulation for them, as well [269]. This relationship does not mean that there are no differences or disputes between businesses and the government. However, the relationship between the local corporations and the government is internal, sensitive and not publicly available. The author assumes that the internality of the relationships means that political support can be a quick path for wealth; conversely, it means that a clash could be a path to marginalisation and financial bankruptcy [269].

7.3.1.2. Problem stream

The second stream within the multiple streams theory [226] is the problem stream. It includes indicators that measure the extent of the problem and the focussing events. Indicators are crucial to inform policymakers and policy development. The hard facts that are generated through monitoring activities or descriptive studies can be simple but powerful [270]. Some examples of the
indicators used by policymakers include morbidity and mortality data, shortages in resources and the increased cost of healthcare services. The focussing events refer to something significant and large scale that could alarm or trigger policymakers (e.g. a crisis or disaster). Focussing events can act similarly to indicators by bringing something invisible to the agenda to be prioritised.

7.3.1.2.1 Obesity problem
The alarming increase in the prevalence of obesity and diabetes was reported on the MoH website and published as a result of the joint work between the MoH and the Institute of Health Metrics and Evaluation in 2013 [271]. The joint work was the largest national survey to determine the prevalence of obesity and other NCDs. The survey was conducted among 10,735 men and women aged 15 years or older [271]. The survey found a prevalence of obesity (having a BMI ≥30 kg/m²) of 28.7% and a prevalence of being overweight (having a BMI ≥25 kg/m²) of 59.5%. While the prevalence of obesity was higher among women (33.5% versus 24.1%), the prevalence of being overweight was higher among men (61.5% versus 57.5%), but neither of these results were statistically significant. The study found that 13.4% of the participants were diabetics, 16.6% of whom were undiagnosed. Among the participants, 5.4% had uncontrolled diabetes [271]. The direct cost of diabetes was estimated to be around 17 billion Riyals. The authors estimated that if the undiagnosed patients joined the treatment pool, the cost would increase to 27 billion Riyals, and if those with glucose intolerance progressed to a diabetic diagnosis at the observed rate, the future cost would be approximately 43 billion Riyals. [271]

Policymakers were made aware of the size and cost of the obesity problem in part through the national survey and were motivated to take action (as mentioned by the participants).

‘It is very clear to anyone why the Saudi government has imposed taxes on carbonated and energy drinks. We have in Saudi Arabia a real
problem in obesity prevalence. From the last national survey, the obesity prevalence was high in the way that no one can ignore. Another problem associated with obesity is diabetes. We are paying currently for diabetes [after] years of neglect. Diabetes and its complications cost the MoH a major amount of the MoH’s budget, and we should seriously work on it immediately’ (elite actor number 1).

Although the 2013 study highlighted diabetes and obesity, they are not recent problems. Over the past thirty years, there has been a nearly ten-fold increase in diabetes [272], with several studies conducted since the late 1980s revealing that as many as 20% of adults have diabetes [273, 274]. Obesity and diabetes have been potential agenda items worthy of serious consideration for many years, yet they were not highly ranked on the governmental policy agenda until recently. This is despite the WHO and academics from the region calling on the Saudi government to act and tackle diabetes and obesity.

Kingdon [275] argued that although problem indicators may exist, they are not always obvious. He also argues that a problem requires a solution without challenges or barriers to be acted on [275]. Several challenges and barriers faced the Saudi government in relation to the introduction of obesity food-related policies (these are presented in Section 7.3.2.).

The next section presents how the actors perceived obesity and SSB consumption as health problems and what they considered to be the roots of these problems. Analysing how elite actors perceived and framed the problem assists in understanding how the solution was developed and proposed.

7.3.1.2.1.1. Views on obesity and sugar-sweetened beverage consumption
Many participants, including those from the MoH, framed obesity as a personal matter, blaming individuals for their choices rather than presenting obesity as
a complex and structural public health problem. This is interesting given that they supported the structural intervention of an SSB tax as a solution to the problem.

‘In the past, obesity prevalence has not reached this level; we burnt the calories we consumed by being active. Currently, people do not walk, and we ask our children to not go outside in the street. We consume high-calorie snacks and drinks, and we do not walk. People say that we have a busy life. I do not think they have a busy life like the Minister of Health or me, but we made a choice. We want our life healthier. I walk every day almost 12 km and the Minister of Health the same as well. People want to eat and drink without burning the calories they consume…Children love chocolate and sugary drinks, and parents do not look out for their children’s health, and these kinds of unhealthy foods are available and unrestricted. My children do not like these kinds of food even though they are now older and almost teenagers because when they were kids, we did not provide these food[s]…I encourage parents and families to look after their children’s health’ (elite actor number 1).

The interviewed actors believed that the consumption of carbonated drinks in Saudi Arabia is high and has led to an increase in the prevalence of obesity.

‘I think the consumption rate of carbonated drinks in Saudi Arabia is very high, and people consume them all the time. As you know that ‘PepsiCo’ has recently opened the largest company manufacturer in the world in Saudi Arabia in Jeddah…I think in Saudi Arabia, we have several bad attitudes; one of them is the consumption of sugary drinks. We consume them all the time, then we ask why we have a high diabetes and obesity prevalence’ (elite actor number 9).
As for obesity, most elite actors believed that carbonated drink consumption is a personal choice.

‘People consume carbonated drinks all the time, during gatherings and with food. They cannot stop consuming these drinks. The changes should start from their inside, their beliefs to reduce the consumption’ (elite actor number 10).

Only one participant from the health sector reported that SSB consumption is influenced by environmental factors (e.g. extensive marketing practices).

‘I do not have a problem with international companies. Coca-Cola and PepsiCo attempt to change sugar content in their beverages and actually succeeded in that, and they have options. The problem is with local companies. They market their beverages everywhere and trick the people in their promotions that their SSBs are healthy and contain vitamins, while in reality these beverages are not healthy and contain high levels of sugar’ (elite actor number 2).

7.3.1.2.2. Financial problem

Saudi Arabia experienced rapid economic development in the late 2000s because of government spending on development projects and the increase in oil prices. The price of oil was over 100 USD for each oil barrel, and this revenue accounted for almost 90% of the government’s budget at that time [276]. In the mid-2010s, the fluctuation in oil prices stabilised at less than 50 USD [276], and this was a shock for the central government and shaped its political priorities. The drop in oil prices created a focussing event and a crisis for the Saudi government in terms of how it was going to sustain continuous spending. The drop in oil prices was identified by respondents, and in the government budgetary documents for the fiscal year 2015 and 2016, as one of the reasons for economic reform. The price drop attracted intense political attention and called for immediate economic reform. It opened a policy window
to introduce solutions to alleviate the financial pressure on the government; one of these solutions was to implement taxation for the first time in Saudi Arabia as one of the measures to diversify the economy.

7.3.1.3. The policy stream
The last stream within multiple streams theory [226] is the policy stream. This stream includes how individuals perceive the solution and promote it in the agenda. Within this theme, it is identified how taxes are perceived as a possible solution to tackle obesity and diversify the economic resources of the central government.

7.3.1.3.1. Financial gain to diversify resources away from oil
Diversifying the economy and looking for other resources to take Saudi Arabia away from the dependence on oil have been pointed out in the Saudi government’s development plans for a significant period. For example, recommendations from the International Monetary Fund and McKinsey Global Institute between 2011 and 2015 were that additional non-oil revenue sources (i.e. broadening the tax base and reducing the dependence on oil) would lead to a more sustainable financial system. At that time, there was no personal income tax on wages on corporate profits and no VAT. However, the corporate profits and the business and professional incomes of individual Saudi citizens have always been subject to zakat (charitable donations) at 2.5%; this is an obligation on individuals in Islam. Documents from the Fascial Balanced programme, one of the government programmes created to achieve Vision 2030 [8], clearly state that the taxation on harmful and luxury products is one of the government’s tools to diversify the economy and to reduce the dependence on oil revenue.

Carbonated and energy drinks had been considered as non-necessities and harmful, and according to some participants, these are two of the reasons why taxation was implemented on them.
‘When we sat together to decide which items could be taxed, we thought about cars, empty and undeveloped lands, but we do not see better options than carbonated and energy drinks. They are unnecessary products, harmful, and could be replaced…the government hits two birds with one stone. The obesity problem and [an] increase [in] non-oil revenue’ (elite actor number 10).

The economic implications of taxing carbonated and energy drinks were used to positively frame the policy. The Ministry of Finance frequently issued press releases and engaged with newspapers and other media highlighting the financial gain as one of the benefits of SSB taxation. It is worth noting that the financial gain of the tax on carbonated and energy drinks was always combined with the possible health benefits of the tax.

7.3.1.3.2. Health gains from the taxation of carbonated and energy drinks
The debate around how to tackle obesity has been ongoing for more than two decades. Historically, the focus has been on changing individual behaviour (e.g. raising awareness of the risks associated with diabetes, educating patients with diabetes and hypertension about a healthier lifestyle through primary care centres and establishing clinics in primary care centres to educate obese patients about their conditions and how they might reduce their weight) [13]. Little was done to address the structural problem of obesity. Recent changes in government ideology have made actors in various sectors point their fingers towards the harmful effects of carbonated and energy drinks on health and move from individual interventions to developing policies and regulations.

‘[The] Ministry of Health for years had been working to increase public awareness about the risk of diabetes and obesity…I think one of the challenges that the government face[s] is [that] changing the public behaviour takes time. The government is now working in different way[s]. [The] Ministry of Health is working to develop new policies and
regulation[s]. We are very happy with this progress’ (elite actor number 12).

The next section presents how actors perceived the effectiveness of the tax on carbonated and energy drinks to reduce consumption and address health issues.

7.3.1.3.2.1. Policy effectiveness
The MoH officials expressed their feelings and beliefs towards the effectiveness of the taxation based on how the taxation reflected government ideology. This contrasted with their personal views that individuals were to blame for their own choices. Participants outside of the health sectors talked much more about what they believed, thought and felt.

For example, a government official from the health sector expressed that obesity was an individual choice and responsibility but was in favour of taxation over individual behaviour change and health education because taxation was a population approach. He perceived that such an approach is more profound and generates more significant results than an individual approach. It is not clear why he had taken different positions on the cause of the problem and the solution; however, it could be difficult for a senior MoH government official to question government policy.

‘Taxation on carbonated drinks would generate great benefits because it would affect the whole population, not like other interventions, which would affect a small percentage of the people’ (elite actor number 1).

Another key staff member from the health sector was in favour of taxation because it suits the Saudi cultural context that punishment works better than education and prevention.
‘I believe that interventions like taxes would fit more the Saudi population...In Saudi Arabia, we have one of the highest road traffic accidents in the world. Many times, the Ministry of Interior and [those of us in] the MoH made several awareness programmes with no observed benefits. However, when the Ministry of Interior implemented the extensive road traffic violation fines with Saher [automated violation detection system], road traffic accidents decreased’ (elite actor number 2).

Multiple key staff from the health sector were in favour of a combined intervention to tackle obesity and reduce the consumption of SSBs.

‘I think all interventions would make changes in people’s behaviour. The collective benefits from all interventions would make the change. No intervention is better than another. In medicine, we call this is a synergistic effect. All interventions together will make the change greater’ (elite actor number 8).

Different perceptions were raised from those outside of the MoH who questioned the effectiveness of the taxation policy. For example, one of the Consultative Council members and an advisory consultant for the chief executive officer of the SFDA perceived taxation as inappropriate because obesity and diabetes are more likely to affect wealthy people while tax would only affect those in lower socioeconomic classes.

‘I am against...taxation. I do not believe it would work to reduce the prevalence of obesity and diabetes as many say. Obesity and diabetes are rich diseases [these diseases are more evident among wealthy people], and what we do, we are increasing only one or two Riyals for each can of Pepsi. It would not affect the rich people, and we only make poor people suffer more and pay more. I think it is not fair. We observe that these diseases hit the rich, and we punish the poor’ (elite actor number 12).
Another argument raised against the taxation policy is that it is a policy developed in other contexts and countries and may not generate similar results in Saudi Arabia.

‘I do not think taxation on carbonated and energy drinks would make great changes in the consumption behaviour. The taxation policy was developed in a different context from Saudi Arabia. The level of inflation in Saudi Arabia is high. On top of that, we are one of the richest countries in the world, and people in Saudi Arabia are rich...not like many other countries’ (elite actor number 5).

7.3.1.3.2.2. Policy transfer

According to Dolowitz and Marsh [277], policy transfer ‘is knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present), which is used in the policy development, administrative arrangements, institutions and ideas in another political setting’. Policy transfer between countries has become an important aspect of the contemporary world of policymaking. Furthermore, international organisations such as the WHO, the International Monetary Fund and the World Bank encourage similar policies across diverse countries after the policy has been evaluated [278]. Key officials indicated that the success of imposing taxes on SSBs in other contexts and countries was one of the drivers that facilitated imposing taxes on carbonated and energy drinks in Saudi Arabia.

‘Several countries have succeeded in imposing taxes on sugary drinks, such as [the] UK and Mexico. They imposed [a] tax on SSBs because it is one of the tools to tackle obesity. We are not the first country to impose taxes on carbonated and energy drinks’ (elite actor number 7).
Another example of how taxation has been pushed on the agenda and imposed on carbonated and energy drinks is that the policy itself is based on the WHO’s recommendations. Interviewees from the health sector and the MoH documents state that the proposed taxation on SSBs was based on the WHO’s recommendations.

‘We have an agreement with the WHO to reduce the prevalence of NCDs and it is kind of policy itself. We have obligations to act on the factors that contribute to the prevalence. Many policies we have in Saudi Arabia are based on the WHO recommendations…the taxation policy is one policy that has been promoted by the WHO’ (elite actor number 2).

7.3.2. Challenges and barriers in implementing other dietary-related obesity policies
At the time these interviews were conducted (2018), the MoH and SFDA announced government strategies for a healthy diet that aimed to introduce new food policies to regulate sugar, salt, saturated and trans-fat consumption and increase public awareness to choose a healthy diet. These included calorie labelling by restaurants and preventing misleading information on food products. Most participants were talking about perceived challenges and barriers to policy implementation prior to this announcement, although they were often implied as ongoing issues. Six challenges or barriers were reported to have prevented or delayed the progress towards food-related policies: (1) a lack of financial resources, (2) unstable leadership, (3) a lack of cohesion, (4) a low level of engagement in civil societies versus a high level of engagement in the food and beverage industries, (5) the public–private partnership and (6) the WTO disputes and power.
7.3.2.1. Lack of financial resources

A commitment to address the determinants of obesity is essential. However, commitment is not enough to move forward; mobilising sufficient resources is very critical in ensuring the success of the commitment. Historically, financial resources have not supported the rhetorical commitments in Saudi Arabia to address obesity. The participants emphasised the need for financial resources to improve food policies for tackling obesity.

‘We cannot control small businesses, and it is very difficult and hard. Government in this area only supervises food safety and did not and cannot observe the food content. It is very challenging. We had several meetings [regarding] food contents; however, it is very difficult because of the financial constraints’ (elite actor number 2).

The lack of financial resources, inadequate budgetary allocations or the failure to use finances has often resulted in weak organisational capacities. These include the absence of qualified professional and administrative staff and a high administrative workload. The participants gave the example of the Ministry of Education’s attempt to ban soft drinks from all school canteens; this failed because of a lack of staff to oversee the canteen suppliers.

‘[The] Ministry of Education banned carbonated drinks from all schools in Saudi Arabia twenty years ago. However, this policy was not fully enforced, and schools’ administration did not take this policy seriously to be implemented. One of the reasons why the policy was not implemented is because there was not enough staff allocated to supervise canteens. I do not know exactly the reason why [the] Ministry of Education did not at that time allocate canteen supervisors, perhaps [a] financial issue is one of [the] main reasons, besides not prioritising the policy itself’ (elite actor number 4).
A lack of resources also undermined the planning activities of the Saudi Arabian government to tackle obesity. Participants emphasised that poor data on food consumption patterns prevented Saudi Arabia from determining what dietary interventions or programmes could alleviate the increasing burden of NCDs. With the absence of financial support, key officials found it difficult to introduce new policies and to evaluate the efficiencies of current strategies.

‘[The] national food composition survey is one of the important tools to determine on which area the government should act. The last national food composition survey was conducted in the late 80s in the last century. We need another national food composition survey to know where we are and to act based on the evidence. I think one of the reasons why we did not have [a] more updated national food composition survey is that it is costly, almost SAR 15 million’ (elite actor number 5).

7.3.2.2. Unstable leadership at the Ministry of Health
The participants expressed that a lack of leadership before appointing Dr AlRabiah had hindered the progress of tackling obesity. Between April 2014 and May 2016, six Ministers of Health were appointed. They indicated that these changes over a short period led to delays in multiple programmes and policies within the MoH.

‘One of the issues that led the Ministry of Health to delay many policies to tackle obesity is lack of leadership and the changes in the ministers. I think almost five or six ministers have been appointed as [the] Minister of Health in two years. Each one of them came with his own belief s [on]how to deal with the ministry issues and prioritise[d] what he believes [d] should be prioritised’ (elite actor number 5).
7.3.2.3. Lack of cohesion

Addressing the drivers of obesity needs coordinated and sustained actions within and across various sectors [31]. This was viewed as a challenge as many dietary policies were outside of the MoH’s realm. In addition, there was low authoritative power over other public or private entities.

‘The MoH cannot legislate laws or policies. We highlight the problems and make recommendations, and we insist on these recommendations, but we do not have the power’ (elite actor number 8).

The level of cohesion towards other food-related policies was not equivalent to what occurred for the SSB taxation policy. Instead, the cohesion and linkage between sectors were loose, and they sometimes passed problems on or acted against each other because of differing institutional interests.

‘There is a grey area between ministries. This grey area contains duplication in the work, and sometimes they work against each other. Sometimes, no one works on these issues, and they transfer the problem or issue between ministries and the problem becomes bigger. Like within the dietary policies’ (elite actor number 2).

Some participants believed that there was no clear framework to unify the efforts and ensure implementation, resulting in delayed obesity-related policies.

‘We do not have a clear framework to translate the government[’s] plans into actions. We are very good at making plans, but to translate these plans, we need collective efforts between ministries and within each ministry…this was not very clear before the Vision’ (elite actor number 11).
It is not clear whether the participants’ confidence in the Vision, as expressed above, came from actual improvement in the government operation or was to show political support to the new government.

### 7.3.2.4. Food-related policies encountered a low level of engagement from civil societies and a high level of engagement from the food and beverage industry

According to some participants, there are more than 60 civil societies interested in health, only one of which is interested in obesity. Participants believed that one of the reasons for the poor and slow response towards food policies is that there was a weak engagement from the civil societies in Saudi Arabia to advocate for attention and resources.

‘One of the reasons for the delay [in implementing] effective policies to reduce the prevalence of obesity is the [absent] role of civil societies. [The] Ministry of Health makes all [the] efforts, and [the] civil societies are not participating in this role. We see people drink carbonated drinks all the time, with food and in social gatherings, and I [have] never heard a concern from civil societies’ (elite actor number 10).

The participants emphasised that the government’s food policies have always been developed from a top-down approach where policymakers mainly drive the decisions, and there is no role for civil society to be part of the policy process or development.

‘There is no role of civil societies in the taxation policy on carbonated and energy drinks. Most government policies always come as initiatives from the government bodies and [are] driven by policy makers due to their beliefs or international recommendations, and were rarely, I would say rarely because it might have happened in the past, even though I have never heard about any policy [that] was driven by any civil society
or based on the civil societies’ recommendations’ (elite actor number 7).

Food and beverage corporations were reported to be more engaged debating and challenging the evidence of the government policies.

‘In the Saudi FDA, there is an online platform to discuss and critique the current policies and raise concerns about any issue. Food and beverage corporates are active in this platform, while civil societies and academics have never participated in this platform. Food and beverage corporates are always challenging our policies with evidence’ (elite actor number 3).

The only participant from the civil society organization justified this low engagement by stating that the government does not recognise their efforts and questioned whether the government could accept civil societies.

‘Government bodies did not recognise our efforts, and this is one of the reasons why there is a low level of engagement from us, and how we could engage with them if they do not see us’ (elite actor number 14).

7.3.2.5. Public–private partnership
A public–private partnership (PPP) was established between PepsiCo and the Saudi government, after the announcement of the SSB tax. The PPP aimed to sponsor an initiative for tackling obesity in selected schools by establishing a database, a supportive work environment, by increasing awareness levels and activating policies and strategies related to a balanced diet and physical activity. The participants appeared reluctant to talk about this relationship; in addition, the initiative and corporate webpages do not mention the link between the government and the company. However, some respondents stated that it is a programme funded by ‘PepsiCo’.
‘One of the initiatives we had to reduce the prevalence of childhood obesity is a result of partnerships between [the] MoH, [the] Ministry of Education, and one of the carbonated drinks international corporate[s] to fund the initiative’ (elite actor number 4).

The key staff within the MoH and the School Health Department made it clear that this partnership is not accompanied by marketing for any SSBs or high-density energy snacks.

‘In our contract with [the] beverage corporate [that] sponsored our new initiative, the sponsored company will never promote any unhealthy products or any beverages during the time they fund the initiative in the schools, only healthy snacks and water could be promoted’ (elite actor number 6).

They also felt that the government entities (primarily the MoH) would not be affected by the partnership because of the strength of the MOH and its large budget.

‘[The] Ministry of Health is a strong Ministry, not like any other governmental bodies…[the] Ministry of Health has the second-highest budget in the Saudi government. We welcome any partnership with the private sector according to our terms. If they do not accept our conditions and terms, we do not accept their partnership. There are mutual benefits, and we understand the importance of private sectors, but their sponsorship should not jeopardise our efforts’ (elite actor number 2).

Non-governmental participants were concerned that partnering with the food and beverage industry and accepting their sponsorship of some projects could
lead to a block or a delay in some projects if there was a request from the industry directly.

‘Private sectors give the money by their hands and take it back from you by a shovel. They try to fund some small projects to delay or block some initiatives you are going to implement. I have seen these kinds of activities, and it happened to me’ (elite actor number 11).

7.3.2.6. World Trade Organisation disputes and power
Transnational corporations can challenge government power by using their legal rights within the WTO; the Saudi government has been a member of the WTO since December 2005 and accepted the Technical Barriers to Trade (TBT) Agreement in 2006 [279]. The TBT aims to ensure that technical regulations and standards do not create unnecessary obstacles to trade [280]. It acknowledges the WTO members’ right to execute measures to achieve legitimate policy objectives (e.g. the protection of human health) but strongly encourages members to base their measures on international standards as a means to facilitate trade [280]. The agreement itself is not an obstacle because it gives the right to members to implement whatever is needed to protect human health, but it requires supportive evidence that may be lacking (see Section 7.3.2.1). For example, the Saudi Cabinet agreed to include a warning statement on energy drinks in 2015. However, energy drink companies blocked this policy through the WTO because it was not supported by evidence.

‘We had a case in the past, but not this taxation policy, when the energy drinks demanded to block the warning tags on all energy drinks; they made the dispute case in the WTO, and they succeeded to block the policy from implementation’ (elite actor number 8).
Furthermore, some dietary policies are based on intervening in the nutritional composition of food products and exercising power over the food industry; this could not happen because of the WTO regulations.

7.4. Chapter summary
This chapter presented the contextual factors around developing a taxation policy of carbonated and energy drinks and the challenges and barriers in implementing other obesity dietary-related policies. The existence of the three major streams (political, problem and policy) included the main facilitating factors to implement a tax on carbonated and energy drinks. A new government ideology that prioritised tackling obesity and diversifying the economic resources away from oil, leading with institutions, leaderships, government cohesion and power, opened the political window to solve the obesity and financial problem with taxation.

Conversely, six barriers and challenges prevented or delayed the government from succeeding to implement other obesity dietary-related policies: lack of financial resources, lack of leadership before the current Minister of Health, lack of cohesion, low engagement from civil societies versus high engagement of the food and beverage industry in government dietary policies, public–private partnership and WTO disputes and power. The following question should be asked: is it enough to impose a tax on SSBs to reduce consumption, or should other instruments be implemented? In the next chapter, the drivers of SSB consumption are discussed among the Saudi population. In addition, the actual drivers that should be tackled to reduce SSB consumption are presented.
Chapter eight: The determinants and drivers of sugar-sweetened beverage consumption

8.1. Introduction
In the last chapter, the political reasons to implement taxes on SSBs and a scoping review of government barriers to the implementation of other policies to restrict unhealthy food intake were presented. While the government has succeeded in implementing one of the WHO’s 'best buys' policies [96], the tax on carbonated and energy drinks (found to be one of the promising population-based policies to reduce the prevalence of obesity and other NCDs [96]), the government has not considered the drivers of SSB consumption and has not attempted to implement policies to address them. This chapter addresses the third and fourth objectives of my PhD by presenting the perceptions, attitudes and behaviours of Saudi Arabians on their SSB intake and by investigating the availability, accessibility and exposure to SSBs in Saudi Arabia. It is important to understand the drivers of SSB consumption in conjunction with understanding people’s attitudes towards SSB alternatives. Therefore, this thesis explores the attitudes towards SSB consumption.

The drivers of SSB consumption are presented among two groups, a low-SES group and a mid- to high-SES group from Mecca in Saudi Arabia. The drivers of consumption are categorised based on the socioecological model by Bronfenbrenner [281] that values several spheres of influence within the lives of individuals. It gives the researcher opportunities to identify how people could be affected by their personal choices, family and community power and the broader cultural and environmental factors that influence SSB consumption and peoples’ attitudes towards it. By applying the socioecological model approach [281], different spheres are considered to confidently determine what can influence consumption behaviour and to find the best support strategies to reduce and limit the consumption of SSBs in Saudi Arabia.
8.2. Results
The socioecological concept was used to understand the determinants and the drivers of SSB consumption among the participants. Three major domains were identified: (1) individual, (2) environmental and (3) social. Within the individual domain, four major subthemes emerged: the enjoyable attributes of SSBs and individual behaviour, knowledge and affordability. Within the environmental domain, two major subthemes emerged: the availability and accessibility of SSBs and industry marketing and promotion. Within the social domain, two major subthemes emerged: social norms and family requests.

One of the major themes that emerged in this chapter is participants’ views on alternatives. Five major subthemes emerged: (1) not recognising any alternatives, (2) taste differences, (3) alternatives are perceived as unhealthy choices, (4) alternatives are not available and accessible (like other SSBs) and (5) natural juices are expensive.

8.3. Individual domain

8.3.1. Enjoyable attributes of SSBs

a) Taste
One of the inherent factors among individuals that drive the consumption of SSBs is the taste. Participants perceived that the taste of SSBs, mainly the level of sugar and carbonation, is what makes them consume them. In addition, the taste preference is one of the main drivers for choosing one SSB over another.

‘I felt it is delicious… the mixture is what I like about Pepsi and Mountain Dew. [The] [a]mount of sugar and gases are amazing and unbelievable. This mixture is what makes me…choose Pepsi over Coca-Cola’ (21 years old, normal-weight shape, with a high school degree from the low-SES group).
Participants perceived the taste of SSBs as more delicious when associated with certain activities (i.e. smoking and eating). These associated activities are discussed in Section 8.2.2.

b) Thirst-quenching and refreshing

The average high temperature of Mecca is 30.5°C [282]; in the summer months, the average high temperature reaches almost 42°C [282]. The hot weather in Mecca is one factor that made the participants perceive SSBs as refreshing and thirst-quenching.

‘When you go outside [at] night and the weather is almost 40 or more, you are not going to drink coffee or tea; you are going to buy something cold. Weather…[affects]…why we drink carbonated drinks’ (24 years old, normal-weight shape, with a university degree from the mid- to high-SES group).

c) Providing energy

One of the attributes that individuals enjoy about SSBs is that they provide energy and make them alert. Several types of commercial SSBs exist in Saudi Arabia. Energy drinks are one of the types that multiple participants referred to. The use of energy drinks varies among participants; some consume energy drinks to make them more alert while driving or when resisting sleep for any reason, and others use energy drinks to concentrate during studying or to provide energy.

‘I work in Jeddah, and I need to drive between Mecca and Jeddah every day. Sometimes, I do not sleep very well at night, so I need to focus while I am driving. I drink Red Bull or Power Horse to make [me] awake and alert’ (34 years old, obese shape, with a university degree from the mid- to high-SES group).
Some participants perceived SSBs (i.e. nectar juices) as a source of energy because of the sugar content inside these beverages that could provide energy to do activities.

‘I like to drink mango or apple juice from Almrai or other brands before I do any activity. I used to have this habit [a] long time ago. When my father or mother [would] ask me to fix the table or to remove some stuff, I like to drink these beverages in the middle or before the activities, so I do not feel tired. It gives energy for at least 30 or 45 minutes, so If I have a lot of things or work to do, I drink maybe two or three bottles’ (20 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

a) Swallowing and digesting food
Most participants consume SSBs during or after eating. When participants were asked why they have this habit, they frequently answered that SSBs helped them digest and swallow the food.

‘It is a habit, I used to drink Pepsi with food to push the food…I meant to swallow. The food is dry and drinking Pepsi with food helps [it] to be swallowed easily’ (39 years old, obese shape, with a university degree from the mid- to high-SES group).

‘People are used to drink[ing] carbonated drinks with food. We eat something greasy that is necessary to have something to facilitate…digestion. So, we drink the carbonated beverages [that] facilitates the digestion’ (40 years old, obese shape, with a high school degree from the low-SES group).

b) Changing the mood
The participants expressed their feelings towards SSBs as a drink that could change the mood. The label ‘change the mood’ was used to justify SSB consumption and was frequently coupled with the notion of occasional
consumption. The belief that SSBs ‘change the mood’ was referred to in certain settings. For example, consuming SSBs during work was considered a stress reliever.

‘Drinking carbonated drinks in work provides me…at least 30 or 45 minutes of relaxation and stress reliever while I am working’ (40 years old, obese shape, with a high school degree from the low-SES group).

Some participants indicated that they needed SSBs to feel total enjoyment while watching football games, television shows or movies. They perceived SSBs to be an essential component in an environment of happiness and satisfaction.

‘Enjoyment…I meant when I watch something on television, I drink carbonated or energy drinks. Sugary drinks set the atmosphere and it gives happiness and taste for the environment. I usually bring popcorn and other snacks while watching television and enjoying my time with [my] wife and son. We laugh and watch television and drink these drinks. Also, I like watching football matches, and I have in my hand a glass full of ice filled with Pepsi and [a] slice of lemon’ (40 years old, obese shape, with a university degree from the mid- to high-SES group).

8.3.2. Associated individual behaviour
Participants from both socioeconomic groups identified several actions that were associated with the consumption of SSBs (e.g. a sedentary lifestyle, watching television, smoking and eating food).

Most participants from both socioeconomic groups mentioned three activities that were usually associated with consuming SSBs (primarily carbonated
drinks): watching television, eating food and smoking. Some participants also prepared popcorn to set the atmosphere when drinking SSBs.

Participants from both socioeconomic groups who smoked mentioned that they usually consume SSBs while smoking. Participants felt that the smoke from cigarettes was hot on their throats and made their throats dry; drinking SSBs helped them moisturise and cool their throats.

‘I am a smoker. Often, the vape of cigarettes is hot on my throat. To overcome this problem, I always like to have something cold with me. Pepsi is one of the things that moisturise[s] my throat, and [cools] my throat, which become a necessity to be with me, when I smoke’ (23 years old, normal-weight shape, with a high school degree from the mid-to high-SES group).

Eating food is one of the behaviours most associated with consuming SSBs in both socioeconomic groups. This association's reasons were cross-referenced with something that participants liked about SSBs: aiding in swallowing and digestion.

Participants felt it was essential to consume SSBs while eating due to the type of food served in Saudi Arabia. Many participants further explained that 'rice and meat or chicken', the most popular food in Mecca and in Saudi Arabia, cannot be eaten without SSBs (primarily carbonated drinks).

‘We…drink carbonated drinks with food. It is essential because [of the] type of food. You cannot have rice with meat or chicken without having Pepsi with it to digest and swallow the greasy and fatty food. If I do not see Pepsi during lunch, I do not complete my food and I go and buy Pepsi quickly’ (23 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).
Young participants felt that Western food types, such as 'burgers' and 'hotdogs', were also associated with SSB consumption and could not be eaten alone.

‘I always drink Coca-Cola with food. Some types you cannot eat them without carbonated drinks. It is impossible to order fast food without Coca-Cola...As I told you previously, you cannot have a burger or Albaik (a popular fried chicken restaurant) with water. It should be with a carbonated drink’ (27 years old, normal-weight shape, with a university degree from the low-SES group).

8.3.3. Knowledge

8.3.3.1. Considering nectar and flavoured juices is healthy
The results revealed that nutrition knowledge represented an essential factor in determining participants' attitudes towards SSBs. Most families perceived SSBs, excluding carbonated and energy drinks, to be healthy and had no problem allowing their children to consume these beverages. Fathers demonstrated their nutrition knowledge of the sugary commercial fruit drinks in a hierarchy. Certain drinks were perceived to be healthier or less healthy relative to others; this rating was based upon the company name, the type of juice (whether it was 100% fruit juice, nectar or just artificially flavoured fruit and coloured with added sugar) and the presence of healthy ingredients such as vitamins. In general, participant perceptions towards the hierarchy of commercial fruit drinks were accurate. However, an issue observed and highlighted by one of the key staff within the MoH was that most companies claim that their juices are 100% fruit juice, but the listed ingredients do not support this claim.

Most participants did not report the sugar content of SSBs or the side effects of sugar as problematic. Instead, fathers considered commercial sugary drinks to be healthy because they considered them to be a source of energy, hydration and vitamins.
‘I do not buy for my children carbonated drinks. I buy for them juices from Almrai [a local nectar juices brand] so they can drink them in their free time with snacks. It gives them energy and keeps them hydrated’ (27 years old, normal-weight shape, with a high school degree from the low-SES group).

‘We have a problem in Saudi Arabia. Parents do not buy or bring home carbonated drinks, but they buy other sugary juices with orange or apple. They consider these drinks healthy and [that they] provide their children with nutrients and vitamins’ (30 years old, overweight shape, with a university degree from the mid- to high-SES group and the first focus group).

The participants reported using sweet drinks to encourage their children to do a particular behaviour (e.g. eating all their food).

‘Sometimes, I let my child [aged four years old]…drink Pepsi because I want to encourage him to finish his food’ (29 years old, normal-weight shape, with high a school degree from the low-SES group).

8.3.3.2. It is not a problem
Most participants from both socioeconomic groups perceived that SSBs were not a problem and provided various justifications for them. The first justification was based on the perception that they drink a small number of SSBs per week. While this perception seems to be a justifiable reason to continue drinking SSBs, the actual consumption of SSBs for these participants was at least one per day.

‘I do not need to stop or reduce the amount of…carbonated drinks. I drink five to six times per week, which is not bad. Less or more is a right amount. I can feel that it is a risk if it is daily. By daily, I mean in the
morning and evening. Those people I would say yes, they should reduce the level of consumption. For me, this level I see it appropriate’ (22 years old, obese shape, with a university degree from the low-SES group).

Another justification among the younger population was the perception that they are still young and are free of chronic diseases.

‘I think carbonated drinks could harm us, but for me, I am young and healthy, and I do not have diseases. I am strong, so why…should [I] stop drinking these beverages or reduce them’ (21 years old, normal-weight shape, with a high school degree from the low-SES group).

Some participants provided a justification for consuming SSBs because they believed they were active compared with other people who led a sedentary lifestyle. They perceived that if they are active, they can drink as many SSBs as they want.

‘I do not see drinking carbonated or sugary drinks [as] harmful particularly for people who work out regularly, instead these beverages provide people with energy’ (30 years old, overweight shape, with a university degree from the mid- to high-SES group and the first focus group).

8.3.4. Affordability
Affordability usually indicates the capability of an individual to buy a product [283]. This is primarily influenced by an individual’s income and the price of the product [283]. In this subtheme, affordability is defined as the product’s price in relation to the participants’ (the consumers) income. The aim of this section of the study is to consider the relationship between the affordability in purchasing SSBs and income.
8.3.4.1. Overview of the prices of sugar-sweetened beverages in Mecca

Different SSBs vary notably in price, depending on the type and corporate name. There are premium SSBs (e.g. PepsiCo’s and Coca-Cola’s carbonated drinks, Power Horse’s and Red Bull’s energy drinks and Ceaser’s juices). There are other less-expensive premium SSBs (B Cola soft drinks, Code Red energy drinks and different local brands of nectar juices). Importantly, after the taxation on all carbonated and energy drinks (regardless of sugar content) was implemented in Saudi Arabia in 2017, the beverage industry initiated several strategies to increase their sales and mitigate the effects of the government’s taxation policy (a possible reduction in sales). The first observed strategy was reducing the can size and the price. PepsiCo launched a new size for their soft drinks, reducing the volume from 330 ml to 200 ml and the price from SAR 2.5 to SAR 2, after tax, respectively. Coca-Cola employed the same strategy, launching two sizes of their popular soft drinks; the first size was 200 ml, and the second one was 150 ml for a reduced price of SAR 2 and 1 respectively. Code Red, a local energy drink, launched a smaller-sized product with a 50% lower price (the volume was reduced from 250 ml to 150 ml).

Within the affordability subtheme, three major subthemes emerged from both socioeconomic groups. The next section presents how the participants perceived the level of affordability of the current SSB prices and how they reacted to the increased prices related to the taxation by either purchasing the newly emerged product sizes or by shifting to lower-price premium brands.

8.3.4.2. Affordability of the current price

Most participants from both socioeconomic groups perceived the current prices of SSBs as affordable (even after taxation). However, most participants from the mid- to high-SES group were slightly more comfortable when expressing their opinions about soft drink prices than those in the low-SES group. They perceived that the increased prices of the carbonated drinks were reasonable relative to their income and would not affect their monthly budget.
‘As I told you previously, it did not affect my budget. The current prices even after taxation is okay. It is only SAR 60 [almost 16 USD] per box for 24 cans. It is nothing for my pleasure and happiness’ (33 years old, overweight shape, with a university degree from the mid- to high-SES group).

Participants from the low-SES group also expressed that the prices of the premium soft drinks were affordable, even after taxation. However, they perceived that the current prices were slightly higher than expected and would add financial pressure. Some of them had switched from their favourite brands to brands with lower prices or purchased smaller sizes at lower prices; these topics are presented in Section 8.2.4.3 and Section 8.2.4.4, respectively.

‘The current prices of carbonated drinks are expensive, but I still buy it even with the increased prices…because I like it, I would never stop it and the price would never stop me’ (33 years old, normal-weight shape, with a high school degree from the low-SES group).

Two participants from the low-SES group were shocked with the increased prices after the taxation on carbonated drinks; however, they returned to their regular drinking habits after they absorbed the shock and realised that they could not stop consuming SSBs because of the increased prices.

‘At the beginning the price was unexpected, and I reduced the amount…only at the beginning, after that, I started to have my normal habit and I absorbed the shock… as I told you, the difference in the consumption rate was after the taxation, but now I returned to my normal habit’ (29 years old, normal-weight shape, with a high school degree from the low-SES group).
Unexpectedly, two participants, each from different income groups, had increased their consumption rate after taxation. They claimed that their increased consumption rate was because they do not like coins; when purchasing the normal-sized carbonated drink for SAR 2.5, they would have received SAR.50 back in coins. Therefore, they intended to buy two cans or even the larger bottle for SAR 3.

‘My drinking volume increased after taxation...I buy the larger size for SAR 3... because it is only for SAR 3 and the regular can for SAR 2.5. The difference is only SAR 0.50 and the size is bigger, and I do not like coins...I do not like collecting coins. They are heavy and I always lose them’ (24 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

Most participants, from both socioeconomic groups, perceived the manufactured nectar juices and other flavoured juices as affordable and cheap (these are not taxed).

‘The prices of nectar juices or juices such as Sun Top are affordable and cheap. Can you imagine the price of the box of this drink is only SAR 8 [almost 2 USD], and it contains more than 20 bottles of juice? It is affordable and everyone can have it’ (36 years old, overweight shape, with a high school degree from the low-SES group and the first focus group).

8.3.4.3. Reaction to price increase: switching to lower-priced brands
Switching to lower-priced brands was one of the strategies participants used to continue drinking SSBs after the implementation of the tax, particularly among the low-SES group. The reaction to the increase in price was to switch to other brands within the same drink category or to switch the type of drink (switching from energy drinks to carbonated drinks or changing from carbonated drinks to manufactured juices).
Almost half of the lower socioeconomic participant group stated that they switched their premium carbonated drink to a lower price SSB. They perceived the price of B Cola to be affordable and the right choice if they did not have enough money to purchase their favourite brand.

‘The price of Pepsi is expensive, and our priorities changed. I am in love with carbonated drinks, but I cannot afford it in this price. This is a new reality. I am not going to be sad like how I used to be. I do not have money to buy Pepsi [so] I changed, and I started to drink B Cola. It is okay. When I receive my salary each month, I buy [a] couple of Pepsi[s] just because it feels good, and I do not prevent myself’ (21 years old, normal-weight shape, with a high school degree from the low-SES group).

Two participants from the lower socioeconomic group stated that they started to drink nectar juices or flavoured juices because they were cheaper than any other SSB.

‘Sometimes I go to the convenience store in the neighbourhood, and I don’t have money, I buy juices [artificial juices or nectar juices]...it depends on the person’s economic status. If he has money or [if he is] poor like me without a job. Options are various and there are many cheap juices such as Nadec [or] Almarai for SAR 1’ (24 years old, normal-weight shape, with a high school degree from the low-SES group).

Only three participants from the mid- to high-SES group had switched the brand of their favourite SSBs to a lower price one; the rest had never expressed any feelings or opinions towards switching to a lower price product. The three participants shared multiple characteristics: university students aged below 21 years, and their only income came from family support and the government allowance for Saudi bachelor students (SAR 999) per month.
These three participants were purposefully included so that the opinions of younger adults were captured.

The first participant believed that his favourite energy drink was overpriced, and he could not afford to purchase it regularly; this made him switch from energy drinks to carbonated drinks. The second participant also had the same belief towards his favourite carbonated drink; this led him to change to one of the nectar juices. The third participant did not change his favourite carbonated drink; however, he commented on his peers' and other people's behaviour towards the prices after taxation and the switch to products that cost less. He believed that the new lines of products from some companies had grabbed people’s attention and that people had begun to buy them.

8.3.4.4. Reaction to price increases: the switch to a lower size at lower price
Several beverage corporations launched smaller sized products at lower prices when the government imposed the tax on carbonated and energy drinks. This strategy increased the purchase ability of consumers in Saudi Arabia and among the participants who were involved in the study.

More participants from the lower socioeconomic group had switched to a smaller size can of their favourite beverages at a lower price compared with the middle and higher socioeconomic group. They felt that the new sizes at lower prices provided the opportunity for them to purchase their favourite drinks without impacting their finances.

‘I drink Cod Red [a type of local energy drink]. It is delicious and makes me happy. Thank God, the company launched a new size for only 2 SAR, almost 0.66 USD… It is still affordable with the new size. Yes, it is expensive, but I can afford it. The pretty thing is that there are options [that]
depend on your needs’ (24 years old, normal-weight shape, with a high school degree from the low-SES group).

Ultimately, daily SSB consumption levels were not altered because people had the ability to purchase SSBs in smaller sizes and at lower prices. Some participants further clarified that they specifically purchased smaller sizes but in the same amounts as when they purchased regular sizes.

‘I think I am still consuming the same amount even after I started drinking the smaller size because I think I started to buy more than what I used to’ (35 years old, normal-weight shape, with a high school degree from the low-SES group).

The affordability was not the only reason participants chose to consume these smaller sized beverages at lower prices; some believed that the smaller size was better because it better preserved the cold temperature and the carbonation.

‘There are two sizes, the regular one and the smaller new one. For me I would rather…drink the smaller one…yes financially at the beginning [it] was…worth it. But now, I love the smaller size because I can finish it all, it kept the coolness in the can and the gases. I think it is more delicious’ (35 years old, normal-weight shape, with a high school degree from the low-SES group).

8.4. Environmental domain
Several environmental factors emerged that influenced the participants’ consumption behaviours. The two main subthemes that emerged under the environmental domain were the availability and accessibility of the SSBs and the marketing and promotion by the SSB industry.
8.4.1. Availability and accessibility

According to the participants, the physical availability of the SSBs was one of the leading factors that led to SSB consumption. This included the availability of these beverages at home, in other people’s homes and in places where SSBs could be obtained or purchased. The existence of SSBs in the immediate environment triggered their consumption.

8.4.1.1. In-home availability

SSB availability at home was related to consumption level. Whenever SSBs were available at home, participants believed that it led to an increase in their consumption. The presence of SSBs in high quantities made participants feel secure that their favourite drinks were available; therefore, they could drink as much as they wanted without the fear of not having these beverages available.

‘I buy large quantities of carbonated drinks because I consume [a] large volume. Perhaps when I return home after work, I do not go outside, so I would rather have my drink in front of me in large quantity…as long as I have this beverage available in front of me, I will never stop. If it is 2 or 3 am, I would never go outside [at] this time because it is late. But if I have it in home late, and I desire to drink it at that time, I will drink it even if I have a box of 24 cans, I will drink them all in one week’ (33 years old, overweight shape, with a high school degree from the low-SES group).

Different strategies were taken by the participants who wanted SSBs available in their homes. These participants, from both socioeconomic groups, reported buying multiple cans of SSBs at a time because they wanted to have them available in their homes.

‘In the last five years, my consumption rate of Coca-Cola has increased obviously…in the past, I used to buy only one can from the convenience store, but now, I started to buy five or six cans, and I put them in the
fridge. So, I can drink the Coca-Cola whenever I desire it’ (25 years old, normal-weight shape, with a high school degree from the low-SES group).

Another strategy was taken by some of the mid- to high-socioeconomic participants; they would purchase large quantities of SSBs in boxes containing 36 cans. They would make these large quantities available at home to feel secure and avoid worrying about the availability of SSBs.

‘Whenever it is available in front of me, I can drink [it] at whatever time, with football matches, and with food. It is always in front of me, and I do not have the feeling that I do not have it when I need it. With television shows and matches, I must drink Pepsi. Sometimes, I drink four cans per day, this [is] why I must make it available in [my] home. Almost every month, I buy two boxes of Pepsi…Because I do not like going to the supermarket all the time. I love to buy groceries one time per month, and [have] what I need [at] home, includ[ing] Pepsi’ (33 years old, overweight shape, with a university degree from the mid- to high-SES group).

8.4.1.2. Outside of the home availability and accessibility
SSBs are available and accessible in various locations outside of the home. Participants from both socioeconomic groups identified the following sites: stores, supermarkets, small stores, convenience stores, workplaces, schools, institutional places, celebrations and events.

8.4.1.2.1. Within the neighbourhood
The participants were recruited from different neighbourhoods; in each neighbourhood, there were differences in the distribution of the stores. This, in turn, affected the availability of and accessibility to SSBs in both neighbourhoods. In the Alkhansah neighbourhood (where the lower socioeconomic group participants were recruited), it was observed that there
were multiple small and convenience stores but no supermarkets or grocery stores. Most participants from this area confirmed this observation; stores were only a couple of feet from the participants' homes, and SSBs were easily accessible whenever desired.

‘The neighbourhood is full of small stores and cafeterias, like any neighbourhood in Mecca. They have [a] full range of carbonated and sugary drinks. It is available and accessible everywhere, and it is not hard to reach out to your drinks at any time’ (35 years old, normal-weight shape, with a high school degree from the low-SES group).

In the lower socioeconomic neighbourhood, a higher availability of the lower premium brands at lower prices was observed (compared with the higher-priced brands). Lower priced premium brands were highly distributed and occupied more shelves than the regular brands (Figure 8.1). The participants from this area did not discuss or mention this observation.
Figure 8.1: A refrigerator in one of the convenience stores in the Alkhansah neighbourhood. It is primarily filled with lower price premium SSB brands.

The Mahmdiah neighbourhood, where participants from the mid- to high-socioeconomic group were recruited, contained larger stores and fewer small and convenience stores than the Alkhansah neighbourhood did. The availability of both larger stores and convenience stores provided high accessibility to various types of SSBs. Participants from this area confirmed that they did not have a problem accessing SSBs in the area due to the availability at both large and small stores.

‘The sugary drinks and carbonated drinks in particular are available in my area where I live. There is next to my house a supermarket. It takes from
me almost three minutes by car’ (34 years old, obese shape, with a university degree from the mid- to high-SES group).

8.4.1.2.2. Workplace availability of sugar-sweetened beverages

In workplaces, it was observed that SSBs were primarily available in vending machines (Figure 8.2), cafeterias or stores within or just outside the building.

![Vending machine](image)

**Figure 8.2:** A vending machine inside the Ministry of Education headquarters that contains SSBs.

Participants from both socioeconomic groups indicated that when SSBs were easily accessible in the workplace, it influenced consumption.

‘Inside workplaces in general, it is very easy to access carbonated drinks. In my work, there is a cafeteria that sells all types of sugary
drinks. Therefore, we drink nectar juices with breakfast. Besides, there is a vending machine. All employees drink nectar juices in the morning and some drink carbonated drinks as well. We all consume sugary beverages and buy them from [the] cafeteria or [the] machine’ (36 years old, normal-weight shape, with a high school degree from the low-SES group and the second focus group).

Some participants pointed out that carbonated and energy drinks were removed from vending machines at institutions where they worked; however, manufactured juices and nectars were still available and accessible in these vending machines. It was observed that inside one of the institutions, the vending machine did not contain carbonated and energy drinks but did contain other sugary drinks. According to some of the participants, some institutions removed only carbonated and energy drinks, not other SSBs.

‘One week ago, almost, the vending machine inside the work [no longer sold] carbonated and energy drinks, but other sugary drinks [were] still available’ (27 years old, obese shape, with a university degree from the mid- to high-SES group).

8.4.1.2.3. Availability in schools and restaurants and at gatherings

In 2001, the Ministry of Education prohibited school canteens from selling carbonated drinks; however, this policy was not fully enforced, as indicated in section 7.3.2.1. In 2017, the MoH, in partnership with the Ministry of Education, reinforced this policy. Nonetheless, some participants from both socioeconomic groups did not know that school canteens were prohibited from selling carbonated and energy drinks.

Some participants from both socioeconomic groups expressed anger at the government because SSBs (especially artificially coloured SSBs) continued to be sold in schools. They assumed that their children consumed these
beverages and that the Ministry of Education should protect their children by removing these beverages from schools.

‘Go and see what [the] school canteen provides and sells. My daughter’s school…canteen sells sugary artificial coloured beverages. Could you imagine artificial coloured beverages inside schools? [The] Ministry of Education should demand [to] stop selling these beverages in schools. Yes, school[s] these days do not provide carbonated drinks, but still do not restrict the availability of other sugary drinks’ (38 years old, normal-weight shape, with an elementary school degree from the low-SES group).

Some participants consumed SSBs due to their availability in restaurants. Multiple participants indicated that the high availability of SSBs in restaurants drove them to drink SSBs.

‘It is not only in my workplace. Carbonated drinks [are] everywhere, which in turn absolutely drives me to consume more than what I am supposed to drink. It is everywhere you just name it, small stores, restaurants. In restaurants particularly, have you ever seen restaurants [that] do not sell carbonated drinks? It is impossible to order carbonated drinks and they are not available. These beverages are essential inside restaurants, and I would be surprised if they are not available’ (35 years old, normal-weight shape, with a high school degree from the low-SES group).

In addition, parents felt that control outside the home was challenging in terms of SSBs; they could not prevent their children from ordering SSBs if they were available in restaurants.

‘But the kids love these beverages. When I go to any restaurant, there is nothing you can order as alternatives for sugary drinks…At some
point, we tried not bringing carbonated drinks home, but outside I
cannot control what my family consume[s]’ (40 years old, obese shape,
with a high school degree from the low-SES group).

Another reason that some participants gave for consuming SSBs was their
availability during celebrations or events; their high availability at these
gatherings drives participants to drink them. The participants further explained
that SSBs are highly available during these gatherings, and it is difficult to
resist them when they are right in front of you. Participants from both
socioeconomic groups perceived the high availability and accessibility of SSBs
outside the home as one of the main reasons why they consume them. They
indicated that it is difficult to stop or reduce their consumption while these
beverages are available everywhere.

‘Three months ago, I stopped drinking carbonated drinks, when I started
my diet. But now, because of the availability [at] wedding parties, when I
visit someone, when I go outside with my family, in restaurants; it is
everywhere…I returned [to] consuming carbonated drinks but not like
before’ (the first participant from the mid- to high-SES group).

8.4.2. Marketing and promotion
The marketing and promotion of SSBs emerged as a dominant influence over
the drinking behaviours of the participants. The recruited participants from both
regions in Mecca mentioned several corporate strategies that influenced them
to drink SSBs. The researcher also observed these strategies in Mecca and
triangulated them with the things reported by the participants.

8.4.2.1. Point of Purchase
Participants emphasised that the product position of SSBs in stores was one
of the leading factors that made them want to repeatedly purchase and drink
them. Many participants had similar stories with points of purchase that remind
them to buy SSBs, even when the primary intention of going to the store may have been to buy different products.

‘Some stores, actually many stores, when you get inside the stores, the first products you see are carbonated drinks and energy drinks next to [the] cashier, at the entrance or the exit. Even if you do not want to drink these beverages, you buy them because they are in front of you’ (24 years old, normal-weight shape, with a high school degree from the low-SES group).

Many participants pointed out that if the point of purchase of the SSBs (the refrigerator) is clean, shiny and colourful with a clear sign of the brand logo (Pepsi, Coca-Cola, B Cola), they are motivated and feel a desire to buy them.

‘Fridges in stores are very clean and could attract your eyes easily. It is clean, shiny and full of juices. [If y]ou find the store that is very small and not clean…the fridge is very clean and shiny’ (28 years old, normal-weight shape, with a high school degree from the low-SES group and the second focus group).

‘Sometimes I go to the store, and my intention is not to purchase any Pepsi, but after I see the fridge how it is clean, and shiny. These characteristics make me want to buy one or more’ (36 years old, normal-weight shape, with a high school degree from the low-SES group and the second focus group).

The majority of the SSB points of purchase in both neighbourhoods were near the cashiers and were as clean and shiny as the participants had mentioned (Figure 8.3). This strategy was deliberated in the PepsiCo MENA documents; the aim of the corporation is to reserve the most premium positions in all stores within Saudi Arabia.
8.4.2.2. Advertisement location and impact

When participants were asked where they find SSB advertisements, many indicated that they find them as posters in stores, during football matches and on Twitter.

‘For me, the main driver for the consumption is advertisements. Advertisements [play] a major role for SSB consumption. You [open] Twitter, you see nectar juices such as Alrbia and other sugary drinks. You go to stores, you see posters. You open television to watch football matches, you see advertisements’ (29 years old, overweight shape, with a university degree from the low-SES group and the first focus group).

Some participants perceived that these advertisements led to a reminder to drink SSBs and an increased desire to drink the advertised products.

‘When you are inside…and suddenly you see the advertisement on the television with cold Coca-Cola and you do not have it. You will go
maybe…not with every advertisement, but when I feel free, I will go. Let’s say I desire drinking, and the advertisement remind[s] me’ (25 years old, normal-weight shape, with a high school degree from the low-SES group).

Many participants revealed that posters (primarily for soft drinks) in their neighbourhood’s small stores and cafeterias are extensively distributed. The researcher noticed that these posters or logo signs are usually found on the windows next to the entrances or were easily observed in the small stores and cafeterias (Figure 8.4).

Figure 8.4: An easily observed logo for Pepsi on the side of a refrigerated case.

‘It is not clear for me why, when I see posters inside stores and posters of famous players, [they] attract me to buy these carbonated drinks. These posters attract me, but I do not know how’ (24 years old, normal-weight shape, with a high school degree from the low-SES group).

It was observed that before, after and during the matches in the biggest football league in Saudi Arabia (Prince Mohammed bin Salman League), B Cola (the
newly emerged local, low-price soft drink) had purchased advertisement time on the Saudi National Sports channel (Figure 8.5). In addition, B Cola had purchased time from the Saudi National Sports channel during the Spanish Super Cup. This type of advertising increased the brand's widespread recognition, particularly after the introduction of the taxation on carbonated drinks in Saudi Arabia.

![B Cola advertisement](image)

**Figure 8.5:** An example of a B Cola advertisement during televised football matches on the Saudi National Sports channel.

Even though Saudi Arabia banned energy drinks from sponsoring any activities in 2014, Red Bull sponsored a sports activity in 2018 in Saudi Arabia’s Eastern Region. Additionally, the Saudi Royal Court Advisor and the Chairman of the General Entertainment Authority, His Excellency Turki Alaalshikh, used his Twitter account to request that PepsiCo and Coca-Cola sponsor the government entertainment season across the country. They responded with a ‘thumbs up’, indicating that they would do as requested.

### 8.4.2.3. Cultural appropriation of advertising

An essential exploration of this study and the environmental factors that may influence SSB consumption is how the SSB industry understands Saudi
culture to convey meaning in their advertisements that influence customers to consume SSBs. Saudi Arabia embraces the past in its cultural values. The SSB industry tries to reflect these values in their advertisements, and participants from both socioeconomic groups perceived that the advertisements were trying to understand the big picture of Saudi Arabia’s core cultural values.

‘The widespread…advertisements of carbonated beverages is very bad. The industry tries to link…their drinks and what the people do every day from morning till night, and during the Saudi societies special occasions. During Ramadan, the industry and corporates make special advertisements and during Eid eve. All of these messages that the industry [sends] promote a subconscious desire to drink all the time’ (32 years old, overweight shape, with a university degree from the mid- to high-SES group and the second focus group).

In Saudi Arabia, as was previously discussed, SSB consumption is associated with social gatherings. Multiple participants pointed out that SSB advertisements use this association to promote their beverages. One of the messages conveyed in PepsiCo’s advertisements was referred to by many participants: ‘with Pepsi, the gathering is more wonderful’. It was observed that SSB advertisements suggest a connection between gatherings and a clear sense of identity through loyalty to the beverage.

With the increasing influence of nationalism in Saudi Arabia, multiple SSBs supported this movement in their advertisements (primarily PepsiCo and Coca-Cola). For example, during the 2018 National Day, PepsiCo sent an indirect message to the people in one of their advertisements that they had always been a successful partner with all Saudi communities in the past, and they hoped to continue this successful partnership in the future. PepsiCo employed multiple famous influencers (e.g. old and young football players, singers, etc.) during this advertisement and used several recognisable quotes,
one of which was a famous quote from the Saudi Crown Prince that ‘our dreams reach the sky’.

Another PepsiCo advertisement, during the 2020 National Day, emphasised that Pepsi is everywhere in Saudi Arabia; the advertisement mentioned multiple regions across the country in which the brand had shared happy times with the Saudi community. In both advertisements, PepsiCo implied that it is always a strong supporter of the government and the people in all regions. Coca-Cola also used this movement to their advantage through their advertising. In 2017, with the government vision to empower women, King Salman bin Abdulaziz announced the removal of the restrictions on women drivers. Coca-Cola was one of the earliest corporations to use this empowerment of women in their advertisements; as a woman learns to drive, she holds a small bottle of Coca-Cola in her hand.

8.5. Social context
The social contexts in which the participants spend their time were essential factors that influenced SSB consumption. While this theme is highly intersected with the availability of SSBs inside and outside of the home, it is critical to consider it as a separate theme because it elaborates on why people make SSBs available both in and outside of their homes. This theme highlights the pressure people feel to meet the social expectation that SSBs be made available during social gatherings. It also presents a more profound understanding of the overall social context that drives the consumption of SSBs.

8.5.1. Social norms in Saudi Arabia
Social norms are critical social contexts that drive the consumption of SSBs and include setting specific norms, determining the suitability of different drink types and identifying the expected behaviours among peers and family. Social
norms add pressure to participants and influence them to act against their beliefs to fit with the attitudes, behaviours and values of others.

Most participants highlighted that the availability of SSBs during social gatherings is considered normal within the Saudi culture.

‘I do not know why in all wedding parties and social gatherings Pepsi and nectar drink[s] are provided by [the] hosts to the guests…I think it is part of the Saudi tradition and culture; you will never see any parties or gatherings without Pepsi or 7-Up’ (35 years old, normal-weight shape, with a high school degree from the low-SES group).

Most participants stated that they drink whatever is available, and during social gatherings, the availability of SSBs increases (primarily carbonated drinks). Participants expressed their desire to avoid conflicts with others in determining drink options at gatherings; this emerged as a decisive factor in shaping participant choice.

‘When you go to any occasion…you will only see Pepsi and other carbonated drinks. It is prohibited to request natural juice, for example, and people are used to drinking carbonated drinks and they will drink them’ (24 years old, normal-weight shape, with a university degree from the low-SES group and the first focus group).

According to the participants, the type of social gathering determines the type of available SSBs. For example, at wedding parties or any big gatherings, or when someone comes to your house, the host initially provides juices (usually nectar). At dinner time, the host provides soft drinks. During gatherings of family and friends, the guest’s preferred type of beverage is what the host provides.
After the introduction of taxes on carbonated and energy drinks, many of the lower socioeconomic group participants started to recognise that either the small-size (and low-priced) Pepsi or Coca-Cola bottles or the lower cost premium brand B Cola were provided at many celebrations and events they have attended.

‘During social gatherings and wedding parties, it is always Pepsi. But recently, I started to recognise that [at] some parties the host provides B Cola’ (24 years old, normal-weight shape, with a university degree from the second focus group).

Generosity and honouring guests are social norms among the Saudi population, particularly in Mecca. Many participants felt that one way to honour guests and show respect and generosity is by providing them with SSBs.

‘Carbonated drinks…exist at various occasions. You know that there are no social gatherings without them (Pepsi, 7-Up) on the table or you will be considered [as] not honouring your guests. People are generally accustomed… this thing is considered necessary on the table, and [at] various types of occasions’ (40 years old, obese shape, with a high school degree from the low-SES group).

People from Mecca consider generosity as an inherent factor because they are Arab. Some participants indicated that generosity is tied to providing SSBs at gatherings and events; most participants felt that not providing SSBs at these times is perceived as an undesirable attitude within Saudi society.

‘It is inappropriate that the host does not provide SSBs. It is very shameful I think because [you are] supposed to give your guests carbonated drinks during dinner. It could be seen as you are respecting your guests and honouring them. To be honest with you, I understand that you do not mean to humiliate anyone by not giving carbonated
drinks, but this [is] our culture and how we see things’ (37 years old, overweight shape, with a university degree from mid- to high-SES group and the second focus group).

The participants felt that hosts in Mecca provide SSBs during social gatherings to avoid gossip and perceptions of stinginess from others if they did not provide them.

‘It is part of our traditions and cultures. People think it is necessary to provide beverages during different occasions and makes people happy through honouring and respecting their desires. You find hosts provide different types of sugary drinks, and at dinner, it must be carbonated drinks. It is a bad habit and it would affect my consumption level...if the host does not provide carbonated beverages, people would comment on this action and talk between them. I do not see it [as] a big deal and it is only a habit, but people would rather...avoid these comments’ (39 years old, overweight shape, with a university degree from the mid- to high-SES group).

Refusing the host’s generosity is impolite in Saudi culture. One participant from the mid- to high-socioeconomic group raised this point when asked about the social reasons for consuming SSBs.

‘It is impolite to refuse the host honouring guests with juice...the host [bought] these juices, and I do not want to say no to him. So, you are forced to drink sometimes juices while you do not feel you want’ (34 years old, overweight shape, with a university degree from the mid- to high-SES group).

Another participant from the low-socioeconomic group indicated that you do not refuse SSBs at social gatherings because if you did, other people would question your health.
‘You cannot say you do not drink juices or carbonated drinks when hosts provide them. People around you would question if you have diabetes, so you drink whatever is provided to you’ (26 years old, overweight shape, with a high school degree from the low-SES group).

Some participants indicated that SSBs are bought, consumed and offered at social gathers to avoid being stigmatised for being poor or not capable of buying whatever is desired. One participant from the low-socioeconomic group felt that he was supposed to consume SSBs to assure his peers that he is not inferior and can buy carbonated drinks.

‘Look Pepsi for me was a punishment. I used to be a fit person looking after my health. People started to question me why I do not drink carbonated drinks like them. The community and people around you had normalised drinking Pepsi and other carbonated drinks, and if you do not drink them, you have a problem, either you are young or poor. I felt that they thought that I do not have money to buy these beverages. Even if I drink water, people would gossip; they would say he did not have the money to buy Pepsi, so he had water instead. I started to drink Pepsi because I do not wish to see people think that I am weak, or [that] I do not have money’ (27 years old, overweight shape, with a university degree from the low-SES group).

8.5.2. Family request
One of the leading social drivers that led participants to bring SSBs into their homes was their family’s requests for them. Many participants felt that when household members (e.g. spouse, parent or siblings) requested SSBs, it acted as a reminder to buy them. Then, when these beverages were available in the home, their consumption level increased, as was mentioned in the availability and accessibility of SSBs, (section 8.4.1.1.).
‘My mother always reminds me to bring…sugary drinks [home], either carbonated drinks or nectar juices…yes, she reminds me because we drink these beverages during breakfast and lunch daily. Children in [our] home do not drink carbonated drinks, so my mother always tries to make nectar juices available for them’ (24 years old, normal-weight shape, with a high school degree from the low-SES group).

It was thought by multiple participants that purchasing SSBs and bringing them home would make their household members happy.

‘When I see my family happy and drinking all the beverages I brought home, I will make them available all the time in home…I am this man…my mother, sister and nephew. They drink nectar juices, so I always buy them. When I see them happy because I make these beverages available in [the] home, I will always buy them without hesitation every day…sometimes they call me to remind me, and other times I buy them without [them] reminding me’ (23 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

Some participants did not believe that SSBs were healthy. However, they still brought SSBs into their homes to avoid conflict with their family members.

‘My family is used to drink[ing] carbonated drinks, I always try to convince my sisters and my mother to stop them. I convinced my mother, but my young sisters insisted on drinking them. Sometimes [we] debate around making these beverages available in [the] home. Many times, I purchase these drinks to avoid argument and sometimes I pretend that I forgot’ (29 years old, normal-weight shape, with a high school degree from the low-SES group).
8.6. Views on alternatives to sugar-sweetened beverages

To analyse the drivers of SSB consumption, it is essential to consider alternative beverages that may compete with the target behaviour (SSB consumption). For example, there are likely alternative products that could reduce or stop the consumption of SSBs. These alternatives have been broadly evaluated to understand the reasons why the participants would still rather choose SSBs.

8.6.1. Not recognising any alternatives

One of the first issues regarding possible alternatives to SSBs was that some participants from both socioeconomic groups had not recognised any alternative options. They were not aware of any beverages that could replace SSBs.

‘There is nothing [that] could make me stop or reduce the consumption of carbonated drinks. Why should I stop them? At the same time, there are no alternatives…nothing has given me the same feelings or the same taste’ (29 years old, obese shape, with a university degree from the mid- to high-SES group).

8.6.2. Taste differences

The participants felt that the available alternatives to SSBs did not taste good and did not provide the same reaction to the taste; therefore, these alternatives were not comparable. Most participants indicated that they had tried these alternative beverages at least once. Therefore, their expressed attitudes were based on real-life experiences.

‘I thought about drinking Diet Pepsi instead of the regular one, but I did not like [it]. I felt it is sour…the taste is completely different with less sugar and more gases… yes, [the] level of sugar is different. But in general, I can
replace Pepsi with other carbonated drinks but not the diet one. I do not like it at all. I only tried it once in my life, and I did not like it. One time, my friends bought for me with lunch a Diet Pepsi, but I did not even open it’ (27 years old, normal-weight shape, with a high school degree from the low-SES group).

8.6.3. Alternatives perceived as unhealthy choices
The third issue relates to artificial SSBs (ASSBs); the participants indicated that they did not believe these carbonated drinks were healthy.

‘I do not trust these diet drinks. I heard rumours say these drinks cause depression and others say it may cause diabetes because it fluctuates level[s] of insulin, and it is not delicious. Why would I drink them?’ (27 years old, overweight shape, with a university degree from the low-SES group).

Some participants further explained that ASSBs are considered unhealthy because they assume that these beverages are not what the beverage industries claim; they believe that they do contain a high level of sugar.

‘There are carbonated drinks with zero calorie[s], and I do not [know] how the corporates make them. It tastes sugary, but without sugar! The question, is it diet as they claim? But, from where is the sugar?’ (22 years old, obese shape, with a high school degree from the low-SES group).

8.6.4. Alternatives are not available and accessible
The fourth issue associated with the possible alternatives to SSBs is that most participants perceived them as not available and accessible in all the places that SSBs are. The participants explained that the diet drinks from Pepsi and
Coca-Cola are not available in all stores and restaurants like the regular versions are.

‘Diet drinks are available, but not always. Some of my friends, who were diagnosed with diabetes, wanted Diet Pepsi from a restaurant, but it was not available. Inside stores, you will see it, but in restaurants or small cafeterias, they are not always available’ (40 years old, overweight shape, with a high school degree from the mid- to high-SES group).

Natural juices with no added sugar were also not always accessible. The participants who enjoyed natural juices perceived that a low level of accessibility was one of the barriers to consuming them as alternatives to SSBs.

‘Natural juices are not available everywhere. The place that sells the natural juice I like is far [away]. Not like carbonated drinks…[that] are available in all stores, where I can buy them from the store next to my home’ (33 years old, overweight shape, with a high school degree from the low-SES group).

One participant from the lower socioeconomic group mentioned that no-sugar family-size carbonated drinks are not available; therefore, he purchases SSBs even though he likes the diet alternatives.

‘I like Diet Pepsi more than the regular one. However, because my wife, children and I drink the carbonated drink together, and there is no family size of…Diet Pepsi, I purchase the regular one. When I am alone, I buy the Diet Pepsi for me’ (40 years old, obese shape, with a high school degree from the low-SES group).
Two participants discussed the preparation of natural juices in their homes; however, they indicated that this is not a sustainable alternative because they take time to prepare. Other SSBs are easily available and accessible.

‘Because I know that it is noisy, installing, washing, and unpacking [and] installing and measuring the sugar level…It is easier for me to buy a carbonated beverage…or fresh juices and that’s it’ (23 years old, normal-weight shape, with a university degree from the mid- to high-SES group).

8.6.5. Natural juices are expensive

The participants indicated that freshly squeezed, no-sugar added natural juices were not affordable and that this was a barrier for their consumption. Many participants from the lower socioeconomic group and some from the mid- and high-socioeconomic group perceived that the price of these beverages was high when compared with other SSBs.

‘Vending machine [s are] not available for carbonated beverages. The college removed these machines and replaced them [with] orange juice machines. But, orange juice is expensive, almost equal [to] three cans of carbonated drinks for one orange juice. I am only [a] student and government support is not enough. I should spend wisely. I always go to [the] cafe outside the college because it is big where I find Pepsi or any other drinks I want’ (23 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

8.7. Conclusion

This chapter presented the drivers of SSB consumption among men living in two different neighbourhoods in Mecca, Saudi Arabia. The participants described the influencing factors of SSB consumption in terms that were
organised within the socioecological model. The influencing factors of SSB consumption were described by presenting the individual, social and environmental factors that were inextricably linked with and influenced by cultural norms and by the beverage industry.

The drivers of consumption at the individual level included the following: the things people liked about SSBs, the activities associated with SSB consumption, a lack of knowledge of the health detriments associated with SSBs and neglecting the risks associated with SSB consumption. In the affordability subtheme, the fact that the beverage industry attempted to dilute the effect of taxation through several strategies was discussed. The beverage industry did this by reducing the sizes and the prices of current SSBs and by launching new products at lower prices. These strategies increased the affordability of SSBs. However, in some segments of the population, the purchasing power was not affected by taxation, and the current prices of SSBs remained affordable.

The drivers of consumption at the environmental level included the availability and accessibility of SSBs and the beverage industry’s marketing and promotions of SSBs. The high level of availability and the easy accessibility of SSBs inside and outside of homes were essential factors driving consumption. Industry marketing strategies (e.g. prominent placement in stores, advertisements on social media and advertisements on television before, during and after football matches) affected the consumption pattern of the participants. Social norms and family requests normalised and even promoted the availability and accessibility of SSBs in homes and at events and celebrations.

SSB consumption patterns seem to be embedded within cultural integrity and attached to family traditions and events. The beverage industry in Saudi Arabia appears to understand the relationship between the Saudi cultural identity and
their beverages; it has also attempted to reinforce and remind consumers about this relationship in their advertisements.

The next chapter describes people's attitudes and perceptions towards taxation. The possible factors and motivations that could support reducing or limiting the consumption of SSBs are also discussed. Finally, possible government interventions that could be applied to change SSB-consumption behaviour are presented.
Chapter nine: Public attitudes towards carbonated and energy drinks taxation and motivational factors and possible strategies to reduce or stop consumption

9.1. Introduction
A fundamental law of economics implies that imposing an excise tax on SSBs would directly raise their costs. In turn, this may reduce their demand and consumption while the government may increase its revenue. In 2017, the Saudi government applied this strategy to reduce the risk of obesity and its comorbidities by implementing a 50% and 100% tax on carbonated drinks and energy drinks, respectively. This strategy was strongly supported by government institutions; however, there is limited evidence of public understanding and support of the SSB tax in Saudi Arabia.

To address the fourth objective of this thesis, this chapter presents the public’s awareness, attitudes and perceptions of the SSB tax among Saudi Arabians living in Mecca. This chapter also presents motivational factors and highlights possible interventions and strategies that could be utilised to stop or reduce the consumption of SSBs.

9.2. Results
Regarding the findings of the public’s awareness, attitudes and perceptions of the SSB tax, two major themes emerged: the knowledge of the SSB tax and its level of acceptability. Two major subthemes emerged from the level of acceptability: the tax is justifiable and a refusal of the idea behind the tax. Three categories emerged from the refusal of the idea of taxation: its ineffectiveness, the participants’ attitudes towards the prices after the tax and the regressive effect.

Another major theme that emerged from the findings of this project was the possible motivation behind a behaviour change. Under this, three major
subthemes were determined: increased levels of awareness, health concerns and price increases. Within health concerns, three categories emerged: experiencing side effects, disease diagnosis or fear of being diagnosed with a disease and family concerns.

Another major theme that emerged in this project is the possible strategies to reduce the consumption of SSBs. Within this theme, two major subthemes were determined: possible government strategies and individual strategies. The four possible government strategies were a reduced exposure to SSBs, an increase in the availability of healthy alternative beverages, the addition of another tax and an increase in awareness programmes. Within individual strategies, five categories emerged, the first of which was an individual's intention to change the behaviour. Subsequently, four categories were determined that might assist the individual with the change in behaviour: a slow reduction of SSBs, a reduction in the exposure to SSBs, choosing other substitutes and requesting social support.

9.2. Attitudes towards the tax on carbonated and energy drinks

9.2.1. Knowledge of the sugar-sweetened beverage tax

Most participants from both socioeconomic groups were not aware of the SSB tax, the reasons for it, when it was implemented or the percentage of the tax on SSBs. In addition, the level of familiarity with the word 'tax' differed between socioeconomic groups. The mid- to high-socioeconomic group was more familiar with the carbonated and energy drinks tax than the low-socioeconomic participants were. Many participants from the low-socioeconomic group did not know about the implemented tax and only knew that there was an increase in carbonated and energy drink prices.

One of the reasons that participants may not have been aware of the tax was its timing. The government simultaneously imposed the tax on carbonated and
energy drinks and charged a VAT on all products in Saudi Arabia. Some low-{
}socioeconomic participants thought the increase in price of carbonated and
energy drinks resulted from the VAT; they questioned why the tax percentage
was higher than the 5% VAT that the government had announced on all
products.

The Saudi government imposed the tax on carbonated and energy drinks to
reduce the consumption of these beverages and to increase non-oil revenue.
These reasons were reported in both government documents and press
releases [276]. When the participants were asked why the government had
imposed the tax, many answered that they did not know the reasons or
answered based on assumptions after the interviewer encouraged them to
think about the government’s reasons. Only one participant (from the mid- to
high-income group) provided a rationale that aligned with the government’s
justification for the tax.

Since most participants were not aware of the taxation and most of their ideas
were based on assumptions, the interviewer briefly explained the official
reasons for the policy. This was done so the participants’ reactions and
responses to the taxation could be gauged.

When the participants were asked about their attitudes towards taxation, they
did not feel comfortable, so the interviewer attempted to soften the
conversation. For example, many participants answered with hesitation when
the interviewer asked questions about taxation such as ‘why did the
government implement this taxation policy?’ The participants were hesitant to
answer because of the political sensitivity in Saudi Arabia and because the
taxation is a part of Vision 2030 (launched by the Crown Prince). To smooth
the questions and make the participants feel more comfortable during the
interviews and focus group discussions, the interviewer tried to refer the
government taxation to the MoH or Ministry of Finance.
9.2.2. Level of acceptability

9.2.2.1. Justifiable

The participants were asked one direct question: 'do you believe that the government has the right to implement taxation on carbonated and energy drinks and force you to change your behaviour?' This was followed by a probing statement to challenge the answers: ‘even if you are adult, mature and you know what benefits you and what harms you?’ Almost all participants from both groups indicated that the government taxation on carbonated and energy drinks was justifiable as the government has the right to implement whatever policy it considers beneficial to the Saudi population.

‘Undoubtedly, as any country where government must make decisions for citizens’ benefits in whatever fields whether it is for health benefits or any other fields. The government or a ministry must focus on citizens’ interests…their job [is] to work on improving the environmental, social and cultural situation’ (22 years old, obese shape, with a university degree from low-SES group).

When the participants were asked why the government has the right to implement hard policies like taxation, they mostly indicated that the government needs to protect public health and increase revenue; however, more participants mentioned the first reason than the latter one.

Almost two-thirds of the lower socioeconomic participants and about half of the mid- to high-socioeconomic participants perceived that the tax was a good strategy to reduce the consumption of harmful, unnecessary products and to stop the growing prevalence of obesity and diabetes.

‘I think the government’s action is justifiable because the benefits return for individuals, economy, and the country itself. Why? Economically, if individuals reduce the consumption of these beverages, their health status will be improved, which in turn the Ministry of Health would
reduce the expenses on the associated diseases...as I said, the benefits return for the country and individuals’ (27 years old, overweight shape, with a university degree from the low-SES group).

Three participants from the low-socioeconomic group further explained that the government policy was intended to protect public health as people do not know what could harm or benefit them, and they do not act in their own best interests.

‘If you are an adult and mature, there are many others who are not. They consider energy drinks are good and there are problems associated with them, and [they] consume them without looking after their health. Those people are harming their health and the country. Yes, the government has the right. If you do not use your mind, the government has the right to force you directly and indirectly’ (36 years old, overweight shape, with a high school degree from the low-SES group and the second focus group).

Almost one-third of the participants from both socioeconomic groups perceived that the taxation on carbonated and energy drinks was justifiable because it was one of the government’s tools to raise additional revenue.

‘Long time ago, the government was paying all public and government services without collecting money from the people. But things change with time and the economic situation of the country. The government’s expenses have increased recently. Instead of [the] government paying all of these expenses, the government decided to put taxation on these beverages’ (29 years old, overweight shape, with a university degree from the low-SES group and the second focus group).
Some of the mid- to high-socioeconomic participants argued that the taxation was not implemented for the interests of ordinary citizens' health; instead, it was only implemented to raise revenue.

‘If [the] government was looking [out] for individuals’ interest and health, the government should have not implemented taxation on Diet Pepsi. That way, the government could have made people shift for diet beverages and other substitutes. As a result, it could have solved the problem of obesity and diabetes. Unfortunately, it is economic and financial reasons as I expected’ (34 years old, normal-weight shape, with a university degree from the mid- to high-SES group).

Two participants from the high-socioeconomic group felt that an SSB tax would be more beneficial if the government used the generated revenue from the tax money for prevention and awareness programmes. Those two participants were, however, uncertain of how productive the use of the tax revenue would be.

‘Tax is a good idea regardless of the tax per cent if the government uses this tax in awareness programmes to prevent obesity that is caused by these beverages. But, to be honest with you, I do not know where the government spends the tax money’ (33 years old, obese shape, with a university degree from the mid- to high-SES group).

9.2.2.2. Refusing the taxation idea
When more general questions were asked about their experience with taxation, the level of acceptability of taxation among the participants reduced (especially in the low-socioeconomic group). The participants from both socioeconomic groups perceived the taxation to be ineffective, regressive and outrageous.
9.2.2.2.1. Effectiveness

One of the initial themes that emerged from multiple participants was that the taxation on carbonated and energy drinks was not effective in stopping or reducing SSB consumption.

Many participants from the low-socioeconomic group did not believe that the tax was an effective tool to reduce or stop SSB consumption because many people had switched their favourite drink to other products that were lower in price or smaller in size (see Section 8.2.4.).

‘I agree with you, the increased prices of carbonated drinks are not effective, and there are many options. For me and others as consumers, we do not feel that the current increase in the prices have affected us’ (29 years old, normal-weight shape, with a university degree from the low-SES group and the first focus group).

Three participants from the low-socioeconomic group and one from the mid-to high-socioeconomic group questioned why the government persisted in imposing the tax.

‘The taxation has been implemented to reduce or stop the consumption, but we are still buying these beverages. This strategy is not working; the government is just taking money from us. Every time I purchase these beverages, I get angry and question why the government increased the cost of these beverages’ (25 years old, normal-weight shape, with a high school degree from the low-SES group).

The participants from the mid- to high-socioeconomic group also felt that taxation was not an effective tool to reduce SSB consumption because the taxation amount was considered small relative to their income.
‘As I told you, the taxation does not affect me and my budget. It is very tiny and weak. It is only SAR 60 per box. I will not stop buying because of SAR 60’ (27 years old, normal-weight shape, with a university degree from the mid- to high-SES group).

Some participants from both groups doubted the effectiveness of the taxation in reducing SSB consumption; these individuals believed that the government should take further steps to reduce SSB consumption and that taxation should not be the instrument of choice. The participants’ suggestions to stop or reduce SSB consumption are presented later in this chapter (Section 9.2.4.).

9.2.2.2.2. Attitudes towards the prices after tax

The participants’ attitudes towards the increased prices of SSBs varied according to the type of SSB. At the time of the interviews, only carbonated and energy drinks had been taxed (other SSBs had not yet been taxed). The Saudi government had imposed a 100% tax on energy drinks; the prices of 250 ml of premium energy drinks (e.g. Red Bull) were equal to almost five 330 ml cans of Pepsi or Coca-Cola.

The participants who consumed energy drinks in both groups perceived the prices of these beverages as expensive; they stated that the prices were not fair and were higher than expected.

‘I used to buy Power Horse and Red Bull [types of energy drinks]. I used to buy them around SAR 6, and now this is almost SAR 12. The current prices are expensive…it is not fair. The increase in the prices have affected me economically’ (34 years old, obese shape, with a university degree from the mid- to high-SES group).

The increased prices of energy drinks were not equal to the increased prices of carbonated beverages; the latter saw a 50% increase because of the tax. The low-socioeconomic group participants were more likely to perceive the
prices of carbonated drinks as expansive and not fair than the mid- to high-socioeconomic participants.

‘I felt that it is overpriced…I used to buy the carbonated drinks for SAR 1. Currently, the price has reached to SAR 2.5…yes, it is overpriced and expensive. It is really expensive’ (34 years old, overweight shape, with a high school degree from the low-SES group).

When the participants from the low-socioeconomic group were asked about the prices, they felt sorrow and anger about the increased prices. They expressed their feelings in words like 'where we live, we are supposed to be in a rich country'; 'I am not happy with this increase in the prices, but what I can do, I accept the policy, but I am not satisfied'; and 'it is really sad to buy a thing you used to buy [for] SAR 1 (he was talking about Pepsi before the taxation was implemented) and now it is for SAR 2.5'. All these statements were directed at the prices; no one disagreed with the government taxation policy on carbonated and energy drinks. This could be related to the politically sensitive environment in Saudi Arabia and the restricted freedom of speech.

One participant from the low-socioeconomic group felt that the increased price of carbonated and energy drinks was catastrophic. He considered the tax percentage to be very high and suggested replacing the high-percent tax on carbonated and energy drinks with a half or one Riyal.

‘I think the tax was supposed to be on products higher than SAR 10. The current prices are expensive. We are people from lower income [and we] felt this increase in the prices has affected us. Instead of applying a high-percent tax, why [has] the government…not applied SAR 0.5’ (38 years old, normal-weight shape, with an elementary school degree from the low-SES group).
Two participants from the low-socioeconomic group explained that their anger towards the increased prices of their favourite beverages was also because the increase had stolen their ‘only joy’.

‘I am really sad for this increase in the prices. The government, through this tax, has not only taken money from us but also took from me my only joy’ (21 years old, normal-weight shape, with a high school degree from the low-SES group).

9.2.2.2.3. Regressive effect

During the interviews with the key stakeholders, one of the stakeholders (Section 7.4.2.1.) raised equity concerns given the regressive nature of excise taxes (i.e. that it takes a larger portion of money from low-income earners than from high-income earners). Indeed, regressive taxation has become a prominent component in debates about SSB taxes. This subtheme describes how participants felt regarding the regressive nature of the tax on carbonated and energy drinks. A discourse of social justice and fairness is not common in Saudi Arabia, and no one raised this concern. However, many participants expressed taxation fairness concerns by commenting on the differing effects taxes can have on various socioeconomic classes.

Participants from the mid- to high-socioeconomic group perceived the tax on SSBs to be regressive in nature because it would not affect their economic class and would only affect the low-socioeconomic group.

‘The taxation is not a fair intervention. [The ] low-income group has been suffering with inflation, and now we are increasing their pain. Can you imagine someone with SAR 3,000 or 4,000 surviving this increase in the prices? And, now, we are adding taxes. Of course, they are going to be affected and their family...he is going to be affected and [this] would extend to his family, prioritising between essentials and the
consumption of SSBs if still keeping the same consumption level even after taxation’ (24 years old, normal-weight shape, with a university degree from the mid- to high-SES group and the second focus group).

Many participants from the low-socioeconomic group felt that the tax was not a fair policy. They also believed that the tax would have more of an effect on the low-income group than the mid- to high-income group.

‘I work in a five-star hotel, and this increase in the prices has never affected people who are wealthy. They buy up a can up to SAR 11 and it does not mean anything to them. The current increase in the price would not affect wealthy people…only people with limited income…This increase has affected us: those people whose income is between SAR 3,000 and 4,000’ (24 years old, normal-weight shape, with a university degree from the mid- to high-SES group and the second focus group).

9.3. Possible motivations to change behaviour
Some possible reasons for changing SSB consumption behaviour (i.e. reducing or stopping the consumption of SSBs) included increased awareness, health concerns, the availability of alternatives and the increased prices after taxation.

9.3.1. Increased level of awareness
Some participants from both socioeconomic groups indicated that one of the reasons that people reduced or stopped the consumption of SSBs was because of an increased level of awareness about the side effects (especially carbonated and energy drinks). The number of mid- to high-socioeconomic participants who referred to an increased awareness level was double the number of low-socioeconomic participants.
‘Look at the last five years, increased awareness in society in general…my consumption level has decreased so much. Everyone knows how much they can drink…I speak in general and talk about a certain people who want to change because there are people in the community who explicitly don't want to be educated and don't want to change’ (22 years old, obese shape, with a university degree from the low-SES group).

Most participants cited social media as their source for the increased awareness levels.

‘In the past, I used to drink nectar drinks, and I thought they [were] healthy and natural. However, I knew from social media in the last years that these drinks are not healthy, and their harms are more than their benefits’ (29 years old, normal-weight shape, with a high school degree from the low-SES group).

9.3.2. Health concerns
Health concerns were one of the primary factors that would make the participants consider reducing or stopping the consumption of SSBs. Four main subthemes were generated under health concerns: experiencing immediate side effects, knowledge about the negative impacts on health, health and weight consciousness and parental supervision.

9.3.3. Experiencing side effects
Many participants reduced or stopped SSB consumption when they experienced side effects. The participants mentioned the following side effects: renal colic and stones, palpitations, stomach aches, bloating, heartburn, diarrhoea and allergic reactions. These side effects were primarily associated
with the consumption of carbonated drinks except for allergic reactions (this was associated with the consumption of energy drinks).

9.3.4. Having a disease or fear of having one

A chronic disease diagnosis is another reason why some participants considered stopping or reducing, or had already stopped or reduced, SSB consumption.

Fear of the long-term side effects (particularly obesity, diabetes and osteoporosis) was one of the reasons why some participants considered reducing or stopping their consumption of SSBs.

‘I thought about the harms that could make to me in the future and for my health. As you know, the prevalence of diabetes and obesity are high in Saudi Arabia. Almost every house has at least one member [with] diabetes. For this reason, I should take [into] consideration preventing this disease. I would try to reduce the consumption’ (33 years, overweight shape, with a university degree from the mid- to high-SES group).

Participants were excluded from this project if they had a diagnosis of diabetes because it may have dictated their consumption decisions. The participants included in this study were young, and it was not expected that they would have a chronic-disease diagnosis [284]. Therefore, many participants referred to a diabetes diagnosis in the future (i.e. if they are diagnosed with diabetes, they will stop consuming SSBs). Some participants referred to their parents’ diabetes diagnoses as examples for when they might stop SSB consumption (as their parents had stopped consuming SSBs following a diagnosis of diabetes).
‘If I felt that one [of] these drinks could harm [me], I would stop. For example, like if I have diabetes, I am not going to drink sugary drinks at all because I will be forbidden’ (23 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

9.3.5. Family concerns
Parenting provision strongly affected SSB consumption among young children and teenagers. Fathers did not determine the age that they were able to influence their children’s behaviour. They also did not determine the age at which their parenting power over their children decreased. However, most participants (who were also fathers) emphasised two points. The first point was that if the children lived with their parents, the parents had control over what their children consumed inside the house (parents had less control over their children’s behaviour if they were outside the home without parental accompaniment). The second point was that if their children grew up and started university, parents would have less control over them and what they consumed. The participants acknowledged parenting difficulties but that their skills and confidence could be essential in determining their children's choice of consumption and of making healthy choices inside the house.

‘Only dictatorial in their health, but in other things, I am not. I want to inform them about these matters and tell them: Come, my son, see why I forbid you from these drinks. I sent him a report on the sugar content of sweetened drinks and the harms of sweetened drinks while he was reading by himself. When I am at home, I like to make fresh juice, so I always make some for them, and I force them all to drink’ (40 years, obese shape, with a high school degree from the mid- to high-SES group).

Some of the younger participants did not have children yet and expressed that their parents held the same beliefs as the older participants (who were parents)
held. They explained that their parents discouraged their SSB consumption by advising them and attempting to provide them with alternatives.

‘If I bring the carbonated drinks to my family home, my parents will throw them out because they do not like me to drink these drinks. I like to consume these beverages outside home so that my family will not throw them away…that was the case when I was in high school, maybe five or six years ago, especially energy drinks and sometimes Pepsi but not as strict as for [the] energy drinks. I used to drink energy drinks outside the house like I am doing something very bad. Even when he knew that I smoke, he did not get upset or sad like energy drinks. I drank energy drinks like I am doing something ‘haram’ [religiously forbidden] outside the house’ (23 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

9.3.6. Price increase
As mentioned earlier, the increase in prices because of taxation only included carbonated and energy drinks. This forced some participants from both socioeconomic groups to reduce their consumption levels. The attitudes towards this increase in prices differed depending on beverage type and socioeconomic group.

Participants from the higher socioeconomic group did not seem to be affected by the taxation on carbonated drinks. Some of them reflected on the effectiveness of this taxation to reduce consumption across the population in general (but not on themselves).

‘The government increased these beverages’ prices, and I feel that this taxation made people consume less…Yes, I told you at the beginning that the tax could be the reason to make people reduce their
consumption of these drinks’ (39 years old, obese shape, with a university degree from the mid- to high-SES group).

Some participants from the higher socioeconomic group also declared that the taxation on energy drinks had stopped them from consuming these beverages.

‘For me, the taxation has affected my consumption…I used to buy Power Horse [a type of energy drink] for SAR 5, but now it is for SAR 12. For this high increase, I stopped the consumption of energy drinks’ (34 years old, obese shape, with a university degree from the mid- to high-SES group).

The effect of the taxation on carbonated and energy drinks was more prominent among the lower socioeconomic group. Some participants from this group indicated that the increase in price led them to reduce their consumption of SSBs.

‘I used to drink between 12 and 15 cans of Mountain Dew, but now I drink only almost 10 per day. I only changed the number of cans per day’ (35 years old, normal-weight shape, with a high school degree from the low-SES group).

Some participants’ points of view contradict their attitudes towards the effectiveness of SSB taxation in this thesis, described by multiple participants as being ineffective in reducing SSB consumption. However, when the participants' opinions regarding the effectiveness of the taxation and their consumption levels are tracked, it is revealed that the participants who indicated that this increase in the prices reduced their consumption had taken several strategies to keep up with the same consumption level (Section 8.2.4.).
Some participants claimed that their consumption level was very high (more than eight cans of carbonated drinks per day) prior to taxation but stated that their consumption level had decreased after taxation. This information was difficult to obtain from these participants because most of the time during the interviews they argued that taxation was not effective because their consumption levels were not affected.

9.4. Possible strategies to reduce sugar-sweetened beverage consumption

9.4.1. Governmental strategies
Participants from both groups had varied opinions towards the taxation's acceptability; multiple participants from the low-socioeconomic group accepted the tax indirectly by recommending other government strategies to reduce SSB consumption (compared with the high-socioeconomic group). Within this theme, four main subthemes emerged:

1. Reduced exposure to SSBs,
2. Increased availability of healthy alternative beverages,
3. Addition of another tax,
4. Increased awareness programmes.

9.4.1.1. Reduce exposure to sugar-sweetened beverages
This chapter has already presented the drivers of SSB consumption. In this subtheme, the participants suggested different strategies that could be taken by the government to counteract the drivers for consumption. Some lower socioeconomic group participants felt that the government tax on carbonated and energy drinks was only harming their purchase power and demanded that the government introduce other policies that would reduce their exposure to the drivers of SSB consumption.
The first suggestion was to restrict the availability of SSBs. The participants pointed out that with the easy availability and accessibility of SSBs everywhere in supermarkets, small stores, convenience stores, restaurants, workplaces and government and private institutions, it was difficult to stop purchasing and consuming SSBs despite the price increases.

‘As I told you that this price is a little exaggerated. The government has only increased the price of these beverages that would affect the consumer only. Instead of making simple consumer[s] accountable, why does the Ministry of Health or Saudi Food and Drug Authority have not [held] juice manufacturers accountable for increasing the consumption level, making them lose money by restricting the sell in specific places’ (25 years old, normal-weight shape, with a high school degree from the low-SES group).

One participant from the lower socioeconomic group explained why the government should restrict the availability and accessibility of SSBs. He stated that in 'Islam', we had been commanded to change other people’s bad behaviour, and the government should take actions against the industry to stop selling SSBs.

‘As for us, as Muslims, we have been requested to change bad behaviour, which could be applied through three strategies. The first is to change by force. What is power? It is that you apply punishment to the one who sinned until he leaves his mistake. The government has the power, so why did it not stop trading these juices like what happened with alcohol beverages? (27 years old, overweight shape, with a university degree from the low-SES group).

One participant from the lower socioeconomic group explained how the government had succeeded in restricting tobacco availability in Mecca because it is a holy city, so people needed to stop smoking there. He assumed
that since the government had introduced this kind of policy towards tobacco, the government could implement a similar approach towards SSBs.

‘I am just wondering why the government has not restricted the availability of sugary drinks. Here in Mecca, it is smoke-free city because it is a holy place. Yes, it is available in some shops like a black market because it is not an enforced policy. But, it is a good a strategy…the government and Saudi FDA is allowing the poisons with higher prices only (40 years old, obese shape, with a high school degree from the low-SES group).

In addition to the availability and accessibility of SSBs, industry marketing strategies have a role in driving and increasing SSB consumption. Some participants from both socioeconomic groups recommended that the government should regulate the industry and stop SSB advertisements.

‘Advertisements should be stopped…as one of the government policies to reduce the consumption, advertisements should be stopped immediately…stop advertisements in the country. All types of advertisements that include posters, billboards or on television’ (32 years old, overweight shape, with a university degree from the mid- to high-SES group and the second focus group).

One participant additionally expressed his view that advertisements should be stopped everywhere; in addition, the government should be questioned as to whether these beverages are harmful and why they have not stopped the advertisements for them.

‘They should not allow the advertisement of these beverages as they are harmful. When these drinks are harmful, why are their advertisements frequent? If these drinks are good because it is allowed to be advertised, why would the Ministry of Health prevent the schools
from selling these beverages?’ (34 years old, obese shape, with a university degree from the mid- to high-SES group).

9.4.1.2. Increase the availability of healthy alternatives
As mentioned in the section regarding participants’ attitudes towards other alternatives to SSBs, these alternatives are expensive and less available and accessible than SSBs. While the evidence is mixed regarding the health effects of artificial SSBs and natural juices without added sugar, they are considered less harmful than SSBs.

Multiple participants from both socioeconomic groups suggested that the government should increase the availability of alternatives. Additionally, some participants from both socioeconomic groups suggested that the government should intervene by placing more affordable alternative beverages in prominent places on store shelves to replace unhealthy SSBs.

‘If there is a problem with a specific juice, the government must provide other juices instead and put them in the place of the old juice. For example, there is a store for fresh natural juices everywhere and in every supermarket, you enter you find that there is a section for fresh natural juices, then you will take this alternative juice…the tax is on the consumer and he will pay, I tell government agencies why you do not reduce these companies and stop operating with them. I am asking if the government agencies work to make fresh drinks everywhere, with cheaper prices than soft drinks and commercial sweetened drinks. So, the solution is to lower the prices of fresh drinks and increase the price of soft drinks’. (29 years old, normal-weight shape, with a high school degree from the low-SES group).

Another participant from the higher socioeconomic group suggested that the government should subsidise fruit prices so that natural juices could become more affordable and compete with carbonated drink prices.
‘The price of fruit in general needed to be reduced. The government can take an action by reducing the price. They are expensive in general and natural juices as a result would be expensive for making natural juices, so simple consumers turn to drink sweetened drinks and not buy natural juices because they find that they are cheaper than natural juices’ (20 years old, normal-weight shape, with a high school degree from the mid-to high-SES group).

9.4.1.3. Increase awareness programmes
Education and awareness programmes are not popular among most public health experts because they leave room for the beverage industry and transnational corporations to use their marketing strategies to mitigate the knowledge taught by the programmes [262]. On the other hand, other public health organisations and experts call for these soft policies (as they are supported by evidence) and believe that these measures are part of the collective action and cannot work in isolation. Many participants from both socioeconomic groups suggested that the government should increase awareness programmes because taxation alone is not enough to reduce the consumption of SSBs.

‘I expect that the government needs to increase their awareness campaigns about the dangers of these drinks. We know about the side effects, but awareness campaigns and educational massages must be increased. A person does not need to know [about] Pepsi and Cola…but the increase in advertisements led to the increase in consumption. At the same time, if there are more campaigns, besides taxes, the consumption would decrease’ (33 years old, overweight shape, with a university degree from the mid- to high-SES group).
Many participants from both socioeconomic groups believed that awareness programmes regarding the side effects of SSBs (especially carbonated and energy drinks) were not evident and apparent.

‘I have not seen awareness campaigns on social media, in newspapers or on television, about the harms of these drinks, especially energy drinks. I did not see that there is anyone explaining to you their composition and explaining to you where the harm lies. I did not see anyone who explains to us that if we drink a certain amount of these drinks will be damaged, so how do you convince people who are addicted to them to stop them without knowing? Many people told me that it was harmful, but all of them were not specialists. I did not see a doctor or a specialist informing me of its harm’ (33 years old, obese shape, with a university degree from the low-SES group)

During the observation period in Mecca, the researcher never witnessed any posters or signs explaining the consequences of SSBs or encouraging people to stop consuming SSBs. Moreover, according to many informants from the public health department within the MoH in Mecca, the MoH has never introduced awareness or education programmes regarding the consequences of SSB effects.

Some participants from the higher socioeconomic group discussed how the MoH is tackling smoking and creating smoking cessation clinics; they also explained that there were no clear awareness or education programmes regarding the consequences of SSBs but that there should be.

‘Awareness and education programmes on the side effects of Pepsi, and [the] amount of sugar inside it are limited and you do not see them. I was surprised when I found out the amount of sugar in Pepsi...The Ministry of Health and [the SDFA] are supposed to increase level[s] of awareness and education programmes...like what happened with
cigarettes and smoking. We know it is harmful because of the Ministry of Health…educating people. They put warnings on packets and have clinics for quitting’ (40 years old, obese shape, with a high school degree from the mid- to high-SES group).

It was clearly observed that smoking is one of the main MoH targets through posters in primary care centres and on giant billboards at these centres encouraging people to stop smoking immediately (Figure 9.1). Multiple advertisements on billboards (paid for by the government) were observed urging people to stop using telephones while driving because of the high prevalence of road traffic accidents. The government, represented by the MoH, had not prioritised the reduction of SSB consumption in any way like these campaigns to reduce smoking or the prevalence of road traffic accidents through education and awareness programmes.
Some participants from both socioeconomic groups suggested that to reverse the effects of widespread SSB consumption, the government should raise awareness about the harmful effects of SSBs through advertisements.

‘There are widespread advertisements of sweetened drinks. On the contrary, health authorities must publish awareness-raising announcements about the harms of these drinks everywhere, and they give the choice to the consumer whether he wants to cut down or not’ (37 years old, overweight shape, with a university degree from the mid-to high-SES group and the first focus group).

One of lower socioeconomic group participants believed that the government should have announced that one of the aims of the tax was to reduce consumption and that it was not only implemented to collect revenue. This kind
of announcement could have had a substantial effect on SSB consumption and provided awareness that SSB consumption is harmful to one’s health.

‘I did not read about the taxation exactly. Is the reason for the tax because these beverages are harmful? And to limit them? If this is the case, [the] Ministry of Health should have raised awareness more…because one is aware of this, and because schools and fast-food stores do provide them, and companies are producing smaller cans and reduce the value of it for which reason? I see that there is a need for greater awareness of this…[he was asked awareness of what]…Awareness on harm…or awareness on why they are adding this tax’ (40 years old, obese shape, with a high school degree from the low-SES group).

Another participant from the same group also suggested that the government should increase awareness and education programmes regarding the consumption of SSBs because, without the knowledge of the side effects, the taxation policy could increase tension between the government and the citizens.

‘That is why I told you that awareness is important because the issue does not become stubbornness between the citizen and the state. The whole issue needs awareness, because if a person is convinced from inside, he will know what is the reason that made the state act in this way, and he will understand why the state raised the prices’ (29 years old, normal-weight shape, with a high school degree from the low-SES group).

9.4.1.4. Add another tax
While many participants disagreed with the SSB tax (particularly on carbonated and energy drinks), they believed that increasing the taxation percentage could force people to stop or reduce buying and consuming SSBs
due to their unaffordability. Participants from both groups suggested that raising the prices of SSBs was required if the government wanted to reduce their consumption.

‘The government can raise the tax, that would reduce the consumption’ (33 years old, overweight shape, with a high school degree from the low-SES group).

The attitudes of the participants from both socioeconomic groups towards possible suggested increases in the price differed. These differences in the suggested prices increases reflected each class's purchasing power that may consequently lead them to a possible reduction of SSB consumption (or to stop drinking SSBs altogether). Some lower socioeconomic group participants suggested an increase of a half Saudi Riyal. In comparison, some higher socioeconomic group participants suggested an increase of SAR 1.5 or doubling the current price.

In a press conference, the Minister of Health suggested that there is a possibility of price increases for SSBs. He also claimed that the current tax would not be enough for the Saudi people to stop purchasing carbonated and energy drinks. The Minister of Health’s suggestion is in line with the participants' suggestions to increase the prices (as the current increase is not enough to prevent SSB consumption).

9.4.2. Possible individual strategies
These individual strategies were suggested according to what the participants believed would facilitate change in their surrounding environments; they were not related to what the government should consider (in addition to taxation) to reduce or stop the consumption of SSBs. Participants from both socioeconomic groups suggested that they may change their immediate
environment as a technique to reduce or stop the consumption of SSBs after they had the intention to do so. The following were the proposed strategies:

1. Slow reduction of SSBs,
2. Reduce exposure to SSBs,
3. Choosing other substitutes,
4. Requesting social support.

9.4.2.1. Intention
When participants from both socioeconomic groups were asked what strategies they might take to reduce their consumption of SSBs, more than half agreed that the first step was to have the intention to do so. They started with the words 'intention', 'if convinced', 'desire', 'decision' and 'I put a plan'; these words reflected the likelihood of an individual to perform the intended behaviour.

Most participants from both socioeconomic groups perceived that the behaviour change towards SSB consumption was a personal matter. When the intention exists, the individual would be capable of changing the behaviour. Some participants from both socioeconomic groups further explained the importance of the intention to change behaviour; they emphasised that the government and public health sectors could not force the public to change their behaviour towards SSBs without convincing them that these beverages are harmful.

‘One wishes, and God willing, I can stop it. Nothing is far from my will…Whatever [the] Ministry of Health tries to change public behaviour…you will not change because it is on you. It is from inside. You know the causes and damages of juices and start changing your habit from soft drinks to fresh juices. This thing is from you and from inside you only’ (33 years old, overweight shape, with a high school degree from the low-SES group).
The need for an intention to reduce or stop the consumption of SSBs overlapped with the importance of raising awareness for those actions. Some participants from both socioeconomic groups emphasised the importance of awareness programmes to change public beliefs; they believed that, in turn, this would affect the public's intention to reduce or stop SSB consumption.

**9.4.2.2. Slow reduction**
Participants who consider themselves dependent on SSBs and frequently consumed SSBs believed that it was challenging to stop. Those participants from both socioeconomic groups perceived that they could only start with a slow reduction by reducing the quantity per or the frequency of consumption.

‘Yes, but gradually. There is nothing that cuts off completely once, and even the smoke does not cut off once. I have a personal conviction that nothing can be cut quickly because if you cut it quickly you will come back again, so you must do it step by step’ (27 years old, normal-weight shape, with a university degree from the mid- to high-SES group).

**9.4.2.3. Reduce exposure**
Participants from both socioeconomic groups believed that reducing their exposure to SSBs is one of the main strategies that they might take to reduce or stop their consumption, particularly if the intention to drink an SSB exists. Participants who suggested this strategy intended to stop purchasing SSBs, so they were not available inside their homes.

‘I [am] no longer bringing them home, or buy them...Yes, because whatever you see in front of you, it makes [you] weak in front of it. If you bought it, you would think that it is a loss of money, so you must drink it’ (38 years old, normal-weight shape, with an elementary school degree from the low-SES group).

**9.4.2.4. Choosing other substitutes**
Choosing other substitutes was the most common strategy suggested by participants from both socioeconomic groups. Participants employed different strategies to drink SSB alternatives.

Most participants were conscious of the fact that the placement of SSBs in homes would impact their consumption level. Therefore, some suggested that making alternatives available at home would lead to reduced SSB consumption.

‘The first thing is to prevent it from being at home and [to] look for an alternative in times when I am consuming it, such as when I watch television or movies. I must look for something else that entertains me other than these drinks. I can drink coffee or tea or eat popcorn, for example’ (33 years old, overweight shape, with a high university degree from the low-SES group).

Two participants from the higher socioeconomic group further explained how to replace SSBs. They stated that they would blend fruits and make juices available and accessible in their homes.

‘The first thing I will buy is a blender and... put it in the house, and I make natural juices. I start learning how to make the easiest juice in the world, without getting tired. I will drink this juice while I am in the house’ (23 years old, normal-weight shape, with a high school degree from the mid- to high-SES group).

As another way to reduce or stop SSB consumption, some participants suggested replacing them with water or other alternatives.

‘Yes, because I am not addicted to it. I can gradually replace it with something else. For example, for me, I can drink fresh juices instead of sweetened juices, and I can replace it with something else instead of
Many participants, particularly from the low-socioeconomic group, suggested that they would switch to nectar or flavoured juices to stop or reduce their consumption of carbonated drinks. However, a lack of knowledge about the consequences of all SSBs, not just carbonated and energy drinks, was considered one of the individual drivers for SSB consumption; when participants were asked what strategies they might use to reduce or stop the consumption of all SSBs, they answered that they would choose nectar or flavoured juices as alternatives for carbonated and energy drinks. These juices still contain a high amount of sugar.

‘If I want to stop soft drinks, there must be an alternative. For example, if I am thirsty, I will not drink water all the time because I want to stick to sugary delicious drink, so I will try to replace it with natural juices such as Caesar, Almarai and Nada [all of these are nectar drink brands and contain sugar]. Ever since, [when] I desire a soft drink I will drink instead natural juice’ (25 years old, normal-weight shape, with a high school degree from the low-SES group).

**9.4.2.5. Requesting social support**

Another consumption driver was the availability of SSBs at social gatherings or in the house (placed there by other family members). Participants felt that they could not stop consuming SSBs without restricting their availability at social events and in their homes. Therefore, social support might be considered an essential element for reducing or stopping the consumption of SSBs for participants from both socioeconomic groups. Social support included requesting support from immediate household members, other family and friends.
The form of support that participants from both socioeconomic groups suggested was that other people in society, particularly their immediate circle of acquaintances, remind them about the risk factors of SSBs and demand that the participants stop consuming them. The tone of the reminder, according to the participants, should differ according to how close the relationship is. According to some participants, immediate family members should ask them to stop SSB consumption; extended family and friends, however, might remind or warn the participants about the consequences of drinking SSBs.

‘It can be encouraged by the people around me that asking me not [to drink] these things could help. My family and my wife supports and reminds of the harms of these drinks helps tremendously’ (33 years old, overweight shape, with a university degree from the mid- to high-SES group).

Another form of support that participants from both socioeconomic groups suggested was asking their spouses or mothers to make natural juices available at home as an alternative to SSBs.

‘I could tell my family to help me preparing the amount I want from fresh juices, so when I go back home I will be knowing that there is fresh juice in the house and stay away from fizzy drinks, this thing can help reduce the amount of citrus consumption’ (33 years old, overweight shape, with a high school degree from the low-SES group).

9.5. Conclusion
A key finding of this chapter was that participants were largely unaware of the implemented tax on carbonated and energy drinks. When they were made aware of the tax, some of the participants justified the government’s motivations for implementing the taxation, and some of the other participants doubted the actual governmental motivations for tax implementation.
However, many participants doubted that the tax would have a meaningful effect on SSB consumption levels. Furthermore, most participants disagreed with the taxation percentage by expressing that the increase in prices of carbonated and energy drinks was higher than acceptable. The last key finding of people's attitudes towards SSB taxation was that participants felt that the tax on carbonated and energy drinks in Saudi Arabia was regressive in nature and that people from lower socioeconomic groups would be more affected by it than other groups.

This chapter also identified possible motivations that might reduce or stop SSB consumption. The main factor that may lead to reducing or stopping SSB consumption is health concerns. In addition, the participants revealed that an increased price of energy drinks (due to the imposition of the 100% excise taxation on SSBs) and an increased level of awareness of the side effects of SSBs could lead to stopping or reducing SSB consumption. In addition to identifying the possible motivations to reduce or stop SSB consumption, the participants identified several approaches that could be utilised to do so. One possible approach identified by the participants was a suggestion for the government to implement specific policies related to individuals themselves and to their relatives. The participants also suggested developing beverage-specific rules that included reducing the exposure to SSBs drivers, increasing the availability of healthy alternatives for SSBs, adding another tax on SSBs on top of the current prices and increasing awareness programmes that encouraged people to reduce their SSB consumption.

The participants also identified that personal intention for change was the first step in reducing or stopping SSB consumption. They suggested that creating specific goals around SSB intake at the individual level, obtaining substitutions of SSBs, reducing their exposure by limiting the availability in their homes and at social gatherings and social support could reduce or stop their SSB consumption.
Chapter ten: Discussion

10.1 Introduction
This PhD project attempted to understand whether the taxation on carbonated and energy drinks by the Saudi government was likely to succeed by addressing the determinants of SSB consumption. Specifically, the contextual factors around the development of the tax were analysed, the challenges and barriers to implementing food-related obesity policies were discussed and the drivers for SSB consumption and the attitudes towards the tax among the male population in Mecca were explored. Finally, possible interventions were presented at the individual and government levels aimed at reducing SSB consumption.

10.2. Main findings

10.2.1. Contextual factors of the tax on carbonated and energy drinks
Employing the multiple stream theory [226], three main factors emerged: political, problem and policy. As Kingdon [275] suggested, the intersection of these three streams opened the political window to introduce the excise tax in Saudi Arabia.

Within the political stream, there were five factors: (1) a new government ideology that promoted the prevention of SSB consumption and diversification of economic resources; (2) leading government institutions (i.e. the Ministry of Finance and the MoH) promoted taxation as a tool for implementing reform; (3) a new era of leadership that included the presence of the Crown Prince and the Minister of Health; (4) a harmonised government structure between ministries and government entities; (5) the Saudi government’s power over local corporations (no corporation challenged the tax, unlike in other parts of the world where the beverage industry succeeded in stopping, or at least delaying, tax implementation).
Within the problem and policy streams, this study identified two main issues that needed to be addressed: increases obesity and diabetes prevalence and the 2014 drop in oil prices. Addressing these issues allowed the government to 'hit two birds with one stone'. It appears that the 2014 oil crisis affected the government more than the problem of obesity and diabetes (both have been recognised multiple times within the last century with little progress made in tackling the determinants of these problems) [20].

It is worth noting that the government’s nationally-representative data, including death data, on obesity and diabetes burden in Saudi Arabia are based on studies that include only Saudi citizens. This limits their value, given that migrants constitute almost a third of the country’s population with a high level of inequality reflected in a Gini Coefficient of .45 [285]. Furthermore, free healthcare services are restricted to Saudi citizens and not available to migrants. As NCDs are a problem for health services at a whole population level, this lack of data may lead to inappropriate government action.

The demand for financial reform in Saudi Arabia resulted in a unique situation where obesity could be tackled through the implementation of a selective tax on carbonated and energy drinks. Many elite participants perceived the reduction in oil prices as one of the main reasons for opening the political window to impose taxes on carbonated and energy drinks as unhealthy products. Framing the problem as financial stress on the government justified how the taxation policy is one of the government’s tools to diversify the economy and reduce oil dependence. Similar to Saudi Arabia, a number of other countries (e.g. Hungary, Fiji and Mexico [286]) introduced health-related taxes because of budget constraints. Elsewhere (e.g. the UK), the objective was to reduce SSB consumption and encourage the beverage industry to reformulate its products. The introduction of this tax was unlikely to be a part of a wider financial reform because it resulted in a significant reduction (50%) in estimated government revenue because the beverage industry decreased their imported sugar content to bypass the higher tier of the tax [287].
The tax on carbonated and energy drinks in Saudi Arabia is one of the significant wins in public health that could be maximised by including all SSBs to avoid potential substitutions of other sugary drinks, besides using a tiered tax structure based on sugar contents incentivises industry reformulation. Restructuring the tax design would also clarify the drive behind the tax and sends the message to the public that sugar is the target nutrient to be reduced, rather than as a means to increase government income.

From a health perspective, different perceptions were raised by the elite actors interviewed in this study. The obesity problem was perceived as either individual or driven by the socioenvironmental context. Similar perceptions towards SSB consumption were voiced by the study participants. Addressing these perceptions requires a change in individual behaviour and/or a change in the context that drives the behaviour. These voiced perceptions are in line with the findings of public health scholars on changing individual behaviour in the 1980s and 1990s [147]. However, since the High-Level Meetings in 2011, there has been a shift in the public health approach to tackling the determinants of NCDs; public health scholars and health institutions now seek to tackle the environmental drivers of unhealthy food consumption [31, 125]. The rationale for this is that tackling the environmental context that drives consumption may be more effective because it would change consumption patterns among the whole population. The effect, therefore, is likely to be more significant than working on changing individual behaviour [91]. The elite participants in this project perceived taxation as a practical solution because it is population-based, and it would influence the whole population. However, they did not regard it as the most effective policy and suggested other approaches to reduce consumption.

Policy transfer (employing a policy that was developed and implemented in other contexts), such as the taxation policy on SSBs, was one of the factors
that encouraged the Saudi government to implement the taxation policy on carbonated and energy drinks. The WHO encourages governments to implement innovative policies developed in other contexts; however, these policies should fit the socio-political context where they are implemented [288]. The SSB tax policy was designed, developed and implemented in other contexts and promoted by the WHO. However, some participants raised the same policy transfer rationale to argue against the SSB tax policy; they believed it would be ineffective in Saudi Arabia because it was developed in other countries, and it would primarily influence the less affluent Saudi population. Participants who were not in favour of the tax policy argued that Saudi Arabia is one of the wealthiest countries in the world, and the tax on carbonated and energy drinks would not be effective in reducing SSB consumption among those with the highest consumption rates because that group is the upper socioeconomic group. These participants also indicated that the upper socioeconomic group is the one with higher rates of obesity and diabetes. In fact, that perception appears to be inaccurate as a new study reported that diabetes is more prevalent among the poor and the less-educated groups in the country [289].

10.2.2. Challenges and barriers to other food-related policies
Vision 2030 puts improving the population’s health as central to the government agenda through two of its themes: “vibrant society with fulfilling lives” and “an ambitious nation responsibly-enabled”. In addition, the vision aims that health and well-being will improve the economy, environmental health, accountability and society. It also focuses on developing cities (urban planning), achieving environmental sustainability, caring for families, and healthy living. The Saudi Government subsequently launched the quality of life program, to achieve the health-focused aims of Vision 2030, to improve individual lifestyle by improving the ecosystem for creating new options that encourage the Saudi population to engage in physical activities. The National Transformation Program 2020, which identifies interventions to strengthen the
health system, promote health, and control noncommunicable diseases, was also launched. This is besides, promoting health in all policies and greater intersectoral collaboration at national and sub-national levels. As part of the Transformation Program, in 2018, the Saudi MoH and SFDA announced the Saudi vision for a healthier diet aimed to reduce the consumption of sugar, salt, saturated fat, and the elimination of trans fat. Despite these successes, challenges and barriers remain regarding the implementation of food-related policies in general.

It is worth noting that interviews with elite actors were conducted in August 2018; at this same time, the MoH and the SDFA announced the Saudi vision for a healthier diet. Through this announcement and the large ensuing transformation in government work, there was a great hope that Vision 2030 could address both current and historical challenges.

First, the literature on public policy emphasises the importance of leadership in advancing public policies, including obesity prevention ones [31, 275]. It is not surprising that participants regarded the numerous changes to the Minister of Health post (six times from 2011–2013) as one reason why Saudi Arabia had been hindered in tackling obesity and its determinants. It is not clear from participant interviews why they thought this would influence government action towards policy development and implementation. Some argued that the frequent change in Ministers had resulted in changes in government provisions that required new policy plans and evidence; in turn, this limited any progress towards the implementation of policies. It is uncommon to have this frequency of change in the Minister of Health position in high-income or middle-income countries in the contemporary world. However, prior research demonstrated that succession in top-level management is often accompanied by a discontinuous change in the structure and strategy of the organisation [290]. There is no doubt that these changes in the Saudi high-executive command affected the political commitment to address the determinants of obesity in the country.
Second, this thesis demonstrated that the lack of cohesion between governmental bodies to implement food obesity-related policies hindered their development. The need for full government support and cohesion is required because many of the food obesity-related policies are outside the authoritative power of the MoH. A plethora of literature emphasised the need for whole-of-government policy development processes to increase the likelihood of food obesity-related prevention policy implementation [31, 275, 291]. The elite actors interviewed in this project highlighted the conflict of interests between government institutions and the lack of unifying efforts and mechanisms as examples of the lack of cohesion between government bodies. At the same time, several studies noted similar barriers in enacting related prevention services: different working practices, different standards for evidence and different organisational norms and priorities.

Third, the governance for tackling obesity will not only require commitment, leadership and coherent action but also needs the capacity and resources to achieve this commitment [31, 275, 292]. Unfortunately, a lack of financial resources is one of the challenges that the elite actors brought up as a barrier to improving the food policies in Saudi Arabia. As a result of the lack of financial resources, the Saudi government and the governmental bodies suffered from weak organisational capacities that included the absence of trained professional and administrative staff, a high administrative burden and inadequate budgeting and accounting systems.

Another crucial consequence of the inadequate budget is poor technical capacities that have undermined planning activities in Saudi Arabia. Accurate and relevant data are needed for effective planning [293, 294]. However, the data on obesity and its risk factors in Saudi Arabia are relatively sparse compared with other regions. There are limited implementation studies to assess the intervention programmes and monitor the population-based
policies. The current studies are mainly descriptive, and there is little evidence that they are being used in programme design or policy formulation.

Fourth, the PPP between the beverage industry and the government or non-governmental organisations (NGOs) might face a dilemma that threatens their goals by providing advantages for corporations; this is often in conflict with the public interest [295, 296]. The interviews with elite actors highlighted two contradictory perceptions. The first is that government officials from the health sector are not concerned with the partnership with the beverage industry because the contract was designed according to MoH terms and conditions and prohibited the industry from promoting unhealthy products. Monteir et al. [297] argued that this kind of partnership raises concerns about a possible increase in brand loyalty for a company with unhealthy products, such as SSBs or energy-dense snacks. Furthermore, public trust in the government and the government’s credibility may decline due to a seemingly visible duplicity of private foundations’ investments in government sectors while the government is tackling obesity by taxing the unhealthy products of these companies that they partnered with [296].

Not all the elite actors interviewed were in favour of this partnership; some of them raised concerns related to it, particularly with NGOs, academics and civil societies. They were concerned that these partnerships may not be healthy and could possibly prevent the achievement of the ultimate goals of these institutions. Risks emerge when partners either fail to manage conflicts of interest or engage effectively in hypocritical activities (e.g. side-by-side lobbying with legislators to support arguments that threaten public health goals). The perception of the PPP between industries and others, including government and civil societies, is that it is not healthy and might threaten or jeopardise the ultimate public interest. The elite actors did not present a real-life example where an industry attempted to lobby against the government through organised works with partners to block or change policies; however, in different parts of the world, the SSB industry has been charged with
manipulating evidence and blocking policies by lobbying and sponsoring activities and research [41].

Finally, one of the challenges that the Saudi government encountered in regulating the food and beverage industry was the high engagement of the industry in policy development. However, the elite actors that were interviewed did not perceive this engagement as an issue. Strong corporate interests influenced policy development in Saudi Arabia by challenging the evidence and by providing other evidence that focused on physical activity to reduce weight; these were attempts to shift the government's attention to the implementation of regulatory policies. An example of the risk of this engagement between industry and government is the Scaling Up Nutrition (SUN) Movement [298]. The SUN Movement intended to establish multistakeholder partnerships, including corporations selling harmful products for health (i.e. PepsiCo, Coca-Cola, Mars, 59-member countries and civil societies). The movement aimed to coordinate nutrition actors at the global level that would advocate and mobilise funding for nutrition and support different country's actions [298]. It developed a guideline for addressing the conflicts of interest in nutrition policies for their member countries [298]. However, looking deeply at this guidance raised multiple concerns regarding its intention and the appropriateness of this interference with other actors setting norms (e.g. the WHO) [298]. The guidance of the SUN Movement did not provide a suitable or sufficient response to the fundamental question of how to protect food and nutrition policymaking against unfair commercial power. Instead, its guidance appeared to promote inclusiveness without any risk assessment [298].

On the other hand, the low participation of civil societies in the government's obesity prevention programmes and food policies is evident. Mobilising civil societies, including both NGOs and informal social movements, had significant roles in food policies in Brazil by generating attention, informing policy actions and sustaining political commitment [299]. In addition, the role of social
societies is enhanced when government arrangement includes them as decision-makers [300]. Therefore, active civil societies hold a significant role in restoring and building an accountable, transparent and proactive governance system in the government. Mexico was an example of how cohesive civil societies played a significant role in driving the commitment to implement a tax on soft drinks [31]. There is an absence of the role of civil societies in Saudi Arabia, and this might be one of the potential reasons for the sub-optimal tax policy design. This finding highlights the potential role of involving civil societies in the future to promote and implement health-related policies based on evidence.

Corporations have significant opportunities within the WTO to interfere with government efforts to regulate the sale of harmful commodities through certain measures in trade agreements (i.e. an investor-state dispute) by raising concerns with the WTO regarding measures utilised that have an effect on corporate trades [301]. As a result, giant corporations prevented the Saudi government from tagging energy drinks as unhealthy by interfering through measures adopted within the WTO. To implement these measures, the Saudi government was required to provide robust justification and scientific evidence for the effectiveness of labelling and was encouraged to implement fewer trade-restrictive measures such as education campaigns. Similar disputed cases in the WTO have been documented against public health measures in Thailand, Chile, Indonesia, Peru and Ecuador when the mandatory front-of-pack interpretive nutrition labelling policy was launched to tackle rising NCD rates [301].

10.2.3. Drivers of consumption
Several factors that influenced SSB consumption were diverse and interrelated (often in a complex manner). These factors were organised according to the socioecological concept [145, 146]. The participants described these factors across several contexts, none of which were in isolation. Instead, the
discussion with participants about the drivers for SSB consumption often moved between factors as though they were one factor.

Within the individual domain, four major factors emerged as important drivers for SSB consumption: enjoyable attributes of SSB consumption, associated behaviours, knowledge and affordability. The participants emphasised that taste was an important enjoyable attribute, along with the fact that SSBs provided energy, quenched thirst and provided refreshment, changed the mood of the consumer and aided in swallowing and digesting food. Most of these factors were previously cited in the literature based in the Gulf region [149-152, 155, 156, 158, 159, 161]. However, changing one’s mood had never previously been described in the literature from the Gulf region. The participants in this PhD project demonstrated how SSB consumption could change their mood. They stated that SSB consumption made them happy when they were taking a break with a refreshing drink while watching television at night or while watching a match or a movie. Closely tied to this, for the participants, SSB consumption was also regarded as a pleasurable activity that accompanied associated behaviours such as watching television, smoking and eating. These findings are also in line with the literature from the Gulf region [151, 153, 157]. However, in this study, the participants provided reasons for these associated behaviours. For example, while watching television, the participants felt that an SSB was essential to set the right environment. While smoking, consuming an SSB moisturised their throats from the cigarette smoke. Food tasted better (especially very salty food) with an SSB.

Knowledge was also a critical factor that drove the participants’ consumption of SSBs. Multiple participants demonstrated a lack of knowledge of what beverages are considered sugary drinks. There was confusion about whether nectar juices were healthy. Similar findings were reported from an Australian study where parents were asked to understand and clarify the SSB consumption drivers among their children [302]. In this PhD project, the
participants believed that SSB consumption was not a problem. This belief is consistent with other findings from studies in the Gulf region [149, 158, 159]. The participants in this project provided certain reasons for this belief (e.g. being young, healthy, considerably fit and not obese). Other qualitative studies reported that knowledge and beliefs are central factors in influencing food choices [179, 303-305].

Affordability was another factor that emerged in this study. While this factor has been explored previously in two studies from Saudi Arabia [155, 159], they were conducted before the implementation of the SSB tax. Many of the participants believed that their consumption did not change after the tax was introduced because of three reasons related to their ability to purchase SSBs and the affordability of SSBs. First, most participants felt that the current prices were affordable despite the increase in price. This view was primarily asserted by the participants from the mid- to high-socioeconomic group. The second and third reasons were related to how the beverage industry and the public (primarily the lower socioeconomic group) reacted to the price increase. The beverage industry launched cheaper brands and smaller sizes at lower prices to increase public purchasing power. Accordingly, many participants from the lower socioeconomic group either switched to the cheaper brands or the smaller sizes at lower prices. This finding is in line with studies from Mexico that demonstrated participants shifted to less expensive and locally manufactured sugary drinks after tax implementation [306].

Within the environmental domain, the availability and accessibility inside and outside of the home and the industry marketing strategies were drivers for SSB consumption. Although these findings were in line with other studies from the Gulf region [159, 165, 166], this study’s participants provided additional details about these environmental drivers. SSB availability in the home and out of the home (particularly within neighbourhood stores, school canteens and stores near schools and workplaces) increase the accessibility of these beverages. These findings are consistent with other research that demonstrates the
correlation between the availability and accessibility of SSBs and the consumption pattern of the population [177, 179, 303, 305].

The marketing and promotion of SSBs emerged as a dominant influence over participants' drinking behaviour. The participants mentioned several corporate strategies that influenced their consumption. First, the participants identified the point of purchase as one of the marketing strategies that reminded them to buy SSBs. They observed that SSB refrigerators were usually clean, shiny and near the check-out point in stores. The chief executive officer of PepsiCo in Saudi Arabia declared that corporate would reserve the most premium locations for their refrigerators to increase their sales. Second, many participants pointed out SSB advertising as a reason for their consumption of SSBs (e.g. advertisements in stores, at football matches and on Twitter). The participants acknowledged the attractiveness of these advertisements and felt that they influenced their choices and consumption habits. Studies have shown that advertising may affect public dietary habits [179]. Additionally, the participants expressed how the advertisements emphasised the perceived image and role of SSBs at social functions and how they promoted the entertainment value and novelty of SSBs. For example, participants often noted common words or catchy phrases from commercials to express their feelings towards commercial marketing and how these corporations understood the socio-political meanings within the Saudi context.

Within the social domain, social norms and family requests were identified as factors that influenced the participants' SSB consumption. Previous research in the region identified the influence of the social context on SSB consumption [152, 156, 158]. This study further explored the factors within the social context and how they drive consumption. Social norms pressured participants and influenced them to act against their beliefs to fit in with the attitudes, behaviours and values of others. Social networks played a role in the participants’ dietary consumption through foods that were directly provided to them. Recent research suggests that SSB consumption increased through the offering of
these beverages in social situations [302]. As was mentioned previously, within the environmental domain, the availability of SSBs in the home influenced participants' consumption patterns. However, within the social domain, the participants further elaborated that family requests and family reminders influenced them to purchase these beverages to make them available at home. Some participants considered SSBs unhealthy but claimed that they purchased them to avoid conflict with other family members.

Moreover, generosity and honouring guests are social norms among the Saudi population. Many participants felt that one way to honour guests and show respect and generosity was to provide them with SSBs. A study among Middle Eastern people in Canada investigating the reasons for sugary product consumption reported that providing sugary products for guests is considered a generous act [307]. The participants also expressed that it is impolite or disrespectful to refuse SSBs when they are offered.

Attitudes to SSB consumption in Saudi Arabia within a social context may well be similar to alcohol consumption attitudes among other cultures, where alcohol is available. Given that alcohol is “Haram”, i.e. forbidden, in Islam, its sale, purchase and consumption is prohibited and punished by law. It is unclear, therefore, whether non-alcoholic beverages, primarily SSBs, act as alcohol substitute for Saudi citizens.

10.2.4. Public attitudes towards the implemented tax
One of the main objectives of this thesis was to understand the public attitudes towards the implemented tax on SSBs in Saudi Arabia. In Chapter 8, the researcher attempted to understand what participants knew about the implemented tax, how they felt about it and their experience with it. The findings of this chapter differed by the participants’ socioeconomic groups. A key finding was that the participants were largely unaware of the implemented
tax on carbonated and energy drinks. This result likely indicated that the
government tax promotion was not targeted at the general public correctly; in
addition, the tax implementation on carbonated and energy drinks occurred
alongside the implementation of the 5% VAT. This finding concurred with one
elite actor who reported that the tax policy on SSBs had not been given much
media attention. This finding aligned with other studies from Mexico and South
Africa, where most of the involved participants were unaware of the
implemented tax [177, 306]. Behavioural economic research suggests that
government framing of a tax and how it is presented may affect public
consumption [308].

Furthermore, when participants were made aware of the tax, they justified
government motivations for implementing it; this indicated a high trust in
government decisions. This contrasts with a number of studies worldwide that
indicated mistrust in the government and the government’s intention in the
countries where a tax on SSBs has been implemented [309].

The level of acceptability towards the tax changed when participants were
asked general questions not related to the government but to their own
experience with the tax. A low level of acceptance of the tax policy might lead
to increased resistance to perform the desired behaviour (in this case, the
reduction of SSB consumption) [306]. Therefore, a future tax framing strategy
should also identify the methods for promoting any unhealthy product tax to
elicit rationalisation and effectiveness. On the other hand, knowledge and
understanding of the factors that influence public acceptance are critical to
getting the most from any implemented policy. Three factors emerged that may
reduce the level of tax policy acceptability: if it is ineffective, regressive and
outrageous.

Many participants doubted the potential meaningful effect of the tax on SSB
consumption levels, particularly those from the mid- to high-socioeconomic
group. As a result, some participants voiced doubt concerning the
government’s motives for the tax and its effect on consumption behaviour and questioned why the government was still implementing the tax when it did not have the desired effect on consumption. This view on tax effectiveness is not unique to the public in Saudi Arabia and has been reported from other studies in other countries [309].

Participants, particularly from the higher socioeconomic group, felt that taxation was not an effective tool to reduce consumption because the taxation amount was considered small relative to their income. The view that the taxation percentage is critical for the effectiveness to reduce consumption has been revealed in other contexts and in other countries [306]; however, the tax percent on SSBs is higher in Saudi Arabia and other GCC countries than in all the other countries that implemented a tax on SSBs. Most participants disagreed with the taxation percentage, believing that the price increases of carbonated and energy drinks were higher than acceptable, despite any effectiveness the tax may have in reducing SSB consumptions. Waves of anger were expressed regarding the tax percentage, particularly among the lower socioeconomic group. The tax percentage in Saudi Arabia is higher than the recommended tax percentage by public health and economic scholars. The recommended tax is 20% [310, 311]; however, in Saudi Arabia, the tax is 50% on carbonated drinks and 100% on energy drinks. Scholars recommend the 20% tax to make room for possible tax increases due to inflation; however, this may not be possible in Saudi Arabia, given the already high tax percentage.

This study’s participants also referred to the regressive effect of the tax. While the discourse of social justice and fairness is not common in Saudi Arabia, and no participant raised this concern, many participants commented on the differing effectiveness among various socioeconomic classes to express taxation fairness (this would disproportionately have an effect on people from the low-SES group). It is correct to state that the taxation policy on SSBs could be regressive in nature, in which the lower economic group pays a higher
percentage of their income to the tax policy. In addition, the distribution of SSBs is unequal, and the greatest burden of diabetes and obesity is observed in lower economic groups. In Saudi Arabia, a recent study reported on the inequality in the prevalence of obesity and diabetes among different socioeconomic groups; it is more prevalent among the lower socioeconomic group [289]. Therefore, if a tax policy is more effective among the lower socioeconomic group, this might be desirable.

10.2.5. Possible strategies to reduce or limit consumption
Participants had varied opinions towards the taxation's acceptability; many did not accept it directly but recommended other government strategies to reduce SSB consumption. These included the following items that the government should do: reduce exposure to SSBs, increase the availability of healthy alternative beverages, add another tax and increase awareness programmes.

The first suggestion was to restrict the availability of SSBs. Participants pointed out that with the availability and high accessibility of SSBs in supermarkets, small stores, convenience stores, restaurants, workplaces and government and private institutions, it was difficult to stop purchasing and consuming SSBs despite the price increases. Industry marketing strategies also drove and increased SSB consumption. Some participants recommended that the government should regulate the beverage industry and stop the advertisements for SSBs. The evidence suggests that restricting the availability of SSBs and restricting industry marketing would be effective strategies to reduce SSB consumption [312, 313].

As was mentioned in section 8.5, SSB alternatives are expensive and are less available and accessible than traditional SSBs. This is particularly true of natural juices with no added sugar. Many participants from both socioeconomic groups suggested that the government should increase the
availability of alternatives. Evidence suggests this strategy is an effective way to reduce the consumption and reduce BMI [314].

While evidence suggests that environmental policies are more effective than educational programmes, many public health organisations are still emphasising the importance of educational and awareness programmes to change behaviour. Many participants from both socioeconomic groups suggested that the government should increase awareness programmes and that taxation alone was not enough to reduce the consumption of SSBs. There is little evidence of the effectiveness of this strategy, particularly if it is applied on a large scale.

While many participants disagreed with the tax on SSBs, they still believed that increasing the percentage of taxation could force people to stop or reduce buying and consuming SSBs due to their unaffordability. Participants from both groups suggested that the prices of SSBs should be raised if the government desires to reduce the consumption of these beverages. In one of the interviews, the Minister of Health announced that there is still room for increasing selective taxes, including those on SSBs. At this stage, increasing the tax percentage could be an effective tool to reduce or limit SSB consumption; however, this study indicated that there are waves of anger among the public because of the high percentage of the tax.

The self-regulatory approach is one of the determinants that limits SSB intake [305]. These strategies are built according to what the participants perceived in this project to facilitate changes in the surrounding environment. The participants from both socioeconomic groups suggested they may change their immediate environment to reduce or stop the consumption of SSBs after they have the intention to reduce or stop SSB consumption. This intention is one of the top predictors for change to a desired behaviour [162]. Several studies showed that intention is very crucial in limiting SSB consumption [258, 305]. If the intention exists, the participants might consider gradually reducing SSB
consumption, reducing the exposure to SSBs, choosing other alternatives and requesting social support.

Participants seemed to understand their innate role in SSB consumption. They mentioned that changing their routines via a gradual reduction in the consumption pattern might help them to reduce and limit SSB consumption. Psychological theories argue that frequent exposure to a specific type of food is what makes a habit [315]. Reducing exposure by gradual reduction, therefore, would reduce the SSB consumption habit. Another strategy that the participants suggested is that limiting the exposure to SSBs would be an effective strategy in lowering their consumption. The participants who suggested this strategy intended to stop purchasing SSBs so that they were not available in their homes. Participants indicated that a decreased availability of SSBs in the home would decrease their consumption. This strategy has been shown to be effective in reducing consumption in different studies [316-318]. The most common strategy to reduce SSB consumption, suggested by the participants from both socioeconomic groups, was choosing substitutes. Most participants were conscious of the fact that the placement of SSBs in their homes would impact their consumption level; therefore, having alternatives available at home would lead to reduced SSB consumption.

Two drivers of consumption were social gatherings and other family members making SSBs available in the house. The participants felt that they could not stop consuming SSBs without restricting their availability at social events and in their homes. Consequently, for many participants from both socioeconomic groups, social support might be considered an essential element in reducing or stopping the consumption of SSBs. Social support included requesting support from the immediate household members, from extended family and from friends. This suggests that an intervention targeting the families, and particularly the parents, may help decrease SSB consumption by guiding these family members about the drivers of SSB placement and availability in the home. However, it is challenging to obtain the support of extended family and
friends through request; therefore, a massive change in the public attitudes towards SSB consumption needs to occur. In addition, the risk associated with the consumption of SSBs needs to be made known to the public.

10.3. Reflections on the use of theory
The socioecological approach [145, 146] was utilised in this thesis to identify all relevant factors that influenced SSB consumption: political, social, environmental and individual. Another framework from the public policy theories, multiple stream theory, was embedded within the socioecological framework and was used to analyse the policy level of the socioecological framework. Other levels within the framework were used to organise the data collection and then analyse the data inductively. This thesis embraced the complementary approach because it aimed to describe different understandings of the world. It was flexible in comparing multiple perspectives and recognising their different intellectual origins. The use of several theories in this thesis provided multiple advantages. First, it provided a more profound understanding of the question that was being investigated and answered. Second, it allowed for the application of multiple lenses with more than one perspective and demonstrated the comparative benefits of each theory. Third, the overarching question of the thesis was addressed from different angles.

This thesis included several levels of influence on SSB consumption. The socioecological concept was distinguished from other theories in that it only focussed on one or two levels of influence on health behaviour. In addition, a vital strength of the socioecological concept is that public health issues can be evaluated on multiple levels; this provides opportunities to broaden the options for understanding.

However, due to a lack of specificity and a lack of information, the value of the multiple levels of the socioecological concept is difficult to demonstrate. There was a lack of specificity and guidance in defining the influence with the most
weight in driving SSB consumption [196]. There was also a lack of information on how influencers operate and interact with each other [196]. The interaction concept of how individuals and societies interact with their environment is a reflection of how life is both complicated and sophisticated.

10.4. Strengths and limitations
This project demonstrated several strengths. One of the main strengths was using the socioecological approach to analyse SSB consumption in Saudi Arabia. Second, this thesis is the first project that took several angles to understand the determinants of SSB consumption through the perspectives of the public and elite actors. Third, it is the first project that employs a qualitative approach; all other studies identified in the region were quantitative in nature. Fourth, the two years of data collection allowed the researcher to understand the context in depth. Several methods were employed for data collection for this project, including in-depth interviews with elite actors and the public, focus group discussions with the public, documentary analysis and non-participant observation. All data and observations were analysed separately and subsequently triangulated to validate the results of the collected data. These different methods increased the depth of the collected information and yielded a broader understanding of the built case. Involving elite actors (from various government sectors, Saudi Consultative members, members from various civil societies and academics), provided the researcher with the opportunity to understand the political determinants of SSB consumption from different aspects and how the political priorities are determined in Saudi Arabia. Fifth, I selected study participants on the basis of visual identification of their body shape as ‘normal’, ‘overweight’ or ‘obese’ shape, as well as income (the neighbourhood from which they were sampled). This helped ensure that participation in the study was not limited to those more or less likely to have high consumption levels of SSBs. Importantly, there was no correlation between participant’s body shape and the attitudes and views expressed during interviews and focus group discussions [60]. Besides, the effect of BMI
on SSB consumption is not consistent in the literature [150, 154, 160]. Finally, as the researcher is a Saudi citizen residing in the same city that the participants were recruited from, it gave the study strength and ease in understanding the social, environmental and political context easily.

On the other hand, several limitations existed in this project related to its generalisability. A critical issue was that the female perspective and the perspectives of other nationalities were not included.

Saudi Arabia is a conservative and strongly patriarchal society, in common with the geographical region in which it is located, which blocked me, as a male researcher from interviewing women. Although the country has started undergoing several changes in recent years, particularly in terms of the empowerment of women, this has not yet changed the sociocultural identity and norms. This thesis has, therefore, been restricted to male participants. Female perspectives were encountered several times, albeit not from the females themselves but as told by the male participants. The thesis was also supplemented by my experiences, observations and understanding of the Saudi context, albeit as a male. While this thesis identified several domains that influenced SSB consumption, the female view of the drivers of SSB consumption was only explored in the social domain. In many families, women were responsible for the hospitality and the decisions on food shopping. The women in this thesis (the wives, mothers, daughters and sisters) were mentioned multiple times as the ones who reminded the male participants to purchase SSBs. Furthermore, the male participants who considered SSBs unhealthy claimed that they were sometimes obliged to purchase them by their female relatives to avoid conflicts. These snippets may go some way to providing a female perspective of SSB consumption in Saudi Arabia which remained otherwise hidden from me as a male researcher. Unfortunately, I did not have the resources to employ a female research assistant. Also, time constraints, language barriers and the lack of resources to hire and train
research assistants are feasibility issues that prevented me from including other nationalities in this study.

In addition, choosing Mecca as a proxy for the whole country may also reduce the generalisability of this study (in terms of how it reflects on the whole country). However, Mecca is one of the most highly populated cities in Saudi Arabia; it is the third-largest city with 1,534,731 residents [244]. Mecca contains the holy mosque for Muslims, which they visit to perform Umrah and at least one Hajj in their lives. These seasonal factors attract corporations to promote their SSBs. Such marketing strategies by the beverage industry have been shown in other areas of the world to be primary factors in increasing SSB sales. In addition, many visitors decide to stay in Mecca and become Saudi citizens; these visitors all have different ethnicities and backgrounds. Therefore, conducting the study in this city enlarged the depth of the information gathered to answer the overall question of this PhD project. As a resident of Mecca, the researcher also found it practical to conduct the study within the city because of the insight held of its neighbourhoods and the access to the population; this facilitated data collection and the interpretation of the results.

Using only two sites in Mecca is another generalisability issue in this project. However, the two sites allowed the researcher to identify and screen participants from both income groups easier and more efficiently. It also allowed the researcher to explore the environmental and social differences in the two neighbourhoods. Furthermore, the two neighbourhoods that were chosen are a reflection of other areas in Mecca in terms of the socioeconomic characteristics of the residents and their accessibility to the stores.

10.5. Recommendations and further research
While the government intended to reduce the affordability of SSBs by imposing a tax, the beverage industry diluted the effect by launching new brands in
smaller sizes and at lower prices. In addition, other factors continued to influence SSB consumption. Therefore, the government should consider further public health measures by addressing the following factors that influence SSB consumption as identified in this PhD project:

1. Increasing public awareness programmes that focus on the risk factors associated with SSB consumption, including all types of SSBs, not just carbonated and energy drinks;
2. Increasing public awareness programmes that focus on the reasons why the government implemented the SSB tax. This might indirectly cause the public to reduce consumption and increase the public trust in government actions. Also, it paves the way for the introduction of future health-related food taxation;
3. Imposing the tax percentage according to sugar content, not according to the type of SSBs;
4. Supporting the activities of civil societies that have the resources needed to engage actively in government policies and help increase public awareness;
5. Prohibiting the SSB industry from sponsoring any governmental activities;
6. Restricting the availability of SSBs inside government buildings and providing incentives to private sectors that act similarly in this restriction;
7. Prohibiting advertisements of SSBs on national television or restricting how often and when the advertisements are shown (e.g. during children's programmes);
8. Promoting healthy alternatives, like water, and weaving them into cultural norms.

Further research projects might be developed from the findings of this thesis and may address the limitations of this PhD project. These could be any of the following:
1. Further policy analysis studies are required in Saudi Arabia to analyse the government situation transparently and to highlight government policy options that might suit the government situation;

2. Including women and other nationalities in Saudi Arabia in the research to understand their motivations and drivers for SSB consumption to obtain a more complete picture and to identify the differences associated with gender and ethnicity/nationality;

3. Including other cities in the country to understand the public drivers and motivation of SSB consumption in these cities to validate the results obtained from Mecca;

4. Replicating the same methodologies on other taxed unhealthy food;

5. Conducting quantitative studies informed by the qualitative findings in this thesis

6. Conducting further quantitative studies in Saudi Arabia to explore the purchase pattern before and after imposing the tax among different SES.
Reference list


122. Hagenaars, L. L., Jeurissen, P., & Klazinga, N. S. (2017). The taxation of unhealthy energy-dense foods (EDFs) and sugar-sweetened beverages (SSBs): An overview of patterns observed in the policy
content and policy context of 13 case studies. *Health policy (Amsterdam, Netherlands)*, 121(8), 887–894. https://doi.org/10.1016/j.healthpol.2017.06.011


method systematic review and meta-analysis. The international journal of behavioral nutrition and physical activity, 16(1), 78. https://doi.org/10.1186/s12966-019-0843-0


# Appendices

## Appendix 1: Daily sugar-sweetened beverage (SSB) consumption among different population groups in Saudi Arabia, 2013

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<tr>
<th>Population group</th>
<th>Daily consumption mean (ml)</th>
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<tr>
<td><strong>Sex</strong></td>
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<tr>
<td>Male (N 5253)</td>
<td>131.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Female (N 5482)</td>
<td>98.8</td>
<td>3.8</td>
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<td><strong>Age group (years)</strong></td>
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<tr>
<td>15–24</td>
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<tr>
<td>Male (N 1189)</td>
<td>172</td>
<td>6.6</td>
</tr>
<tr>
<td>Female (N 1193)</td>
<td>127</td>
<td>8</td>
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<tr>
<td>25–39</td>
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<tr>
<td>Male (N 1857)</td>
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<td>6</td>
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<tr>
<td>Female (N 2169)</td>
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<td>4.9</td>
</tr>
<tr>
<td>40–59</td>
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<td>Male (N 1495)</td>
<td>64.9</td>
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<td>Female (N 1575)</td>
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<td>60 or older</td>
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<td>Male (N 712)</td>
<td>30.4</td>
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<td>Female (N 545)</td>
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<tr>
<td><strong>Education</strong></td>
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<td>Primary or less</td>
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<tr>
<td>(N 3286)</td>
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<td>Elementary/High school</td>
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<td>College or higher</td>
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<td><strong>Household monthly income (Riyals)</strong></td>
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<td>Less than 5,000</td>
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<td>(N 3161)</td>
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<td>5,000–14,999</td>
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<td>(N 4549)</td>
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<tr>
<td>15,000 or more</td>
<td>91.0</td>
<td>5.6</td>
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<td>(N 1131)</td>
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The information in this table was obtained from SHIS
Appendix 2: Search strategy for the systematic review

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<td>Search #1</td>
<td>(((&quot;Carbonated Beverages&quot;[Mesh]) OR &quot;Energy Drinks&quot;[Mesh])) OR (((&quot;Sugars&quot;[Mesh]) OR (&quot;Sweetening Agents&quot;[Mesh] OR &quot;Dietary Sugars&quot;[Mesh] OR &quot;Dietary Sucrose&quot;[Mesh]) OR Sugar sweeting beverages OR Soft drink)))</td>
</tr>
<tr>
<td>Search #2</td>
<td>((((((Oman[MeSH Terms]) OR United arab emirates[MeSH Terms]) OR Kuwait[MeSH Terms]) OR Qatar[MeSH Terms]) OR Saudi arabia[MeSH Terms]))) OR Kuwait[Title/Abstract] OR Saudi Arabia[Title/Abstract] OR United Arab Emirates[Title/Abstract] OR Qatar[Title/Abstract] OR Oman[Title/Abstract] OR Bahrain[Title/Abstract] OR Gulf states[Title/Abstract] OR Gulf countries[Title/Abstract] OR Gulf cooperation council countries[Title/Abstract])))</td>
</tr>
<tr>
<td>Search #4</td>
<td>Search #1 AND Search #2 AND Search #3</td>
</tr>
<tr>
<td>= 344 articles</td>
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</tr>
</tbody>
</table>
Search strategy in EMBASE:
1. (Kuwait or Saudi Arabia or United Arab Emirates or Qatar or Oman or Bahrain or Gulf states or Gulf countries or Gulf cooperation council countries).mp.
2. exp United Arab Emirates/ or exp Oman/ or exp Saudi Arabia/ or exp Qatar/ or Gulf cooperation council countries.mp. or exp Bahrain/ or exp Kuwait/
3. (determinant or determinants or correlation or correlations or correlated or correlates or relation or relations or relationship or relationships or relate or related or relates or factor or factors or predict or predicted or prediction or predictive or predicts or predictor or associate or associates or associated or influence or influences or influencing or influenced).mp.
4. (Sugars or Sweetening Agents or Dietary Sugars or Dietary Sucrose or Sugar sweeting beverages or energy drink or soft drink).mp.
5. exp sugar/ or exp sugar intake/ or exp sugar-sweetened beverage/ or sugar.mp.
6. energy drink.mp. or exp energy drink/
7. soft drink.mp. or exp soft drink/ or exp carbonated beverage/
8. 1 or 2
9. 4 or 5 or 6 or 7
10. 3 and 8 and 9 = 256 articles

Search strategy in PsychINFO
1. (Kuwait or Saudi Arabia or United Arab Emirates or Qatar or Oman or Bahrain or Gulf states or Gulf countries or Gulf cooperation council countries).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
2. (determinant or determinants or correlation or correlations or correlated or correlates or relation or relations or relationship or relationships or relate or related or relates or factor or factors or predict or predicted or prediction or predictive or predicts or predictor or associate or associates or associated or influence or influences or influencing or influenced).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
3. (Sugars or Sweetening Agents or Dietary Sugars or Dietary Sucrose or Sugar sweeting beverages or energy drink or soft drink).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]

4. sugar.mp. or exp SUGARS/

5. exp "Beverages (Nonalcoholic)"/ or sugar-sweetened beverage.mp.

6. exp Energy Drink/ or Energy drink.mp.

7. 3 or 4 or 5 or 6

8. 1 and 2 and 7 = **12 articles.**
Appendix 3: The Agency for Healthcare Research and Quality (AHRQ) Methodology Checklist for Cross-Sectional/Prevalence Study

N. The Agency for Healthcare Research and Quality (AHRQ) Methodology Checklist for Cross-Sectional/Prevalence Study

Website: http://www.ncbi.nlm.nih.gov/books/NBK35156/

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<tr>
<td>2. List inclusion and exclusion criteria for exposed and unexposed subjects (cases and controls) or refer to previous publications</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Indicate time period used for identifying patients</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Indicate whether or not subjects were consecutive if not population-based</td>
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</tr>
<tr>
<td>5. Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants</td>
<td>Yes</td>
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<tr>
<td>6. Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements)</td>
<td>Yes</td>
</tr>
<tr>
<td>7. Explain any patient exclusions from analysis</td>
<td>Yes</td>
</tr>
<tr>
<td>8. Describe how confounding was assessed and/or controlled</td>
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<tr>
<td>9. If applicable, explain how missing data were handled in the analysis</td>
<td>Yes</td>
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<tr>
<td>10. Summarize patient response rates and completeness of data collection</td>
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<tr>
<td>11. Clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained</td>
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Appendix 4: Quality assessment for included studies.

1. Al-Hazzaa et al. (2014)

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= 7/11 = 63.6%

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= 4/11 = 36.4%

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7. Alsunni and Badar (2011)

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13. Murad and Rafeeq (2016)

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Appendix 5: Ethical approvals from both UCL and MoH

1st May 2018

Professor Sarah Hawkes
Institute for Global Health
UCL

Dear Dr Hawkes

Notification of Ethics Approval with Provisos

Project ID/Title: 13267/001: A policy analysis of Saudi Arabian healthcare system’s diabetes prevention programs

I am pleased to confirm in my capacity as Joint Chair of the UCL Research Ethics Committee (REC) that I have ethically approved your study until 1st May 2019.

Ethical approval is subject to the following conditions:

Notification of Amendments to the Research

You must seek Chair’s approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an ‘Amendment Approval Request Form’

http://ethics.grad.ucl.ac.uk/responsibilities.php

Adverse Event Reporting – Serious and Non-Serious

It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Joint Chairs will decide whether the study should be terminated pending the opinion of an independent expert. For non-serious adverse events the Joint Chairs of the Ethics Committee should again be notified via the Ethics Committee Administrator within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Joint Chairs will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Final Report

At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes in particular issues relating to the ethical implications of the research i.e. issues obtaining consent, participants withdrawing from the research, confidentiality, protection of participants from physical and mental harm etc.
5 November 2019

Professor Kholoud Porter  
Faculty of Population Health Sciences  
Institute for Global Health  
UCL

Cc: Rakan Ekram

Dear Prof. Porter

Notification of Ethics Approval

Project ID/Title: 16651/001: Perceptions and attitudes among Saudi Arabian men on factors contributing to sugar sweetened beverage intake and use of taxation to reduce intake

I am pleased to confirm in my capacity as Joint Chair of the UCL Research Ethics Committee (REC) that I have ethically approved your study until 15 January 2020.

Ethical approval is also subject to the following conditions:

Notification of Amendments to the Research

You must seek Chair’s approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an ‘Amendment Approval Request Form’ [http://ethics.grad.ucl.ac.uk/responsibilities.php](http://ethics.grad.ucl.ac.uk/responsibilities.php).

Adverse Event Reporting – Serious and Non-Serious

It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Joint Chairs will decide whether the study should be terminated pending the opinion of an independent expert. For non-serious adverse events the Joint Chairs of the Ethics Committee should again be notified via the Ethics Committee Administrator within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Joint Chairs will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Final Report

At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes in particular issues relating to the ethical implications of the research.
IRB Registration Number with KACST, KSA: H-01-R-012
IRB Registration Number with OHRP/NIH, USA: IRB00010471
Approval Number Federal Wide Assurance NIH, USA: FWA00018774

April 12, 2018
IRB Log Number: 18-190E
Department: External
Category of Approval: EXEMPT

Dear Rakan Ekram,

I am pleased to inform you that your submission dated April 10, 2018 for the study titled 'Policy analysis of Saudi Arabian healthcare system’s diabetes prevention programs' was reviewed and was approved according to ICH GCP guidelines. Please note that this approval is from the research ethics perspective only. You will still need to get permission from the head of department or unit in KFMC or an external institution to commence data collection.

We wish you well as you proceed with the study and request you to keep the IRB informed of the progress on a regular basis, using the IRB log number shown above.

Please be advised that regulations require that you submit a progress report on your research every 6 months. You are also required to submit any manuscript resulting from this research for approval by IRB before submission to journals for publication.

As a researcher you are required to have current and valid certification on protection human research subjects that can be obtained by taking a short online course at the US NIH site or the Saudi NCBE site followed by a multiple choice test. Please submit your current and valid certificate for our records. Failure to submit this certificate shall a reason for suspension of your research project.

If you have any further questions feel free to contact me.

Sincerely yours,

[Redacted]

Prof. Omar H. Kasule
Chairman, Institutional Review Board (IRB)
King Fahad Medical City, Riyadh, KSA
Tel: + 966 1 288 9999 Ext. 26913
E-mail: okasule@kfmc.med.sa
Approval Letter

Date: Central IRB log No: 2019-0110M
Category of Approval: Exempt
Affiliation: UmU

Dear Dr.,

The Central IRB-MoH pleased to inform you that submission dated for the study mentioned below was reviewed and approved.

<table>
<thead>
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<th>Protocol Title</th>
<th>Perceptions and attitudes among Saudi Arabian men on factors contributing to sugar-sweetened beverage intake and proposed methods to control their consumption.</th>
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<tr>
<td>Principal Investigator</td>
<td>Rakan Abdulaziz Mohamed Mohamed Ekram</td>
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<tr>
<td>Affiliation</td>
<td>Um AlQura University</td>
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<tr>
<td>Documents Reviewed</td>
<td>Study proposal, CV, Request for exempt status, PI statement, signed consent form, MOH data base information, signed Data Share Agreement, Questionnaire A, NCBE certificate</td>
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Decision:
The Central IRB was approved the protocol according to ICH-GCP. Approval is given for one year from the date of this letter.

Approval Conditions:

- Abide by the rules and regulations of the Government of Saudi Arabia, NCBE, Central IRB and the IHC-GCP guidelines.
- To conduct research as per the approved documents.
- Research participant confidentiality should be protected at all times.
- All researchers are required to have current and valid certificate on Protecting Human Research Participants (NIH or NCBE certificate).
- Amendment to the approved documents, the Principal Investigator is required to advise the Central IRB for its approval before implementation.
- You are required to submit a Progress Report every 6 month.
- If PI is unable to complete your research within the validation period, he will be required an extension letter from the Central IRB one month before the expiry of the approval.

E-mail: GDRS-IRB@moh.gov.sa
Appendix 6: Topic guide and list of questions used to understand the government’s reasons for imposing taxes on carbonated and energy drinks and scoping review of government challenges in other dietary policies.

1. What is the relationship between health and sugar?
2. How important are these problems compared with other health issues in Saudi Arabia?
3. What are the main ways of dealing with such problems in Saudi Arabia? **Probe:** Individual behaviour change, health education, community action, regulatory interventions (e.g. taxation, regulating access or marketing); which one of these approaches is better? Why?
4. Who supports these approaches? What benefits do they receive from supporting such approaches?
5. How could the policies be improved?
6. What are the barriers to improvement?
7. What are the policies in other regions pertaining to sugar? Could we use them in Saudi Arabia? If so, why? If not, why not?
8. Give examples of self-regulation that have been successful in Saudi Arabia.
9. In what forums do corporations engage with the government?
10. How strong is the evidence for regulation and control? What would make the evidence more credible? Would more quantitative analysis matter?
11. To what extent does empirical evidence play a part in decision-making in health policy decisions in Saudi Arabia? Examples?
12. Do you know of an example where the use of evidence was successful in changing policy? What made it successful? What about an example where evidence was overlooked? Why did that happen?
13. What do you think of increasing taxation on sugar (e.g. on soda)?
   - What institutions support such a policy and why?
   - What institutions oppose such a policy and why?
   - Which other stakeholders do you think would support/oppose such a policy?
• What is the power of these stakeholders? Where is the leadership?
• How do these stakeholders interact with each other?

14. What is the role of civil society in pressing for change on any of these policy issues?
15. Thinking about the food industry here in Saudi Arabia...

A. To what extent does the industry lobby policy makers? What is the focus of the lobbying?

B. To what extent does industry shape the debate on food policy? How?

C. What are the industry relationships with key opinion makers? With researchers? With health professionals? With the media? How much corporate sponsorship of community events takes place?

D. Has the food industry used legal measures to block policy options? What about when seeking to influence trade and investment agreements?

E. What else can you tell us about the tactics and strategies that industry uses to influence food policy and regulation in Saudi Arabia?
Appendix 7: Questions list and the topic guide used in individual interviews to understand the drivers for SSBs and the attitudes towards the imposed taxation

Theme 1: Drinking behaviours

1. What type of drinks with added sugar are available in this area? **Probe:** Carbonated drinks, fruit juices with added sugar, energy drinks, flavoured beer, iced tea, iced coffee
2. Tell me the thoughts and feelings that come to mind when thinking about each of these drinks?
3. In a typical week, which of these do you drink? How often?
4. When do you drink these drinks, and is it on specific occasions? **Probe:** What are you usually doing, where are you, who are you with, how do you prefer to drink them (cold, with ice, canned, bottled, large or small size)?
5. What other activities are associated with these drinks? **Probe:** Relaxing, eating, smoking, studying, etc.
6. What are the main reasons for choosing these drinks? **Probe:** For each drink they mentioned
7. How do you feel when you drink X (SSB they consume most often)? **Probe:**
   - Excitement
   - Happiness
   - Guilt
   - Strong
   - Energised
   - Nothing
8. Do you think the amount of sugary drinks you consume has increased or decreased over the last five years?

Theme 2: Social and environmental factors

9. Do you ever have these drinks at home? What are the reasons for buying/not buying? **Probe:** Who decides their presence/absence in the home?
10. Are these drinks ever available at work? What are the reasons for having/not having? **Probe:** Who pushes their presence/absence in the home?

11. How does socialising with your friends and family affect your consumption of these sugary drinks?

12. How essential is it to have sugary drinks available when you gather with your family and friends?

13. **Theme 3: Industry activities**

14. How available and accessible are X (most common sugary drinks)? Has this changed over time?

15. Where do you usually buy them from? How long does it take you to get to that place? Why that place?

16. What sizes are available at that place?

17. What other drinks are available from these places?

18. Would you prefer to buy another product if it was more accessible to you?

19. Within supermarkets, how are sugary drinks promoted? **Probe:** Location, promotions

20. What could influence you to buy sugary drinks while you are shopping in the supermarket?

21. How do you feel about the way sugary drinks are advertised? **Probe:**
   - Effectiveness
   - Frequency in media
   - Distribution on the street

22. **Theme 4: Behavioural intention:**

   22. Could you please rank for me the level of sugar in those drinks? **Probe:** What were you thinking about when you put X first…

23. Do you think you drink too much, too little or the right amount of sugary drinks? What makes you say that?
24. What do you feel is an acceptable number of sugary drinks for an adult to consume each week?
25. If you wanted to change the sugary drinks you consume, what would make it easy or hard?
26. Which would be the easiest to give up? Which would be the hardest?
27. What would be benefits of reducing, or stopping altogether, the number of sugary drinks you consume? ** Probe:** Short- and long-term health benefits
28. Would you like to reduce the quantity of sugary drinks that you consume? Why/why not? **If yes,** how would you do it? What would you need to achieve this?

**Theme 5: Taxation**

29. How do you see the price of sugary beverages? How does their price compare to other drinks?
30. There is a taxation on soft drinks and energy drinks; can you tell me what you know about this tax? **Probe:** What is its purpose?
31. Do you feel that taxation has changed your behaviour towards sugary drinks? **If yes,** tell me how. **If no,** why not? What would the government need to do to change your consumption?
32. Do you believe that the MoH has the right to change behaviour through taxation? Could you tell me why?
### Appendix 8: List of documents included in the analysis

<table>
<thead>
<tr>
<th>Document</th>
<th>Year</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The National Diet &amp; Physical Activity Strategy (DPAS) 2015–2025</td>
<td>2015</td>
<td>MoH</td>
<td>22 pages describing MoH strategies to reduce non-communicable diseases (NCDs)</td>
</tr>
<tr>
<td>Fiscal_Balance_Programme_2018</td>
<td>2018</td>
<td>Ministry of Finance (MoF)</td>
<td>22 pages describing the economic reforms in Saudi Arabia</td>
</tr>
<tr>
<td>International Monetary Fund (IMF) Country Report No. 11/292 and 12/271</td>
<td>2011 and 2012</td>
<td>IMF</td>
<td>The IMF holds bilateral discussions with Saudi Arabia usually every year. Based on this discussion, with the presence of the Deputy Minister of Finance in Saudi Arabia, several recommendations were released. One of which was to broaden the tax base in Saudi Arabia.</td>
</tr>
<tr>
<td>SAUDI ARABIA BEYOND OIL: THE INVESTMENT AND PRODUCTIVITY Transformation</td>
<td>2015</td>
<td>McKinsey Global Institute</td>
<td>140 pages analysing the strengths and weaknesses of the Saudi economy, giving recommendations to overcome the weaknesses and diversify the economy. Many times in the report, the McKinsey Global Institute obliged the Saudi government to add taxes to diversify the economy.</td>
</tr>
<tr>
<td>Document</td>
<td>Year</td>
<td>Source</td>
<td>Description</td>
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</tr>
<tr>
<td>TRADE POLICY REVIEW</td>
<td>2016</td>
<td>World Trade Organization (WTO)</td>
<td>This document contained written questions from WTO members and replies provided by Saudi Arabia. Question No. 38 demanded verification for Saudi Arabian plans to introduce tax on luxury products.</td>
</tr>
<tr>
<td>KINGDOM OF SAUDI ARABIA</td>
<td></td>
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<tr>
<td>MINUTES OF THE MEETING</td>
<td></td>
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<tr>
<td>National Transformation Programme</td>
<td>2016</td>
<td>The Ministry of Economy in Saudi Arabia</td>
<td>The National Transformation Programme is a government plan to achieve Saudi Vision 2030, which contains government initiatives intended to be implemented before 2020.</td>
</tr>
<tr>
<td>Health Profile 2015, Saudi Arabia</td>
<td>2016</td>
<td>WHO</td>
<td>The WHO provided a comprehensive health profile report which was intended to serve as a tool to monitor progress in the health of the population. In the report, the WHO highlighted the role of Saudi Vision 2030 and the National Transformation Programme in reducing the burden of NCD and in earmarking sin taxes on tobacco and SSBs.</td>
</tr>
<tr>
<td>WHO Country Cooperation Strategy at a Glance: Saudi Arabia</td>
<td>2017</td>
<td>WHO</td>
<td>In this report, the WHO highlighted the role of the National Transformation Programme in introducing the sin taxes.</td>
</tr>
<tr>
<td>Document</td>
<td>Year</td>
<td>Source</td>
<td>Description</td>
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<td>-----------------------------------------------</td>
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<tr>
<td>Saudi Vision 2030</td>
<td>2016</td>
<td>Ministry of Economy</td>
<td>This report described Saudi Vision 2030, which acts as a roadmap for the government. In this report, the government emphasised different areas for improvements, including governance, transparency and diversifying the economy.</td>
</tr>
<tr>
<td>Public Statement Copy of the Government Budget 2017</td>
<td>2017</td>
<td>MoF</td>
<td>In this report, the MoF described the reasons for introducing taxes on carbonated and energy drinks, regardless of sugar content. Moreover, it emphasised the importance of these initiatives in sustaining government spending and the expected financial gain, including from taxes on carbonated and energy drinks.</td>
</tr>
<tr>
<td>WHO EMRO</td>
<td>WHO Director-General Visits Saudi Arabia</td>
<td>2018</td>
<td>Media centre of the WHO</td>
</tr>
<tr>
<td>Document</td>
<td>Year</td>
<td>Source</td>
<td>Description</td>
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<tr>
<td>Saudi Vision 2030, the National Transformation Programme and the role of the Minister of Health in implementing important public health measures to reduce the burden of NCD.</td>
<td></td>
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</tr>
<tr>
<td>Questions I asked General Authority of Zakat and Tax</td>
<td>2017</td>
<td>General Authority of Zakat and Tax</td>
<td>When General Authority of Zakat and Tax refused to conduct an interview with the author of this thesis, I tried to acquire as much as possible from this institution. The institute agreed to let me ask a responsible employee from the legal department questions on the taxation of carbonated drinks and energy drinks. The questions asked, and clarifications demanded, were the same questions the author asked in the interviews with elite actors.</td>
</tr>
<tr>
<td>Report on the collaboration between MoH and the Saudi FDA</td>
<td>2018</td>
<td>MoH</td>
<td>In this report, the MoH described the results of the collaboration between the two government entities, the MoH and the Saudi FDA, and the challenges that they faced. In the report, the MoH highlighted potential obstacles that the government faced in imposing taxes on SSBs and the government’s fears in being blocked from tagging energy drinks as</td>
</tr>
<tr>
<td>Document</td>
<td>Year</td>
<td>Source</td>
<td>Description</td>
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<td></td>
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<td>unhealthy products by strategies similar to previously used ones.</td>
</tr>
</tbody>
</table>
Appendix 9: Themes definition

(1) Policy analysis

<table>
<thead>
<tr>
<th>Themes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitators to implementing a tax on carbonated and energy drinks</td>
<td></td>
</tr>
<tr>
<td>Political stream</td>
<td></td>
</tr>
<tr>
<td>New government ideology</td>
<td>The government’s Vision 2030 played an important role in driving the taxation policy on carbonated and energy drinks.</td>
</tr>
<tr>
<td>Presence of leading institutional actors</td>
<td>Several institutions, such as MoH and MoF, adopted the policy, and that was one of the main drivers for the taxation.</td>
</tr>
<tr>
<td>Government cohesion</td>
<td>It was evident from both interviews and documents that the government was highly cohesive and worked together to implement the tax.</td>
</tr>
<tr>
<td>Existence of leadership</td>
<td>Champions and leaders played important roles in implementing the tax.</td>
</tr>
<tr>
<td>Government power</td>
<td>Government power over local corporations was obvious. No corporations raised concerns, refused or challenged the government over the tax policy.</td>
</tr>
<tr>
<td>Problem stream</td>
<td></td>
</tr>
<tr>
<td>Financial problem</td>
<td>The drop in oil prices was one of the main reasons for taxation on carbonated and energy drinks.</td>
</tr>
<tr>
<td>Themes</td>
<td>Definition</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Obesity and diabetes problem</td>
<td>Increased prevalence of obesity and diabetes is a real problem.</td>
</tr>
<tr>
<td>Views on obesity and SSB consumption</td>
<td>The reasons behind the increased prevalence of obesity are controversial.</td>
</tr>
<tr>
<td><strong>Policy stream</strong></td>
<td></td>
</tr>
<tr>
<td>Financial gain by diversifying resources</td>
<td>One of the government tools to reduce the dependence on oil was taxation on carbonated and energy drinks.</td>
</tr>
<tr>
<td>apart from oil</td>
<td></td>
</tr>
<tr>
<td>Health gains as result of the tax on</td>
<td>One of the taxation’s aims was to reduce the prevalence of obesity and diabetes.</td>
</tr>
<tr>
<td>carbonated and energy drinks</td>
<td></td>
</tr>
<tr>
<td>Policy effectiveness</td>
<td>The effectiveness of the government’s taxation policy is controversial. Some interviews show that it is a good policy because it is a population-based intervention and it suits the Saudi population well.</td>
</tr>
<tr>
<td>Policy transfer</td>
<td>It was a policy developed in other countries and transferred to Saudi Arabia in addition to policies pushed by the WHO as a result of other countries’ experiences.</td>
</tr>
<tr>
<td>Challenges and barriers in implementing</td>
<td></td>
</tr>
<tr>
<td>other dietary-related obesity policies</td>
<td></td>
</tr>
<tr>
<td>Lack of financial support</td>
<td>Poor financial support is one of the government’s central challenges in introducing several policies. Key</td>
</tr>
<tr>
<td>Themes</td>
<td>Definition</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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</tr>
<tr>
<td>staff believe that financial support could</td>
<td>to support research and increase the level of evidence, to increase workforce power for the enforcement of policies and to train and incentivise said workforce.</td>
</tr>
<tr>
<td>Unstable leadership at the MoH</td>
<td>The Saudi government saw six Ministers of Health in two years. The change in ministers is believed to have affected progress towards other food-related policies.</td>
</tr>
<tr>
<td>Lack of cohesion</td>
<td>Two of the Saudi government’s challenges in dietary policies include conflicts of interest and having no clear framework.</td>
</tr>
<tr>
<td>Low level of engagement from civil society</td>
<td>Civil society’s weak engagement with the government’s policies is one of the reasons there has been a delay in food-related policies. In contrast, there has been high engagement from the food and beverage industry.</td>
</tr>
<tr>
<td>in food-related policies versus a high level</td>
<td></td>
</tr>
<tr>
<td>engagement from the food and beverage</td>
<td></td>
</tr>
<tr>
<td>industry</td>
<td></td>
</tr>
<tr>
<td>Public-private partnership</td>
<td>Public-private partnership is defined as an agreement between the government and private sectors. This agreement aims to transfer the risk or part of the risk from the government to private industry.</td>
</tr>
<tr>
<td>WTO disputes</td>
<td>International corporations have the right to block policies by disputing them in the WTO.</td>
</tr>
</tbody>
</table>
### (2) Determinants and drivers of SSB consumption

<table>
<thead>
<tr>
<th>Themes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual domain</strong></td>
<td></td>
</tr>
<tr>
<td>Enjoyable attributes of SSBs</td>
<td>Intrinsic factors made the participants consume SSBs.</td>
</tr>
<tr>
<td>Taste</td>
<td>Participants commented that the taste of SSBs is what makes them drink a particular drink.</td>
</tr>
<tr>
<td>Thirst-quenching and refreshing</td>
<td>Feeling thirsty and how SSBs could quench thirst were two of the factors why participants drank SSBs. Another factor associated with thirst-quenching is that they are refreshing. The definition of ‘refreshing’ is vague, but when participants said they were refreshing in hot weather or they made them feel cool in hot weather, I considered these the refreshing factor.</td>
</tr>
<tr>
<td>Providing energy</td>
<td>Another factor also obtained from participants was their claim that SSBs gave them energy or power.</td>
</tr>
<tr>
<td>Swallowing and digesting food</td>
<td>Participants stated that SSBs help them to swallow and digest food.</td>
</tr>
<tr>
<td>Changing mood</td>
<td>Participants stated that SSBs changed their mood, if they were unhappy, and made them happy.</td>
</tr>
<tr>
<td>Associated individual behaviour</td>
<td>Some behaviours have been frequently associated with SSBs, including smoking, watching TV, and eating food.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>There was a lack of knowledge on what is considered healthy or not and an identification that SSBs are okay to consume if an individual seems healthy or active.</td>
</tr>
</tbody>
</table>
### Themes and Definitions

<table>
<thead>
<tr>
<th>Themes</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nectars and flavoured juices considered healthy</td>
<td>Participants considered nectar and flavoured juices healthy alternatives to carbonated drinks and energy drinks.</td>
</tr>
<tr>
<td>Not a problem</td>
<td>Participants did not find consuming SSBs a problem if an individual is active, healthy, fit or in shape.</td>
</tr>
<tr>
<td>Affordability</td>
<td>SSBs are affordable to be purchased.</td>
</tr>
<tr>
<td>Affordability of the current prices</td>
<td>Even after the tax was implemented, SSBs are highly purchasable.</td>
</tr>
<tr>
<td>Reaction to price increase: Switching to lower-priced brands</td>
<td>Due to the increase in prices, participants were more able to purchase SSBs by switching to cheaper brands.</td>
</tr>
<tr>
<td>Reaction to price increases: Switching to smaller size with lower price</td>
<td>Participants were more able to purchase SSBs by switching to smaller sizes, which have lower prices.</td>
</tr>
<tr>
<td>Environmental domain</td>
<td>All physical factors that made participants consume SSBs.</td>
</tr>
<tr>
<td>Themes</td>
<td>Definition</td>
</tr>
<tr>
<td>------------------------------------------</td>
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</tr>
<tr>
<td>Availability and accessibility</td>
<td>Where participants find SSBs.</td>
</tr>
<tr>
<td>In-home availability</td>
<td>The effect of availability of SSBs in the home.</td>
</tr>
<tr>
<td>Availability outside the home</td>
<td>Where participants find SSBs outside the home.</td>
</tr>
<tr>
<td>Within neighbourhood</td>
<td>The availability of SSBs in neighbourhood stores and how it affects consumption level.</td>
</tr>
<tr>
<td>Availability of SSBs in schools, restaurants and gatherings</td>
<td>The effect of SSB availability in schools, restaurants and gatherings.</td>
</tr>
<tr>
<td>Marketing and promotion</td>
<td>The effect of industry marketing strategies on consumption level and where participants recognize these marketing activities.</td>
</tr>
<tr>
<td>Point of purchase</td>
<td>The effect of point of purchase on consumption level and where participants locate these points of purchase.</td>
</tr>
<tr>
<td>Advertisement location and impact</td>
<td>Identifying locations of beverage industry advertisements and how they affect consumption.</td>
</tr>
<tr>
<td>Themes</td>
<td>Definition</td>
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<tr>
<td>--------------------------------------------</td>
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</tr>
<tr>
<td>Cultural appropriation of advertising</td>
<td>How participants perceive the advertisements and how the industry employs advertisements that suit the culture.</td>
</tr>
<tr>
<td>Social context</td>
<td>The social drivers, which include perceived factors, that push participants into behaviour for others and not for themselves, even if it goes against their beliefs.</td>
</tr>
<tr>
<td>Social norms in Saudi Arabia</td>
<td>Specific norms, the suitability of types of drinks and the expected behaviours among peers and family.</td>
</tr>
<tr>
<td>Family request</td>
<td>Family members asking for SSBs at home increases the availability of SSBs, which could affect consumption level.</td>
</tr>
</tbody>
</table>
(3) Views on alternatives to SSBs codebook

<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not recognising alternatives</td>
<td>Participants did not know which beverage could replace their favourite SSB.</td>
</tr>
<tr>
<td>Different taste</td>
<td>Other tastes were not like their favourite SSB.</td>
</tr>
<tr>
<td>Alternatives perceived as not healthy</td>
<td>Participants perceived the risk of drinking SSB alternatives as unhealthier than SSBs. This perception was mostly associated with ‘diet’ drinks.</td>
</tr>
<tr>
<td>Alternatives not available or not as accessible as SSBs</td>
<td>Participants had difficulties accessing alternatives, unlike with SSBs which are widely available and accessible everywhere.</td>
</tr>
<tr>
<td>Natural juices are expensive</td>
<td>These are expensive and not always affordable.</td>
</tr>
</tbody>
</table>
### (4) Public attitudes towards taxation on carbonated and energy drinks

<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of the SSB tax</td>
<td>Include the reasons why the government introduced the tax; the tax per cent.</td>
</tr>
<tr>
<td>Level of acceptability</td>
<td>Level of acceptability is measured by understanding if the participant is for or against the tax on carbonated and energy drinks.</td>
</tr>
<tr>
<td>Justifiable</td>
<td>Participants perceived the introduction of the tax as justifiable because of increasing prevalence of diabetes and obesity and increased government revenue.</td>
</tr>
<tr>
<td>Refusing the idea of the tax</td>
<td>Participants did not refuse the government tax directly, but they refused the tax indirectly by stating that it was ineffective, regressive or a high percentage.</td>
</tr>
<tr>
<td>Ineffective</td>
<td>Did not change their consumption level.</td>
</tr>
<tr>
<td>Regressive</td>
<td>Low-income groups pay more per cent of their income compared to high-income groups.</td>
</tr>
<tr>
<td>Outrageous</td>
<td>It is a very high per cent tax.</td>
</tr>
</tbody>
</table>
### (5) Possible motivations to change behaviour

<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased level of awareness</td>
<td>Due to understanding the risk associated with drinking SSBs, some people might reduce their consumption level.</td>
</tr>
<tr>
<td>Health concerns</td>
<td></td>
</tr>
<tr>
<td>Experiencing side effects</td>
<td>This includes the immediate side effects associated with SSB consumption.</td>
</tr>
<tr>
<td>Having a disease or fear of a disease</td>
<td>Having a chronic condition or fear of one might lead to stopping or reducing consumption.</td>
</tr>
<tr>
<td>Family concerns</td>
<td>Fear of family, including parents and even grown-up children, experiencing the side effects of SSBs.</td>
</tr>
<tr>
<td>Price increase</td>
<td>The increased price after tax reduces the consumption.</td>
</tr>
</tbody>
</table>
(6) Possible strategies to reduce consumption of SSBs

<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Governmental strategies</strong></td>
<td></td>
</tr>
<tr>
<td>Reduced exposure to SSBs</td>
<td>Reduced exposure to all risk factors might increase consumption; this includes restricting availability and accessibility and restricting exposure to SSB advertisements.</td>
</tr>
<tr>
<td>Increased availability and accessibility of healthy alternatives</td>
<td>Any government activities to promote increased availability of healthy SSB alternatives.</td>
</tr>
<tr>
<td>Add another tax</td>
<td>Increasing the tax per cent might lead to reduced consumption.</td>
</tr>
<tr>
<td>Increased awareness programmes</td>
<td>All activities that promote reduced consumption, such as boosters, Twitter accounts or other forms of media.</td>
</tr>
<tr>
<td><strong>Individual strategies</strong></td>
<td></td>
</tr>
<tr>
<td>Intention</td>
<td>The desire to change behaviour.</td>
</tr>
<tr>
<td>Gradual reduction</td>
<td>Gradually reduced consumption.</td>
</tr>
<tr>
<td>Theme</td>
<td>Definition</td>
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<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Choosing other substitutes</td>
<td>Instead of drinking a favourite drink, choose an alternative.</td>
</tr>
<tr>
<td>Requesting social support</td>
<td>Asking family members and close friends to support the reduction or end of SSB consumption.</td>
</tr>
</tbody>
</table>