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YEDITEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
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NUTRITIONAL KNOWLEDGE, ATTITUDE, AND CONSUMPTION PATTERN OF SUGAR SWEETENED BEVERAGES AMONG SOMALI STUDENTS IN TURKEY

MASTER OF PUBLIC HEALTH THESIS

Saido Abdirahman Mohamud GEDI,

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APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated 31.07.2019 and numbered 2019/13-40

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Director of Institute of Health Sciences

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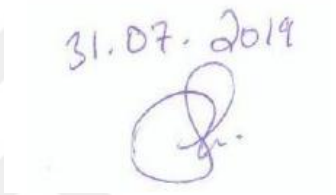
DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.



Saido Abdirahman Mohamud GEDI

DEDICATION

This thesis is dedicated to my parents, my siblings and the Somali students in Turkey.

ACKNOWLEDGMENTS

First of all, I am deeply grateful to Allah for giving me the strength, wisdom, peace of mind and good health to complete this research.

Throughout the writing of this dissertation I have received a great deal of support and assistance. My sincere gratitude goes to my supervisor, Dr. Hale Arık Taşyıkan whose expertise was invaluable in formulating the research topic and methodology in particular. She provided me with the tools that I needed to choose the right direction and successfully complete my dissertation. Many thanks to all my tutors, Dr. Güldal İzbırak, and Dr. Çiğdem Altunok for enriching me with knowledge. Also, I would like to acknowledge Prof. Dr. Erol Sezer for inspiring my interest in chronic diseases and being a mentor throughout the course.

The interview session with the participants for data collection was impossible without the support of the Somali Students Organization team, the DAD Research Group in Istanbul, the Tawfik Society in Ankara and the Students Association in Mersin for their cooperation and management throughout the interview. I would also like to thank all the students for their enthusiastic participation in this study.

Finally, I express my deep appreciation to my beloved family for their endless love, support and inspiration. In addition, there are my friends who have been very supportive, as well as offering happy diversion to rest my mind outside of the research.

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LIST OF SYMBOLS AND ABBREVIATIONS

AHA	American Health Association
BMI	Body Mass Index
CHD	Coronary Heart Disease
EASD	European Association for the study of Diabetes
GDA	Guideline Daily Amounts
GI	Glycemic Index
HFCS	High-Fructose Corn Syrup
IPAQ	International Physical Activity Questionnaire
KAP	Knowledge, Attitude and Practice
NAFLD	Non-Alcoholic Fatty Liver Damage
NFP	Nutrition Facts Panel
NCDs	Non-communicable diseases
SSBs.	Sugar Sweetened Beverages
SES	Socio-Economic Status
SPSS	Statistical Package for Social Science
RCT	Randomized Controlled Trials
ROS	Reactive Oxygen Species
TV	Television
WHO	World Health Organization

ABSTRACT

Saido Gedi. (2019). Nutritional Knowledge, Attitude, and Consumption Pattern of Sugar-Sweetened Beverages among Somali Students in Turkey.Yeditepe University, Institute of Health Science, Department of Public Health, MPH thesis, İstanbul.

Nutrition plays a major role in the age of adults, especially at university, where unhealthy eating habits such as high consumption of fast food and sugar-sweetened beverages (SSBs) are adopted. Excessive consumption of SSBs was associated with obesity, tooth decay, type 2 diabetes, dyslipidemia, high blood pressure, subversive behaviors, and poor mental health. To the best of our knowledge, no study has been conducted among Somali students in Turkey, so the aim of this study is to assess the level of knowledge, attitudes and practices of Somali students towards sugar sweetened beverages and determine the effect of SSBs on the body mass index (BMI). The data were collected by interview-based survey of a sample of 325 undergraduate and postgraduate students studying at universities in Istanbul, Ankara and Mersin. Participants were interviewed on socio-demographic, socio-economic status, a structured KAP-based questionnaire, and physical activity level as well as weight and height. The data were analyzed by using SPSS 25.0. To evaluate associations Spearman's correlation, chi-square test, Mann-Whitney U test, and Kruskal Wallis tests were used. All students surveyed reported consuming sugar-sweetened beverages, males were the highest consumers of sugary drinks compared to females. Packaged fruit juice and coke were the most frequently consumed beverages. Participants reported their primary reason for drinking soft drinks were taste (39%), and refreshment (20.6%). Almost 69% of female students and 49% of male students had an acceptable level of knowledge about the types of SSBs and potential health conditions if consumed excessively.76% students had positive attitude in reducing the consumption of sugary drinks. No significant correlation was found between BMI and SSBs consumption. In line with the high consumption of sugary drinks and the lack of awareness among students, interventions must begin at the university and home level. However, interventions in the food industry, media, government, and health care levels should play a role in improving healthy eating habits.

Key words: Sugar- sweetened beverages, Nutritional knowledge, Consumption pattern, Body Mass Index, Somali students.

ÖZET

Saido Gedi. (2019). Türkiye'deki Somalili Öğrencilerde Şeker Katkılı İçecekler ile İlgili Bilgi, Tutum ve Tüketim Durumu. Yeditepe Universitesi, Sağlık Bilimleri Enstitüsü, Halk Sağlığı Anabilim Dalı, Halk Sağlığı Yüksek Lisans Tezi, İstanbul.

Üniversite yaşamı, erişkinlerin fast-food ve şekerli/şeker katkılı içecekler gibi sağlıksız ürünlerin yüksek oranlarda tüketilmesinde ve sağlıksız beslenme alışkanlıklarının benimsenmesinde önemli bir rol oynamaktadır. Aşırı şekerli içecek tüketimi şişmanlık, diş çürüğü, tip 2 diyabet, dislipidemi, hipertansiyon, yıkıcı davranışlar gibi birçok olumsuz sağlık durumu ile ilişkilendirilmiştir. Beslenme bilgisi ve olumlu tutumun diyet uygulamalarını etkilediği bilinmektedir. Ancak bildiğimiz kadarıyla, Somalili öğrencilerin şeker katkılı içecekleri tüketim örüntüsünü ve bilgi ve tutum düzeylerini araştıran bir çalışma bulunmamaktadır. Bu nedenle bu çalışmanın amacı, Somalili öğrencilerin şekerle tatlandırılmış içecek tüketimine yönelik bilgi, tutum ve davranış düzeylerini değerlendirmek ve bu içeceklerin beden kitle indeksi üzerindeki etkisini belirlemektir. Veriler, İstanbul, Ankara ve Mersin'deki üniversitelerde okuyan 325 lisans ve lisansüstü Somalili öğrenciden ankete dayalı yüz yüze görüşme yöntemiyle toplanmıştır. Katılımcılardan, demografi ve sosyo-ekonomik durum, şekerli içecekler ile ilgili bilgi – tutum – davranış durumu, fiziksel aktivite durumu ile ağırlık ve boy hakkında veri toplanmıştır. İlişkilerin istatistiksel anlamlılığını değerlendirmek için Spearman korelasyon testi, ki-kare testi, Mann-Whitney U ve Kruskal Wallis testleri kullanıldı. Araştırmada, erkekler kadınlara göre daha yüksek düzeyde şekerli içecek tükettiklerini bildirdi. Katılımcılar, bu içecekleri içmenin temel nedeninin tat (%39.0) ve verdiği ferahlama hissi (%20.6) olduğunu bildirdi. Kız öğrencilerin yaklaşık %69'u ve erkek öğrencilerin %49'u, aşırı tüketildiği takdirde, şeker katkılı içecekler ve potansiyel sağlık etkileri hakkında kabul edilebilir bir bilgi düzeyine sahipti. Öğrencilerin %76'sı şekerli içecek tüketimini azaltmada olumlu tutum sergilemişti. Vücut kitle indeksi ile şekerli içecek tüketimi arasında anlamlı bir ilişki bulunmadı. Şekerli içecek tüketiminin yüksek olması ve öğrenciler arasında farkındalık eksikliği nedeniyle, üniversite ve ev düzeyinde girişim çalışmalarına ihtiyaç duyulmaktadır. Bununla birlikte, gıda endüstrisi, medya, hükümet ve sağlık hizmetleri düzeyindeki müdahaleler sağlıklı beslenme alışkanlıklarının iyileştirilmesinde rol oynamalıdır.

Anahtar Sözcükler: Şeker katkılı içecekler, beslenme bilgisi, tüketim kalıbı, beden kitle indeksi, Somalili öğrenciler.

1. INTRODUCTION

This chapter presents background information, aim of the study, study objectives and significance of the study.

1.1. Background Information

Increased consumption of free sugars along with a poor diet was associated with the onset and development of noncommunicable diseases. (NCDs) (1). Noncommunicable diseases are the leading cause of death in the world: they have been responsible for nearly 70% of all deaths worldwide. Many of these deaths were premature (less than 70 years) and occurred in low- and middle-income countries. Adjustable risk factors such as unhealthy diet and physical inactivity are among the most likely causes of noncommunicable diseases, such as obesity. Lifestyle habits such as unhealthy food behaviors and lack of physical activity are not only associated with deaths from chronic diseases but also have economic consequences by reducing the productivity of society (2).

In recent years, consumption of fast food and sugar sweetened beverages (SSBs) has been increased (3). It is estimated that fifty percent of the increase in daily caloric intake is coming from consumption of SSBs (4) (5). Over the past 30 years, there has been a significant increase in consumption of SSBs worldwide. Six out of 10 young people (63%) and 5 out of 10 adults (49%) drank a sugar-sweetened beverage on a specified day in 2011-2014. Young Americans consume 143 calories from SSBs on average and American adolescents consume 145 calories from SSBs on a particular day (6). The use of sugar has been linked to industrialization and the proliferation of processed foods and drinks that have added sugar such as sweetened tea and coffee (7). In developing and developing nations, the consumption of sugar-sweetened drinks has risen gradually over the previous four decades. (8). In other countries, there have been varying levels of increase in sugar-sweetened beverages, with some countries such as Mexico reaching such serious government interventions to reduce them.(9).

One-third of the adult population is not physically active, resulting in the serious risk of obesity and overweight. Obesity is a worldwide issue that spreads throughout society in all social and economic organizations (10). Weight gain in early adulthood was

associated with reduced physical activity and increased energy consumption and obesogenic environment (11). Chronic diseases, including obesity, cardiovascular diseases are diet-related and interventions targeting early adulthood may reduce the effect of health issues and risk factors for chronic disease in later life (11). South Africa has one of the highest prevalence of overweight or obese people in Africa, and SSBs consumption may be a potential risk factor (12). Nearly 70 percent of South African females are overweight or obese, the largest rates of females in Africa, according to the 2018 study of the World Health Organization from South Africa. 31% of males in South Africa are overweight or obese. Unhealthy diets and lack of physical activity in people may show high blood pressure, hyperglycemia, high blood lipids and obesity (13).

SSBs include soft drinks, fruit- flavored drinks (not 100% juice), sweetened milk, sports drinks, energy drinks, and tea and coffee with added sugar (14). These sugary beverages contain large amount of energy due to high sugar content in the form of fluid which have no nutritional value and give no satiety as compared to solid food (15). While mild fruit juice intake can be a significant source of vitamins, minerals and antioxidants, excessive fruit juice intake is associated with enhanced weight and tooth decay growth (16).

Carbonated soft drinks have become the world's biggest beverage industry and have slowly overtaken the hot beverage industry since soft drinks were introduced on the market in 1830, their presence is hard to overlook. (15). The consumption of carbonated soft drinks is popular among youngsters worldwide (17). Their consumption and popularity are gradually increasing because of strong preference to palatable sweet taste, at a very cheap price. Also the availability of advanced production technologies contribute to popularity of soft drinks (15). These soft drinks contain saturated carbon IV oxide, sweeteners, as well as other ingredients like flavor enhancers, salts, additives and preservatives (17). One of the main ingredients in soft drinks is sugar, with an average soft drink containing 100 g/L (18). A can of 300ml carbonated soft drink contains about 40 grams of sugar and sweetened fruit juice nearly 45 grams of sugar (19, 20).

Globally, SSB consumption has steadily increased in low- and middle-income countries due to rapid urbanization and intensive marketing (13). The number of beverages served

each year in the past decade increases in any year by the number of drinks that have been in existence 50 years ago or earlier. Most of these new drinks are either sweetened with sugar or contain caffeine and sometimes both, but have appeared with low calorie levels, a range of flavors, and many caffeine components and other added nutrients (14).

Drinks increase the proportion of energy in the diet. Because they represent a weak compensatory nutritional response, they may cause an increased risk of positive energy balance (21). The main reason for the positive trend in beverage consumption is an important concern for public health is that drinks that contain energy get little dietary compensation. Therefore, adding energy from fluids to the diet may increase total energy consumption (21). Energy-producing fluids, mainly beverages, such as snacks, meal accompaniments and meal replacements, account for about 25 percent of total daily energy consumption in the United States, are widely used, and their consumption has increased in conjunction with the overweight / obesity problem. These study results have shown immense consideration in the potential role of "liquid calories" in the balance of positive energy and weight gain. There is an increasing body of evidence suggesting that caloric intake in beverages is associated with increased body weight or body mass index (BMI) in adults (22). Excessive consumption of SSBs has been reported to have health consequences such as chronic nutrition-related diseases, including overweight, obesity, diabetes, hypertension, and coronary heart disease (8)

Many communities and organizations, including the American Heart Association, the American Academy of Pediatrics and the 2010 US Dietary Guidelines Review Committee, have announced a reduction in consumption of SSBs to help prevent obesity and improve public health (23). Taxes have been successful in reducing cigarette consumption, especially among young people whose decisions are subject to price changes. While taxes on soft drinks were not high enough to have a significant impact in the United States, Rivard et al. report in this matter that thirty-six percent of respondents in the US survey supported a tax of up to twenty percent on sweetened beverages and thirty-nine percent said that such a tax would cause them to reduce their consumption (13). Norwegian health authorities supported the World Health Organization (WHO) initiative to curb the marketing of unhealthy foods and beverages targeting children and young people. In the Norwegian Food-based Guidelines, two out

of 12 drinks guidelines suggest one avoiding drinks and sugar-rich foods added daily, and one recommends drinking water when thirsty (24).

Furthermore, nutritionally, people do not need any sugar in their diet. WHO recommends that if people consume free sugars, they consume less than 10 percent of their total energy needs and lower it to less than 5 percent for additional health benefits. Dr Francesco Branca, director of nutrition and health at the World Health Organization, says this equates to less than one serving (at least 250 ml) of sugary drinks which are commonly consumed daily.

1.2. Aim of the study

The main aim of this study is to assess nutritional knowledge, attitudes and consumption pattern of SSBs among Somali students in Turkey, and determine the determinants consumption of SSBs. The secondary aim of the study is to determine the impact of SSBs consumption on body mass index (BMI).

1.3. Objectives of the Study

1.3.1 General Objectives

The general objectives are the assessment of nutritional knowledge, attitude and consumption pattern in regard to SSBs among Somali university students in Turkey.

1.3.2. Specific Objectives

The specific objectives are:

a) To determine consumption pattern of SSBs and factors influencing consumption.
b) To assess the level of knowledge on sugar sweetened beverages.
c) To determine students' attitudes toward SSBs Consumption.

d) To describe the consumption pattern according to sociodemographic characteristics such as age, gender, education, own and parental socioeconomic status.
e) To determine the impact of SSBs consumption on body mass index (BMI).

1.4. Significance of the Study

The number of Somali students in Turkey is increasing each year with the highest proportion of students living in Istanbul. Most students receive a scholarship from the Turkish government, allowing them to study and have experience in a new country. These students are urged to move to independent living, a period of changes in diet. Although some epidemiological studies have been conducted to investigate nutritional knowledge, attitudes and consumption patterns of sugar-sweetened beverages for Somali students, but to the best of our knowledge, no study have been conducted for Somali students residing in Turkey, hence this study found the need to do so. With the results of this study, appropriate preventive measures can be proposed to educate them from adverse health effects caused by excessive consumption of sugary beverages. Moreover there are limited colleges to enlighten knowledge of nutrition related diseases therefore this study will serve as an educational baseline to overcome the unhealthy lifestyle.

2. LITERATURE REVIEW

Literature review is discussed under various sections- the definition of SSBs, the factors related to consumption of SSBs and the potential health effects related to excessive consumption.

2.1. Definition of Sugar Sweetened Beverages

SSBs were defined as any non-diet, non-alcoholic beverage items and beverage concentrates with added sugars. SSBs were grouped into four types: Soft drinks, Soda (Regular and Diet), fruit- flavored drinks (not 100% juice), fruit juices, sweetened tea and coffee drinks, sweetened milk, sports drinks, energy drinks, and other beverages with added sugar (14).

- ***Sugar-sweetened beverages (SSBs) or their less formal synonym, sugary drinks:*** This term refers to any soft drink, carbonated or noncarbonated, sweetened with sugar or HFCS. The universe of SSBs includes sodas but also juice drinks, fruit drinks, fruit ades, teas and coffees, sports drinks, energy drinks, tonic water, vitamin waters, and any other drink containing sugars or high-fructose corn syrup (HFCS) (25).
- ***Soft drinks:*** This is the generic term for nonalcoholic beverages other than plain water and 100 percent fruit juices. Soft drinks may be carbonated or noncarbonated, unsweetened or sweetened with sugar, HFCS, or artificial sweeteners (25).
- ***Sodas (also known as pop or soda pop)***: This term refers to carbonated soft drinks—mostly colas, and mostly produced by the Coca-Cola and PepsiCo companies—sweetened with sugars or HFCS (25).
- ***Diet sodas:*** These are carbonated soft drinks made with one or more artificial sweeteners such as aspartame, acesulfame potassium, or stevia. They contain no or very little sugar and provide no or very few calories (25).

Table 1. Type of soft drinks with description and examples (26).

Type of soft drinks	Description	Examples
Fruit juice	Contain 100% pure fruit juice + minerals and vitamins	Apple juice, grape juice, orange juice, peach juice
Carbonated drinks	Any effervescent soft drinks aerated with carbon dioxide	Sodas such as Coke, Spirit and Pepsi
Fruit drink	Fruit flavored drinks, not actual fruit juice, basically contains sugar and water	Fruit blend, punches fruit nectars with beverage added sugar, apple drink, orange drink
Sugar-sweetened soft drinks	Carbonated or non-carbonated drink containing sugar, natural sweetener or High Fructose (HFCS) and concentrates of fruits	Sweetened sodas, Iced tea, lemonade, red bull, sunny delight orange flavor, sports drinks, energy drinks, sweetened coffee and tea
Light soft drinks	Carbonated or non-carbonated drink with no sugar and calories, but with artificial sweetener	Light soda, coffee, tea

2.2. Health Effects of Increased Intake of SSBs:

SSB, classified as glycemic index (GI) fluids, increased blood sugar levels after eating and reduced insulin sensitivity. In addition, drinks with a high GI content are offered to low satiety and over-eating afterwards. Low-GI beverages stimulate delayed hunger return, leading to increased flexibility in the amounts and frequency of meals (27). Epidemiological studies suggest that consumption of sweetened beverages is associated with increased energy consumption, increased body weight and increased abdominal fat, which increases metabolic, cardiovascular and cardiovascular disorders (28). Sugar-sweetened beverages contain sugars such as sucrose or high fructose corn syrup. A portion containing 330 ml or 12 ounces of sugar-sweetened soft drinks contains about 35 grams (about nine teaspoons) of sugars and provides about 140 calories of energy and generally has little nutritional value(19). Moreover, scientific studies have shown how a drink or a daily drink can increase the risk of many health problems. Some of

these health problems are obesity, diabetes, tooth decay, osteoporosis, undernourishment, heart disease and many neurological disorders (29).

2.2.1. Cardiovascular disease

Diets rich in simple sugars may lead in low HDL cholesterol (30) and high fasting triglycerides (31) which are established risk factors for cardiovascular disease. In 2013, the American Heart Association (AHA) claimed that sugar-sweetened beverages including soft drinks, sports drinks, and fruit drinks may be associated with an around 180,000 deaths worldwide each year (32). In addition, 78% of these deaths were for excessive sugary drinks in low and middle-income countries, not in high-income countries (32).

SSBs can also effect the risk of coronary heart disease (CHD), independent of obesity, as a potential contributor to hyperglycemia, which is associated with higher concentrations of C-reactive protein and increased risk of diabetes and CHD (33). Inflammation affects not only atherosclerosis but also the stability of plaque and blood clotting. Therefore, SSB consumption can affect risk of CHD adequately in a short time of a few years (34). Strong evidences shows that low-grade systemic inflammation is related to the development of obesity and cardio-metabolic diseases (35).

It was recently stated that oxidative stress may be a mechanism of added sugar-induced CVD, that various sources of sugar-induced generation of reactive oxygen species (ROS) such as mitochondria, nicotinamide adenine dinucleotide phosphate-oxidase, advanced glycation end products, insulin and uric acid (36).

2.2.2. Overweight/Obesity

Obesity is a major public health issue worldwide, with at least 2.8 million people dying every year as from being overweight or obese (37). Being overweight and obese is the fifth major risk of global mortality. Weight gain is a medical condition where BMI ranges between 25 and 29.9 and obesity is a condition where BMI is 30 or higher (38). Obesity is now also common in low- and middle-income nations once connected to high-income countries. Even though the etiology of obesity remains not fully understood, the development of obesity fundamentally involves an excess of caloric

intake over caloric expenditure. Sugary beverages is a significant contributor for obesity epidemic. The western obesity epidemic has confirmed the relationship with risk factors for cardiovascular disease in diets rich in added sugars –specifically glucose, sucrose, and fructose, for example high-fructose corn syrup, abundant in sugar-sweetened beverages. Based on NHANES 1999-2000, researchers found that increased consumption of SSBs was also linked to abdominal obesity in US adults aged 20–39 years (39).

Some researchers proclaimed that sugar-containing food and beverages can be addictive under certain circumstances which further contributes to obesity and eating disorders. They have proposed a neurochemical hypothesis that may explain sugar dependency. SSBs are thought to result in weight gain due to elevated sugar content and incomplete compensation for complete energy after caloric consumption in subsequent meals (4) because energy in liquid form can be less satisfying than solid foods, leading to increased consumption. Solid foods containing sugars are generally dense(if not always) in energy, and frequent and substantial energy-dense food consumption is associated with excess weight gain and other excess adiposity measures (27). Sugar-sweetened beverages and other sources of fructose were suggested to promote liver, skeletal, visceral and serum fat deposits independently of their effect on body weight (27). Fructose is like alcohol, according to Lustig, it is metabolized straight into fat – not cellular energy, like glucose (40). This implies that nutritional fructose can heavily boost the transformation of surplus carbohydrates into fatty acids known as "lipogenesis".

A meta-analysis of eighty eight studies showed that increased intake of soft drinks was related to increased energy consumption and body weight (41). Adults who are overweight and obese are more likely to have serious health problems including type 2 diabetes, high blood pressure, asthma and other respiratory problems, sleep disorders and liver disease. They may also suffer from psychological effects, such as low self-esteem, depression and social isolation.

2.2.3. Insulin Resistance and Diabetes

Insulin resistance is defined as “a state when a normal or elevated serum insulin level produces an attenuated biological response, leading to impaired sensitivity to insulin

mediated glucose metabolism" (42). Insulin resistance is linked to many abnormalities such as diabetes, hypertension, dyslipidemia and CVD (43). These abnormalities and related physical outcomes, as a cluster, produces the insulin resistance syndrome (44). In fact, insulin resistance is closely related to the development and progression of T2DM (45).

Majority (about 90-95%) of people with diabetes are estimated to have T2DM (46). In fact, more than one third of US adults are affected by prediabetes, a health condition characterized by a higher than normal blood glucose level, but not yet within the diabetes range. Prediabetes is not known by approximately 90% of patients (47). Without intervention, people with prediabetes will progress to T2DM at a rate of 10% per year (47). As the top food source of added sugar, SSBs has been found to be associated with higher risk of insulin resistance and diabetes by a growing body of evidence, through increased adiposity and other metabolic effects (48).

Diabetes is a metabolic disease where there is a high level of sugar in the blood. High sugar consumption, especially sugar-sweetened beverages, is commonly associated with malnutrition and overall poor diet. A new research presented at the annual meeting of the European Society for the Study of Diabetes (EASD) found that the high consumption of sugar sweetened beverages was significantly associated with a reduction in eating foods that were generally considered healthy (32). However, researchers concluded that the excess consumption of sugar- sweetened beverages is associated with poor nutrition, which can cause health concerns that lead to chronic diseases such as type 2 diabetes mellitus (38).

Type 2 diabetes affects about 17 million Americans. Soft drinks are the main source of added sugars in the American diet. Each meal represents a large amount of blood sugar that may increase the risk of diabetes (49). In 2013, Romaguera et al used information on the consumption of sugar-sweetened soft drinks and soft drinks gathered by eight European organizations to study the connection between the consumption of sugar-sweetened drinks and type 2 diabetes and discovered that drinking at least one serving of sugar-sweetened soft drinks per day is sufficient to boost the risk of type 2 diabetes by 22 percent (40).

A serving of 330ml of carbonated soft drink contain about **10 teaspoons** of sugar. Therefore, excessive consumption leads to a sustained increase in blood sugar level, which exceeds the limit recommended by WHO by 10% of the calories of added sugars which eventually leads to type 2 diabetes. Sugar causes red blood cell aggregation. As a result, the flow of oxygen into the cells is blocked and thus removes carbon dioxide from the cells leading to the accumulation of waste (41).

An epidemiological analysis was performed in 2016 to distinguish the relationship between sugar-sweetened beverage consumption and the risk of prediabetes and insulin resistance. The assessment discovered that individuals who frequently eat sugar-sweetened drinks have a 46% greater risk of developing prediabetes than low or non-consumers over one serving of soft drink per day. The elevated consumption of sugar-sweetened drinks was also correlated with high insulin resistance, a risk factor for type 2 diabetes. (40). Also another study finding promotes the fact that drinking sugar-sweetened drinks is associated with an rise in visceral fat that can influence the risk of diabetes and heart disease (50).

2.2.4. Dental Diseases

Dental caries is a destructive process that causes the decalcification of tooth enamel, resulting in the continued destruction of the teeth, eventually leading to dental cavity (51). Dental caries is a multifactorial disease. The factors that lead to the development of dental caries are the high consumption of sugars, which are the main components of soft drinks, namely sugar, where an average soft drink containing 100 g/L. Soft drinks have been suggested to cause damage to the teeth for two reasons. First, the low pH and high acidity of some drinks may erode the enamel surface. Second, the sugars in the drinks are metabolized by the microorganisms of the plaque to produce organic acids that lead to the removal of minerals leading to tooth decay (52). Dental caries is also associated oral bacteria, the teeth, and time, depending on the amount and frequency of total sugar consumed. Oral bacteria especially "Streptococcus mutans" ferment sugars in sweetened drinks to acid produce a sustainable acidic environment of pH <5.5. This begins the process of removing the minerals that are capable of destroying tooth enamel (53). Since sugars produced by soft drinks have strong adhesive properties, clearing them with saliva is slow and difficult, thus contributing to tooth decay. Individuals who

ate 3 or more sugary drinks per day had an increased rate of 17- 62% tooth decay. The World Health Organization (WHO) recommended that sugar be consumed at less than 10 percent of total energy consumption to prevent tooth decay (53). The negative health effects of tooth decay are cumulative, due to frequent consumption of sugar-rich acidic beverages, the traceability of childhood to adulthood and most cases of tooth decay occur now in adults.

Erosion of teeth is a condition where there is chronic loss of dental hard tissue which is result of chemically etching of the tooth surface by acid and chelation without microbial action (54). This elicits to a huge effect on patients' oral wellbeing by making loss of tooth structure, tooth hypersensitivity and changes in the complete tooth form. The pattern of erosion is identified by the frequency of exposure of tooth structure to acidic liquid (55). Carbonated soft drinks are more damaging than non-carbonated soft drinks due to high acid content and can remain in the mouth longer (51). The factors that have a significant impact in the progression of erosion of the teeth include the amount, type, severity of the acid level, the buffering capacity of the beverage to be stored and the concentration of phosphate, calcium and fluoride in beverages (56). Dyes used in soft drinks often result in brownish or yellowish spots on the teeth.

2.2.5. Non-Alcoholic Fatty Liver Damage (NAFLD)

Drinks that contain high sugar cause ‘non-alcoholic fatty liver disease’ where there is an accumulation of fat inside liver cells (51). NAFLD is a silent disease, classified by the accumulation of triglycerides in liver cells that have nothing to do with alcohol consumption, which can lead to liver damage. Around 25 percent of Americans with the disease have no symptoms in the early stages (57). In addition, obesity and overweight increase the risk of NAFLD. People with NAFLD tend to increase the risk of chronic diseases such as cardiovascular disease and type 2 diabetes mellitus (57). Fructose found in carbonated soft beverages is extremely absorbable in the liver owing to its full hepatic removal and fast transformation into glucose, glycogen, lactate and fat (steatosis). It has already been shown that consuming large amounts of fructose causes blood lipid disorder and weakens the sensitivity of hepatic insulin. This may stimulate the fatty liver. People who consumed more than 2 servings of soft drinks a day increased the risk of developing fatty liver, leading to cirrhosis of the liver, similar to

those found in chronic alcoholics (51). Small doses of aspartame are present in diet drinks and sodium preservatives that can cause liver cell damage and lead to cirrhosis of the liver (50). Jiantao et al found a relationship between excess added sugar consumption and NAFLD. There has been a rise in the prevalence of NAFLD among people who drink more than one serving of soft drink a day, compared with individuals who do not drink sugar-sweetened beverages (57).

2.2.6. Uric Acid

Since its introduction in US food supplies in the 1970s, high-fructose corn syrup has become the most common sweetener used in processed foods, particularly in soft drinks and soft drinks. Fructose, unlike glucose or other polysaccharide sugars, is metabolized only in the liver where it leads to the destruction of nucleotides, thus producing uric acid. Human studies confirm that experimental feeding of fructose or intravenous fructose increases the levels of uric acid in the blood. This may be important because uric acid in the blood is linked to being a sign of the risk of cardiovascular disease and a possible intermediate step towards the development of high blood pressure (58). Fructose consumption may lead to elevated uric acid in the blood through fructose phosphorylation by liver cells and the generation of adenosine diphosphate, which is metabolized to uric acid (59). Increased serum uric acid may alleviate BP by lowering levels of nitric oxide, a potent vasodilator (60).

The global epidemic of metabolic syndrome is consistent with the rise in uric acid in the blood as well as a significant increase in the total intake of fructose. Fructose increases uric acid, which inhibits nitric oxide's bioavailability. Since insulin needs nitric oxide to boost the absorption of glucose, we hypothesized that hyperuricemia induced by fructose could play a part in metabolic syndrome as a pathogen (60). These information give the first proof that uric acid can cause metabolic syndrome, probably because of its capacity to inhibit endothelial function (61).

2.2.7. Blood Pressure

High blood pressure is a chronic medical condition where pressure increases in the arteries (51). The following mechanisms have been proposed to explain how soda causes high blood pressure. First, overweight people as a result of increased intake of soft drinks put the heart under great pressure to pump an adequate amount of blood, leading to high blood pressure. Secondly, the glucose and fructose of drinks increases the levels of uric acid in the blood, which interferes with the ability of the blood vessels to expand leading to high pressure. Thirdly, excess sugar resulting from soft drinks causes the body to store more water, thereby increasing blood pressure. Finally, sugar in the drinks may raise catecholamine hormones, leading to high blood pressure (62).

The American Heart Association recommends reducing the consumption of soft drinks only to 355 ml of servings per week (41). Sugar consumption was also associated with increased sympathetic nervous system activity and sodium retention (63). The most compelling proof to date is the PREMIER Study, a behavioral intervention study of 810 pre-hypertensive and hypertensive people in which reduced consumption of SSBs or sugar over 18 months was associated with reduced blood pressure (64). Observed direct connections of sugar-sweetened drinks with blood pressure are consistent with the outcomes of the PREMIER intervention study where a decrease in SSB consumption of 355 ml/day was associated with a decrease in systolic/diastolic BP of 1.8/1.1 mm Hg, 0.7/0.4 mm Hg with a shift in body weight adjustment (64).

2.2.8. Cancer

It has been shown that industrial sweeteners such as saccharin and caramel coloring in soft drinks have carcinogenic effect on humans. Among the various cancers found in humans, pancreatic cancer is most likely attributable to soft drinks. High levels of sugar in soft drinks raise the level of insulin, which increases the growth of pancreatic cancer cells. Frequent consumers of carbonated soft drinks may have a higher risk of pancreatic cancer because the metabolic product of aspartame, formaldehyde accumulates as a carcinogen (41). Some studies have indicated a connection between extra sugar consumption and cancer incidence in the gastrointestinal tract, especially in the colon and pancreas. Fox et al, tested the relationship between the consumption of

sugar-sweetened beverages and the recurrence of cancer and mortality in patients with stage III colon cancer (65). Wong et al, found that the high consumption of soft drinks sweetened with sugar and sugar-sweetened fruit drinks is linked to increased chances of breast cancer. Women who consumed more than 0.5 servings per day of regular soft drinks increased the risk of breast cancer before menopause. Furthermore, high glycemic index diet was linked to an increased risk of breast cancer (66). In addition, eating high-sugar foods raises the level of insulin in the blood, and when consumed in large quantities can lead to hyper insulin in the blood, which was found to increase the risk of endometrial cancer (67). In fact, there is an indication that increased intake of sugar may play a major role in the development of ovarian cancer (68). The implication of these results suggests that a low sugar diet can reduce the risk of breast, endometrial and ovarian cancer (68).

2.2.9. Sugar Consumption on Cognition and Depression

The consumption of added sugar was also associated with impaired cognition, especially reduced memory function of the hippocampus. Aspartame, used in soda soft drinks, is a powerful neurotoxin and endocrine disorder. When digested, aspartame is divided into aspartic acid, phenylalanine and methanol as metabolic products. Aspartic acid causes chronic neurological disorders by over-stimulation of nerve cells such as sensitive neurons that are slowly destroyed. Phenylalanine reduces serotonin (a neurotransmitter in the brain) leading to emotional disorders, depression, and poor-quality sleep. Two ecological studies have shown a correlation between levels of per capita sugar consumption and prevalence rates of depression (69).

2.2.10. Bone Disease

Osteoporosis is a medical condition in which the bones become brittle and fragile from tissue loss, due to hormonal changes, or calcium deficiency or vitamin D (51). During the initiation of new bones and decomposition of old bones, the body maintains a steady phosphorus and calcium in the bloodstream. Intake of phosphoric acid in the carbonated soft drinks causes an increased level of phosphorus in the blood (51). Moreover, the increased intake of sugar from high-calorie soft drinks increases urinary excretion of

calcium, magnesium, chromium, copper, zinc, and sodium by weakening the absorption of the kidneys. The loss of calcium in the blood triggers thyroid hormone (PTH), leading to the release of calcium from the bones to maintain balance. Over time, the process leads to poor bone structure (osteoporosis). The elevated calcium level in the blood is eliminated by urine excretion, joint deposition (causing osteoarthritis, bursitis, gout,), formation into stones (like kidney stones), and deposition in arteries (calcified plaque). Therefore with less calcium available, bones become more porous and prone to fracture (51).

One serving (12-ounce) of soda contains phosphoric acids with an average of about 30 milligrams. Phosphoric acid in the drink can release toxic amounts of aluminum (from the can) into the soft drink. Exposure of aluminum increases the amount of bone fracture and, at the same time, reduces the formation of new bone. Aluminum causes excessive calcium loss in the urine resulting in osteoporosis accompanied by severe bone pain (70).

2.2.11. Chronic Kidney Disease

Chronic kidney disease is a gradual loss of kidney function in a time period of months or years (51). High consumers of artificially sweetened drinks, particularly more than two drinks a day are more likely to experience a decrease in renal function. Carbonated drinks can lead to elevated calcium decomposition of bones leading to the formation of calcium insoluble stones in the kidneys. The high fructose corn syrup used to desalinate soft drinks may lead to hyperuricemia, leading to the formation of uric acid crystals in the kidneys. Consuming 3 servings of sodas per week can increase the risk of kidney stones by fifteen percent (41).

2.2.12. Adrenal Fatigue

When the adrenal glands operate below the normal level, it leads to a state of adrenal fatigue (51). With the consumption of carbonated sugary drinks, stress is stimulated and the cellular metabolism is accelerated. Adrenal glands respond to stress and maintain balance. Fatigue, lethargy, lack of energy, sleep difficulties, dizziness, dizziness, reduced blood pressure, nausea, body aches, weight gain, and exposure to infection are

common symptoms of adrenal fatigue. Caffeine in sugary drinks triggers the adrenal gland without providing nutrition (41).

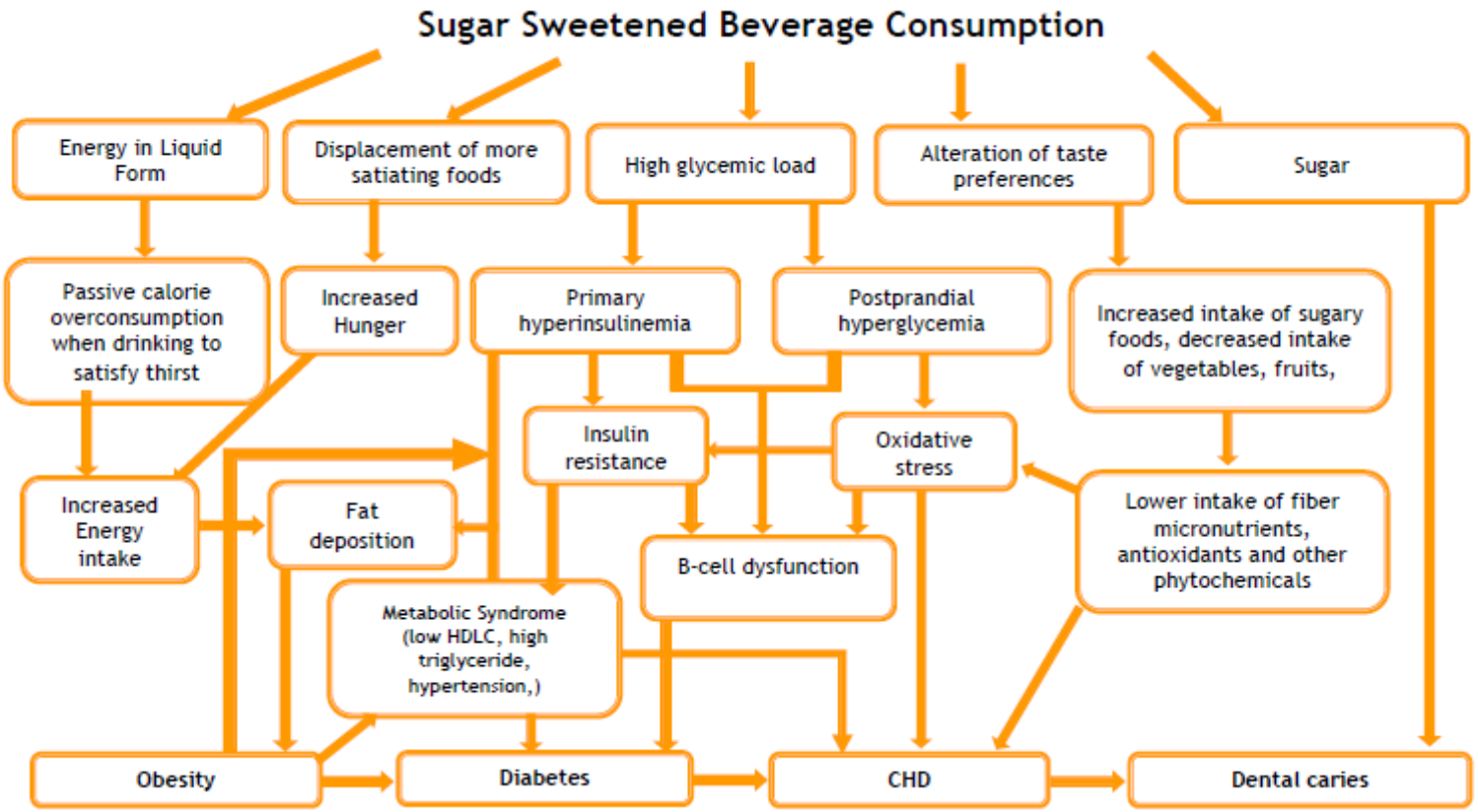
2.2.13. Gastrointestinal Distress

Gastrointestinal distress is a condition where there is increase in gastric acid levels and moderate to severe gastric infection with possible gastric lining erosion (51). Drinking sodas disturbs the acid-alkaline balance of the lining of the stomach, producing a permanent acidic environment that causes inflammation of the lining of the stomach and duodenum. Weak digestion because phosphoric acid leads to a reduction of the body from the secretion of hydrochloric acid used in protein digestion, fat, and mineral absorption. This insufficient digestion results in bloating. and flatulence (41). Acidic soft drinks provide plenty of air in the form of CO_2 to the stomach, leading to a distension. As the intake of carbonated sodas increases, the duration of acid exposure increases. Drinking one servings of soft drinks daily may lead to an increase of 53.5 minutes of acid levels in the stomach. Therefore, serious disorders such as chest pain or acid reflux can occur (51).

2.2.14. Caffeine Addiction

Regular soft drinks contain thirty-five to thirty-eight mg of caffeine, while diet soft drinks contain about 40 mg. Caffeine in soft drinks leads to excretion of adrenaline accompanied by high blood sugar. The pancreas works by secreting insulin, which reduces blood sugar levels by pushing sugar into cells for oxidation and energy production. As a result, excess sugar accumulates in the form of fat (41).

Caffeine in drinks inhibits nerve receptor sites in the central nervous system, causing narrowing of the cerebral arteries, rapid heartbeat, high blood pressure, and excessive urine secretion (71). Adult use of caffeine can lead to dependence later in life with negative effects on brain growth. When taking excessive doses, caffeine can cause aggression, insomnia, anxiety, recklessness, insomnia, irritability, and irregular heartbeat (51).



Source: D. Ludwig &W Whillett, Harvard SPH, 2009

Figure 1. Pathway linking Sugar-Sweetened Beverage intake with health

2.3. Factors Associated with SSBs Consumption:

Early adulthood is a key time of life-cycle development in which many health and nutritional habits are created (72). The adult population demonstrates some of the unhealthiest eating habits of all age groups, characterized by inadequate fruit and vegetable intake and elevated intake of quick food and sugar drinks. The consumption of sugary beverages for adolescents is known to be excessive, so it is essential to know the factors connected with the consumption of added sugar to formulate efficient nutrition strategies and intervention programs (73).

2.3.1. Personal Factors (Individual Factors)

2.3.1.1. Taste Preferences

The strongest indicator of soft drinks consumption is the preference of the sweet taste of soft drinks. With the increased taste preference, the number of soft drinks consumed increases. The caffeine and sugar content of soft drinks enhances the choice of soft drinks in teenagers. The brand of soft drink varies from person to person. Taste choices may also vary on factors such as age, sex, and knowledge. Teenagers may prefer soft drinks while children prefer fruit juices. Boys like to drink regular soft drinks while girls may choose diet soft drinks (74).

Obese individuals are thought to have high preferences or implicit attitudes towards the consumption of large amounts of soft drinks compared with their non-obese counterparts (75). The author also found that young men had higher liking to sweet taste compared to women of the same age and long-term exposure to soda consumption may increase the taste threshold for both children and adults. Leptin, the hormone responsible for the effect on satiety levels in humans, affects the perception of sweet taste due to central leptin resistance and the effect of satiety, which leads to excessive consumption of high-energy foods by obese people (75) (76).

2.3.1.2. Knowledge and Health literacy

Knowledge plays an important role in an individual's decision to consume, not to consume or even restricting the consumption of sugary beverages. Health literacy refers to the extent to which individuals have access to the basic health information needed to make, handle and understand appropriate health decisions (77). In fact, people mostly underestimate the number of calories and amount of added sugar in the foods and drinks they consume, which may restrict their abilities to make healthy food choices (78). Adults who are unaware of the effects of sugar on health are more likely to consume. Park et al. reported that knowledge about the adverse effects of SSBs was significantly associated with SSBs consumption and lower added sugar intake (78). Also, knowledge is associated with the social and economic situation of parents (51).

2.3.1.3. Lack of awareness

In addition, another influencing factor was lack of consciousness. The findings of this research show that few learners reported significant calorie content when making food decisions, and most of them said they were not aware of the amount of calories in beverages. There is also some recognition of elevated sugar content in fruit juices, but it was deemed a good choice by many learners. Most of the adverse perceptions of sugar-sweetened drinks concentrated on the adverse health effects on sugar and the chemical ingredients discovered in soda (79).

Young people are particularly vulnerable to excess sugar consumption. Awareness-raising may be the first step to reduce sugar consumption. University students have reported that educational messages can be a useful tool to reduce the consumption of sugary beverages (79).

2.3.1.4. Level of physical activity

Sedentary behavior is shown to be accompanied by long hours of watching TV or working on the computer. This leads to an increase in the consumption of unhealthy foods, mostly soft drink consumption (80). Therefore, spending more time on computer, watching TV, and playing video games will replace more physical activities (81).

2.3.1.5. Fast food purchasing habits

Frequent visits to fast food outlets increase the intake of soft drinks because of the purchase of more fast food which is likely to be accompanied by the purchase of soft drinks (74).

2.3.2. Socio-Environmental factors

2.3.2.1. Easy availability of soft drinks

Social environments like homes and universities are the easiest sources of soft drinks for students because they spend a lot of time there. The availability of more soft drinks in homes and vending machines in universities proves that there are no restrictions leading to increased consumption, and therefore, this will result in increased intake of unhealthy food. Unhealthy food choices will be chosen unless the food environment is healthy (82).

2.3.2.2. Price

Price was a key factor, according to a study conducted in six colleges to describe the factors that affect the intake of sugar-sweetened beverages among students (79).

2.3.2.3. SSBs Consumption of Family and Friends

The consumption of sugar-sweetened beverages among young people is largely related to the consumption of sugar-sweetened beverages between family and friends. The influence of parents and peers plays a central role in the behavior of the consumption of soft drinks in adolescents. Sometimes, the parental effect may be greater and vice versa. Also sweetened drinks can be served as snacks in fast food restaurants and with friends in universities and homes (51).

2.3.2.4. Influence of Advertising

Social media and social life can have a major impact on food and drink options. Intensive marketing campaigns are implemented to promote sugary drinks so that they are visually appealing to viewers. Watching TV more often means more viewing for these soft drinks ads and promotions. In fact, marketing through social media has been on the rise, and sugar-sweetened soda and energy drinks accounted for 84% of these hits on Facebook, 86% of Twitter followers and 95% of YouTube views (83).

2.3.3. Socio-Economic Status

Socioeconomic status (SES) is a complex assessment that is measured in a variety of ways to calculate the economic and social status of the person in relation to others, based on income, education and occupation (84).

Many complex factors interplay between socioeconomic status and consumption pattern of sugary beverages that vary with the level of education attained, education of parents, current occupation, net income, as well as household income. *Education* influences health through lifestyle and health-related behaviors such as diet. People who have relatively few resources realize the impact of certain elements on their health. *Occupation* and personal autonomy as important health factors, especially through the stresses associated with low social status and low autonomy. Stress related to a person's social and economic situation may affect his or her health (85).

3. METHODOLOGY

This chapter focuses on methodology, design of the study, study population and sample size. The method of data collection, the operational definitions of the variables and the ethical considerations in this chapter have been elaborated.

3.1. Study Design

This study is a cross-sectional study of Somali students pursuing undergraduate and postgraduate studies in Turkey.

3.2. Study Population and Sampling Technique

The study population includes Somali students studying at different universities in cities such as Istanbul, Ankara and Mersin. Students living in Turkey are recruited through the Somali Student Organization, a center that focuses on the records of Somali students in Turkey, with only 325 students selected to participate in the study. All students are of Somali origin, aged 18 to 40 years, and are currently studying in undergraduate and graduate studies at the universities of Istanbul, Ankara and Mersin. On the contrary, students from other ethnicities, under the age of 18 and over 40, are not included in the study.

The minimum sample size calculated for this study was 325 students with a 95% two-sided confidence level and a power of 80%. The sample size was calculated based on the formula used for estimation of a proportion with a specified precision by using Epi info version 7.2.2.6.

Inclusion criteria**:** Students of Somali ethnicity, age group 18-40 years, undergraduate and postgraduate students in Istanbul, Ankara and Mersin.
Exclusion criteria**:** Students of other ethnicities under the age of 18 and older than 40 years, students not enrolled in universities.

3.3. Data Collection

Data collection was conducted by face to face interview-based survey. This was carried by using structured questionnaires designed to obtain socio-demographic characteristics, knowledge, attitude and frequency pattern towards SSBs consumption. The questionnaire was structured in a comprehensive way to cover specific objectives of the study. The questionnaire was pre-tested on a convenient sample of 15 students from Yeditepe University as a pilot study which was conducted a month prior to the study, so that the questionnaire was understandable to the participants. As a result of this pretest, some of the items on the questionnaire were discarded because most of the questions were lengthy. The data collection period was completed in five months, between January 2019 and May 2019.

The questionnaire is divided into following parts

- Sociodemographic questions
- Physical activity assessment
- Consumption pattern of SSBs
- Factors related to initiation of SSBs consumption
- Knowledge regarding benefits and risks to consumption of SSBs
- Attitude towards SSBs intake

In the sociodemographic characteristics part, the participants are interviewed with questions that include gender, age, education, occupation status, income, as well as the socio-economic status of parents which combines information on education and income, duration of sleep, own and parental health status reflecting diet related diseases. BMI was calculated using self -reported weight and height calculations.

Participants' physical activity was assessed using the short form of the International Physical Activity Questionnaire (IPAQ). Short IPAQ is a collection of 7 questions related to vigorous activity, moderate activity, walking, and sitting during the last 7 days. IPAQ data were analyzed using a standard recording protocol. Metabolic equivalent (MET) was also obtained. Total MET-min per week was obtained as MET level of activity multiplied by activity duration (in minutes) / day multiplied by the

number of days the activity per week. Three levels of physical activity based on MET-min per week were classified as inactive, moderate activity, and highly active.

The second part of the interview includes a structured questionnaire based on knowledge, attitude and consumption pattern (KAP) study model. The nutritional knowledge was measured with 13 statements if the students have attended nutrition class, if they read the nutrition label before purchasing any product, the good and bad health impacts (e.g. overweight/obesity, dental erosion, diabetes) and the nutritional composition of soft drinks (such as sweetener, $C0_2$, flavor enhancers, additives and preservatives). Of the questions, they had to indicate if these statements are true or false. To create a knowledge score, it was tabulated using the Yes / No format. A correct answer was given to one score, a wrong answer was given to two, and the answer of prefer not to answer received a score of three.

Participants completed questions about their attitudes towards SSBs consumption and consumption habits. Several factors were included under attitude questions. For example participants were required to answer to the extent they either agree or disagree on various items of SSBs. Question on consumption habits included items such as; 'consuming sugary beverages is something...' (i) 'that belongs to my routine', (ii) 'I'm used to from my childhood', (iii) 'I learned from my parents'(iv) 'prefer consuming sugary beverages with meals' , the habits regarding attitude questions included 'The effect of sugar beverage consumption on advertisement', 'Tried to reduce consumption of sugary beverages', 'Tried to quit consuming sugary beverages', 'Confident to stop adding sugar to my tea/coffee', 'Persuade friends and family to reduce their consumption', 'Consume sugary beverages for prolonged use' and the reason for drinking soft drinks (i) taste, (ii) caffeine, (iii) refreshment, (iv) brand loyalty, (v) for digestion and (vi) with the meal.

The consumption pattern of SSB intake, was assessed by the following 4 questions: (1) "During the past month, how often did you drink regular soft drinks? How often did you drink diet soft drinks? (2) "During the past month, how often did you drink sports and energy drinks?" and (3) "During the past month, how often did you drink sweetened fruit drinks, such as iced tea, lemonade and fused tea? Also, fruit drinks you made at home and added sugar to." (4) "During the past month, how often did you drink coffee,

including lattes, and tea, particularly Somali tea that was sweetened with sugar or honey? For each question, response options were 'Never, 1-3 per month, 1 time per week, 2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2 times per day 3-4 times per day, and 5-6 times per day'.

The amount of SSBs consumed within one month prior to the study was calculated by total amount of SSBs consumption of each student within one month prior to the study. The cold beverage consumption is calculated per one serving which is 330 ml or 0.3 L. Furthermore, to find out the frequency on monthly basis, each serving was computed by multiplying 0.3 L with the number of servings per day. The sugar in cold beverages was calculated in cubes as the size of servings. For regular soft drinks the serving as in one can was 330ml therefore it was calculated as Coke (10 cubes), Pepsi, (10 cubes), Fanta (11 cubes), Fused tea (8.25 cubes), Iced tea (4 cubes), Fruity soda (11 cubes), Energy drinks (9.75 cubes), while the other cold drinks was measured in one cup as 200ml such as Package fruit juice- (6 cubes), Milkshakes (10 cubes), Cold coffee (5 cubes), Flavored milk (7.5 cubes), Lemonade (1.5 cubes), Other cold drinks (4 cubes) and other soft drinks (4 cubes). The amount of sugar was calculated for regular soda by the amount of cubes in one serving of soda per month. Therefore, total sugar consumed in regular soda is calculated by adding up amount of sugar cubes in Coke, Pepsi, Fanta fused tea, iced tea, fruity soda and energy drinks in one serving per month. Also, the total sugar consumed in other cold drinks was calculated by amount of sugar cubes in one cup of packaged fruit juice, milkshakes, cold coffee, flavored milk, lemonade, other cold drinks and other soft drinks per month. The percentile group of the association between consumption pattern and socio-demographic and socio-economic characteristics was divided by tar tiles into three categories as high consumers, medium consumers and low consumers.

The consumption for the hot beverages such as coffee (latte, Nescafe and Turkish coffee) and tea (Turkish black tea, Somali tea, green tea and fruit teas) are calculated by the number of cups consumed. Each cup is measured as 200 ml or 0.2 L. The consumption frequency of each student is computed on the amount of each cups on monthly basis. The minimum cups consumed is 2 cups which is consumed in regards to monthly, $4^{1/2}$ cups, 9 cups, $15^{3/4}$ cups and 24 cups for 1 time per week, 2 times per week, 3-4 times per week and 5-6 times per week respectively. 30 cups were consumed for

once a day per month, 60 cups twice a day per month, 105 cups for 3-4 times a day and 165 cups for 5-6 times per a day on a monthly time period. The amount of sugar in hot beverages (tea and coffee) was calculated as the amount sugar in one cube per a cup. One cube of sugar contains 4 grams of sugar. The total sugar consumed in hot beverages was calculated by amount of sugar cubes in one cup of latte, Nescafe, Turkish coffee and Turkish black tea, Somali tea, green tea and fruit teas per month.

The quantity consumed at a single time were measured in cups, can and bottles. The cups were small, medium and large while the one can equals 330ml and the bottles as 500ml,1 litre, 1.5litre and more than 2 liters. Moreover, the time of consumption for hot and cold sugary beverages were listed into twelve categories such as; *feeling thirsty, at party/celebration, during or after meals, while studying, at the university campus, while having guest at home, while traveling, along with snacks, after playing sports, at work, with friends and without any reason.*

Friends and family's consumption of sugar-sweetened beverages included four statements; family's consumption as yes/no, friend's consumption as yes/no and if the family as well as friends discouraging students from drinking sugary beverages. The scale was never, rarely, sometimes, and always for the statement of family and friends discourage me from drinking sugary beverages.

Outcome Variables

Students' knowledge of SSBs was measured based on their understanding about ingredients of the SSBs, the benefits of SSBs and health risks associated with SSBs consumption.

Students' attitude toward SSBs was measured based on how much they agree with SSBs consumption and how willing they were to stop consuming SSBs if being aware of health risks.

The amount of SSBs consumed within one month prior to the study was calculated by total amount of SSBs consumption per student within one month prior to study.

Explanatory Variables

The background information about the study participants included age, gender, grade, perceived household economic status, and fathers', mothers' and own socioeconomic status, own and parental health status of diet-related diseases.

3.4. Operational Definitions of Variables

Table 2. Operational definitions of dependent and independent variables

VARIABLES		
Age	Age is categorized into three groups 18-22, 23-24, >25	Continuous / ordinal
Sex	Male, and female	Dichotomous
Geographic place of birth	East Africa, Middle East and Europe	Nominal
Marital status	Single, and Married	Nominal
Educational level	Undergraduate, Graduate (Master), and Graduate (Doctorate)	Ordinal
Living expenses	Scholarship, Family income and own income	Nominal
Occupational level	Only Student, Full time (30 hours a week or more) + student, Part time (less than 30 hours a week) + student, self-employed + Student, Unemployed (seeking for work) + student, Unemployed (not seeking for work) + student	Nominal
School achievement	Much above average, slightly above average, average and below	Ordinal
Socioeconomic level	High income, just get by, and low income	Ordinal
Living status	Dormitory and house residence	Nominal
Physical activity	High activity, moderate activity and low activity	Ordinal
BMI	Underweight, normal weight, overweight and obese	Continuous / Ordinal
Dental problem	Dental problem (yes/no)	Dichotomous
Sleep problem	Sleep problem (yes /no)	Dichotomous
Father's employment status	Full time (30 hours a week or more), Part time (less than 30 hours a week), Self-employed, Retired, Unemployed, student	Nominal
Mother's employment status	Full time (30 hours a week or more), Part time (less than 30 hours a week), Self-employed, Retired, Unemployed, student	Nominal
Father's education	No formal education – Non-literate/Literate Primary School, Middle school, High school Two years technical education, University degree Master's degree, Doctorate	Ordinal
Mother's education	No formal education – Non-literate/Literate, Primary School, Middle school, High school Two years technical education, University degree, Master's degree, Doctorate	Ordinal

MAIN KNOWLEDGE, ATTITUDE, AND CONSUMPTION VARIABLES		
Consumption Pattern	Consumption pattern fundamentally reflects nutritional well-being of individuals and the pattern in this context is defined by the culture and availability of the Sweetened sugary beverages.	Participants were asked about their consumption pattern of fruit juice/drink, soft drink(regular/light), other cold drinks such as energy drinks, milkshakes, cold coffee, flavored milk and consumption pattern of hot drinks (tea, coffee, fruit/herbal teas)
Attitudes towards SSBs	Attitudes are emotional, motivational, perceptive and cognitive beliefs that positively or negatively affect an individual's behavior or practice. The behavior of the individual in nutrition or eating is influenced by his emotions, motives, ideas and perceptions. Attitudes affect future behavior regardless of the individual's knowledge and help explain why the individual has adopted one practice and other alternatives.	Participants were required to indicate to which extent they either agree or disagree on various items. For example, 'consumption of sugary beverages belongs to my routine', 'I have been consuming from childhood' or 'I learnt from my parents'. The reason for consuming for refreshment, for digestion purpose, taste, caffeine or brand loyalty. The last section includes attitude towards advertisement, to which extent to reduce consumption of SSBs, persuade friend/ family to reduce the amount of SSBs, and if to quit consumption, confident enough in reducing to add sugar/honey in tea, and if they are thinking to continue for prolonged use.
Nutritional Knowledge on SSBs	Knowledge is the understanding of any given topic. In this manual, it refers to an individual's understanding of nutrition related to Sugar Sweetened Beverages (SSBs) including the intellectual ability to remember and recall drink and nutrition-related terminology, specific pieces of information and facts.	Nutritional Knowledge included the nutritional composition of soft drinks (such as sugar, CO2, preservatives, color additives, caffeine) and their health impacts (e.g. Overweight/obesity, CVS, high cholesterol, high blood pressure, and diabetes). If the students have studied nutrition class, if they read the nutrition label before purchasing sugary beverages and if adding sugar in hot beverages provide energy.

3.5. Ethical considerations:

To proceed with the study, firstly an approval was obtained from the Somali Students Association in Istanbul, further reviewed and approved by the Ethics Committee of Yeditepe University, in advance to the data collection.

Before the distribution of the informed consent letter to each student, the content of the letter was explained to them. The informed consent form provided details of the research. They were asked to sign it at the start of the interview and no student was compelled; only those interested was asked to partake in the study. Their identification was strictly kept confidential by the researcher. All participants were assured that the information they provided would remain confidential. Data from the study was kept in record.

A ten-minute nutrition education session on potential health risks associated with the consumption of sugary beverages was presented through the distribution of educational materials at the end of each interview. The nutrition counselling included individual and group meetings targeting strategies to increase water consumption and reduce SSB consumption. The researcher highlighted key points such as WHO's recommendation of daily sugar intake. By the end of the session, students were able to estimate the amount of sugar contained in all SSBs, especially carbonated soft drinks- Coke, Pepsi and other soft drinks such as energy drinks and packaged fruit juices. They also estimated the amount of sugar in one teaspoon of tea and coffee. The students' reactions were positive and they appreciated the understanding of health risks associated with drinking too much sugar and learning healthy alternatives to SSBs.

Furthermore, I was selected as a keynote speaker at the "Call for Sugar Reduction" seminar for Somali students in Istanbul organized by the Somali Students Association (USAI).. The highlights of the seminar included "Noncommunicable diseases (NCDs)", "Burden of NCDs","definition of Sugar", "sources and types of sugar", "how to find hidden sugar on products", "the health consequences of excessive sugar consumption", "the amount of sugar to consume in a single day", and "steps to overcome sugar addiction". At the end of the seminar, students received educational leaflets as a message to take home, including a 30-day challenge to reduce excess sugar

consumption. In addition, the chairman presented an appreciation award for advocating the Somali students about sugar.

3.6. Data analysis:

Only 325 questionnaires were used that were completed correctly and fully for statistical analysis.

To analyze the data, the Statistical Package for the Social Sciences (SPSS) version 25.0 was used. Data were cleaned, coded and transferred into SPSS for analysis. Quantitative variables were described according to the mean, and standard deviation. Categorical variables were described according to counts and proportions. Conformity of the data to a normal distribution was checked using Kolmogorov-Smirnov test and histograms with normal curves. To test the associations between the independent and dependent categorical variables, the SPSS crosstab procedure was used and p-values were determined by Pearson chi-square test. A P- value of <0.05 was accepted as significant. A spearman's correlation test was conducted with consumption pattern of SSBs as total sugar consumed in cubes with BMI. Mann-Whitney U and Kruskal Wallis tests were used to evaluate the associations between consumption of SSBs and dental problem, sleep problem, and school achievement.

4. RESULTS

This chapter illustrates the results obtained from the relevant analysis conducted on the data collected. The results, are direct inputs to the objectives of this study.

4.1. Sociodemographic Characteristics of Participants

As shown in Table 3, in this study sample, 60% of students are male and 40% female. 31% of students are under the age of 22 years, while 28% are between 23- 24 years, and 40% over 25 years old. Students were classified as single and married with 92% single students and only 8% were married. The place of birth was grouped according to geographical locations such as East Africa, which includes Somalia, Ethiopia, Kenya, Sudan and Eritrea. The Middle East region included Saudi Arabia, Kuwait, Yemen and the United Arab Emirates. Europe included Finland, Denmark and the United Kingdom. 300 students (92.6%) were of East African origin, 18 students (5.6%) were born in the Middle East, and 2% were born in Europe. Students from different cities including Istanbul, Ankara and Mersin were also interviewed. 74.5% were students from Istanbul universities, 13% from Ankara and approximately 11% from Mersin students.

Table 3. Socio-demographic characteristics of the study participants (n=325).

Sociodemographic	Frequency (n)	Percentage (%)
Gender		
Male	196	60.3%
Female	129	39.7%
Age		
18-22	98	31.2%
23-24	89	28.4%
>25	127	40.4%
Marital status		
Single	297	92%
Married	26	8.0%
Geographic Place of Birth		
East Africa	300	92.6%
Middle East	18	5.6%
Europe	6	1.9%
University by city		
Istanbul	242	74.5%
Ankara	43	13.2%
Mersin	35	10.8%
Others	5	1.5%

4.2. Socioeconomic Characteristics of Participants

Table 4 presents socio-economic characteristics. Of the field of education, 33.2% were health students, 30.5% were students from the social sciences department, 20% were engineering students, 12.0% were political science students and 4.3% were students of preparatory school. The level of education as a undergraduate student was rated 54% of students, graduate students in the master's study with approximately 40% and doctoral students of 6%. The student's living place were divided as residence house and dormitory. Approximately half of the students (49.5%) were living in dormitories and 50.5% of the students were living in houses. Living expenses were classified as scholarships, family income and own income, which comprised 27%, 48.6% and 24.6%, respectively. As for the occupational status, only 78% were students, while 22% were students and part-time workers.

The high school achievement was above average by 48% students, slightly average students were 24% and 28% of students belong to average and below. The family income is considered high income, get by income and low income. 48% of the families had a high income, preceded by only 36 per cent of get by income and low income was 15%. The father and mother job was classified as workers, retired and unemployed / housewife. In the situation of the father, 80% were working, 16% were retired and only 3.5% were unemployed. On the contrary, 64% of mothers were housewives, 33% were employed and 3% were retired. The educational status of the parents was classified as having no formal education, primary school + middle school, a completed secondary school, a technical university, a university degree and a postgraduate degree. Only 21 per cent of fathers had no formal education compared with 34 per cent of mothers. 11% of parents and 19% of mothers completed primary and middle school, while 28% of mothers compared to 22% of fathers completed secondary school. The proportion of technical university for two years was approximately 4% for both parents. 27 per cent of fathers had a university degree, compared with 11 per cent for mothers. The percentage of holders of postgraduate studies (Masters + PhD) was 15% for fathers and 3.2% for mothers.

Table 4. Socio-economic Characteristics of the Study Participants

Education field	Frequency (n)	Percentage (%)
Health Students	108	33.2%
Engineering students	65	20.0%
Political students	39	12.0%
Other social science students	99	30.5%
Preparatory school	14	4.3%
Level of Education		
Undergraduate	175	54.0%
Postgraduate(Masters)	129	39.8%
Postgraduate(PhD)	20	6.2%
Accommodation		
Dormitory	161	49.5%
House residence	164	50.5%
Living Expenses		
Scholarships	86	26.8%
Family income	156	48.6%
Own income	79	24.6%
High School Achievement		
Much above average	147	48.2%
Slightly above average	72	23.6%
Average and below	86	28.2%
Perceived household economy		
High income	85	48.6%
Just get by	64	36.6%
Low income	26	28.2%
Father's employment		
Employed	205	79.8%
Retired	43	16.7%
Unemployed	9	3.5%
Mother's employment		
Employed	98	32.9%
Retired	10	3.4%
Housewife/unemployed	190	63.8%
Father's Education Level		
No formal education	66	21.0%
Primary+ middle school	35	11.1%
Completed high school	71	22.6%
Technical university	12	3.8%
University degree	84	26.8%
Graduate degree	46	14.6%
Mother's Education Level		
No formal education	107	33.8%
Primary+ middle school	62	19.6%
Completed high school	88	27.8%
Technical university	15	4.7%
University degree	35	11.0%
Graduate degree	10	3.2%

4.3. BMI, Physical Activity Status, Health Status and Lifestyle Behaviors of Study Participants.

The results of Table 5 indicate that BMI is classified as underweight, normal weight, overweight, and obesity. 78% students belonged to the normal weight category followed by 13% of overweight students, 6% were underweight and 2% were obese students. For the level of physical activity, 204 students (62.8%) showed a moderate level of activity, 94 students (28.9%) were very active, and the remaining 27 students (inactive). Sleep duration category was divided into three categories such as greater than 8 hours sleep duration, 6-8 hours of sleep duration and less than 6 hours of sleep. Almost 12 percent students slept for more than eight hours, the majority of students (70%) had a sleep duration of 6-8 hours and 23% of students slept less 6 hours per day. For the smoking status, 3% of the students were smokers and 97% were non-smokers. For the dental problem, about 25% of the students had dental problems and 75% of the students did not have dental problems: The reduction of sugar intake after arrival in Turkey was as much as 58% of the students increased sugar intake while 42% had no change in sugar intake.

Table 5. BMI and Lifestyle Behaviors of the Study Participants

BMI category	**Frequency (n)**	**Percentage (%)**
Underweight	20	6.6%
Normal weight	235	77.8%
Overweight	40	13.2%
Obese	7	2.3%
Physical Activity level		
High	94	28.9%
Moderate	204	62.8%
low	27	8.3%
Sleep duration		
< 8 hours	37	11.6%
6-8 hours	207	64.9%
> 6 hours	75	23.5%
Smoking Status		
Smoker	11	3.4%
Non-smoker	314	96.6%
Dental Problem		
Yes	79	24.5%
No	244	75.5%
Sugar Intake Reduction		
Yes	190	58.5%
No	135	41.5%

4.3.1. Health Status of Study Participants and Family's.

The health status was assessed as own health status and family health status as shown in table 6. The diet related diseases included heart diseases (CVS), high cholesterol level, high blood pressure, Diabetes, cancer, food allergies, obesity and others. 86 percent of the students were healthy with no diseases mentioned as above, while almost 9 percent had food allergies, 2 percent were obese and below 1 percent accounted for other diet related diseases. For the health of the family, diabetes ranked first, 26.5% of the family had diabetes, 15.4% had high blood pressure and 11.1% had high cholesterol. Only 3.4% of the family has a history of gastritis and 3.1% have a family history of CVS. Only 2.8% and 1.5% have a family history of food allergies and obesity. 36% of the family did not show any history of diet-related illnesses.

Table 6. Health status of the Study Participants and Family's

Health Status(own)	**Frequency (n)**	**Percentage (%)**
CVS	1	0.3%
High cholesterol level	2	0.7%
High blood pressure	2	0.7%
Diabetes	1	0.3%
Cancer	1	0.3%
Food allergies	27	8.8%
Obesity	4	1.3%
Others	6	2.0%
No health problem	262	85.6%
Health Status(Family)		
CVS	10	3.1%
High cholesterol level	36	11.1%
High blood pressure	50	15.4%
Diabetes	86	26.5%
Cancer	1	0.3%
Food allergies	9	2.8%
Obesity	5	1.5%
Gastritis	11	3.4%
others	117	35.9

4.3.2. Health Behaviors of Study Participants

As in figure 2, 44% of students consumed fruits and vegetables on weekly basis while 23% students consumed fresh fruit juice weekly. Only 6.6% and 10.3% were non-consumers for fruits and vegetables but 45% students did not consume fresh fruit juice.

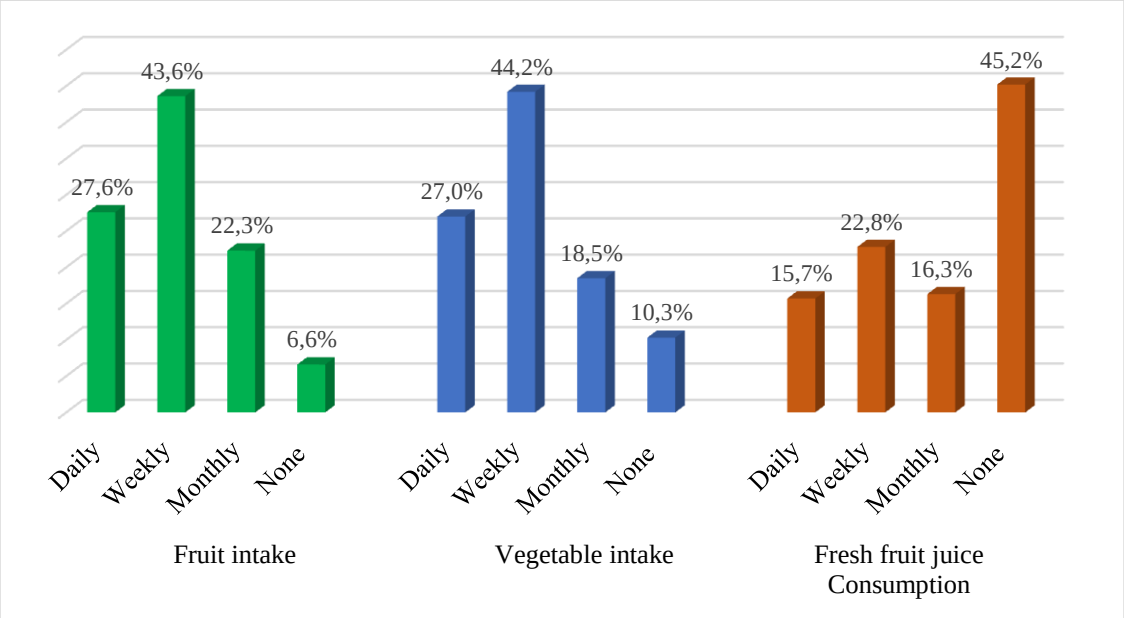


Figure 2. Health behaviors of the study participants

4.4. Nutritional Knowledge Among Study Participants

The assessment of nutritional knowledge among the study participants is given in table 7. Out of 325 students, only 66% of students studied nutrition class in their high school. 55.3% of students read nutrition labels at time purchasing products. For the statement, if sugar was good for health, only 27.2% of students agreed and if sugar is bad for health, 94.2% of students agreed. The benefits of sugar included three statements such as sugar in cold beverages provides energy, adding sugar to tea/coffee provides extra energy and soft drinks help with digestion, 65.9% agreed to sugar as energy fuel, 54.6% students agreed that sugar in hot beverages provide energy and 60.7% students disagreed with the soft drinks help with digestion. For the negative effects of excess sugar on health, 89.3% students agreed that excess sugar causes overweight, 92% students agreed that excess sugar causes diabetes, 80.4% students agreed that excess sugar causes high blood pressure, 90.5% agreed that excess sugar causes dental erosion, and 75.8% agreed that

excess sugar causes osteoporosis. For the statement of knowledge of the ingredients in soda, 69.5% students identified sweeteners, 64.0% identified carbon dioxide, 57.5% students identified flavor enhancers, 46.5% identified color additives, 38.8% students identified additives, and 35.7% students identified preservatives.

Table 7. Knowledge Among Study Participants

	Frequency (n)	Percentage (%)
Nutrition class		
Yes	100	34.0%
No	214	66.0%
Read Nutrition Label		
Yes	168	55.3%
No	136	44.7%
Good for health		
Yes	84	27.2%
No	225	72.8%
Provides Energy as Fuel		
Yes	199	65.9%
No	103	34.1%
Sugar in Tea gives Energy		
Yes	173	54.6%
No	144	45.4%
Helps with Digestion		
Yes	112	39.3%
No	173	60.7%
Bad for Health		
Yes	294	94.2%
No	18	5.8%
Excess sugar causes Overweight		
Yes	268	89.3%
No	32	10.7%
Excess sugar causes Diabetes		
Yes	277	92.0%
No	24	8.0%
Excess sugar causes high blood pressure		
Yes	201	80.4%
No	49	19.6%
Excess sugar causes Dental Erosion		
Yes	268	90.5%
No	28	9.5%
Excess sugar causes Osteoporosis		
Yes	144	75.8%
No	46	24.2%
Knowledge of Ingredients in Soda		
Sweeteners	226	69.5%
Carbon Dioxide	208	64.0%
Flavor enhancers	187	57.5%
Additives	126	38.8%
Preservatives	116	35.7%
Color additives	151	46.5

4.5. Attitude of Study Participants Towards SSBs Consumption

Participants completed 12 questions about their attitudes towards SSBs consumption and consumption habits in table 8 given as below. For the attitude questions, 66.3% students agreed to consuming sugary beverages is something that belongs to my routine, 79.9% students agreed to consuming sugary beverages since childhood, 73.1% students agreed to learn from my parents and 53.7% students preferred consuming sugary beverages with meals.

The habits regarding attitude included effect of consumption towards advertisement, where 20.4% students agreed, 47.8% students disagreed and 31.8% students were neutral to the effect of advertisement on consumption of SSBs. For the reducing habits, 76.6% students tried to reduce consuming excess sugary beverages. Whereas 48.4% students tried to quit completely consumption of sugary beverages. For the question to stop adding sugar to my tea and coffee, 75.6% students were confident to limit adding sugar to their hot beverages. Small fraction of students of 11% agreed to the statement 'consuming sugary beverages for prolonged use'.

Furthermore, the reasons for drinking soft drinks, included taste, caffeine, refreshment, brand loyalty, digestion purposes and with meal. 39.4% students agreed for taste, 10.9% students agreed for caffeine, 20.6% students agreed for refreshment, 2.3% students agreed for brand loyalty, 18.9% students agreed for digestion and 8.0% students agreed drinking soft drinks with the meal. The category to persuade friends and family to reduce their consumption, only 64% students persuaded their friends and 65.5% students persuaded their family to reduce consuming sugary beverages.

Table 8. Attitude Towards Consumption of SSBs

	Frequency (n)	Percentage (%)
Consumption of sugary beverages belong to my routine		
Agree	200	63.3%
Disagree	116	36.7%
I have been consuming Sugary beverages since childhood		
Agree	246	79.9%
Disagree	62	20.1%
Consuming Sugary Beverages is something I learnt from my parents		
Agree	223	73.1%
Disagree	82	26.9%
Prefer consuming Sugary beverages with meals		
Agree	161	53.7%
Disagree	139	46.3%
Advertisements affect on attitude		
Agree	59	20.4%
Disagree	138	47.8%
Neutral	92	31.8%
Tried to reduce consumption of Sugary Beverages		
Agree	239	76.6
Disagree	73	23.4
Tried to Quit consuming Sugary beverages		
Agree	148	48.4
Disagree	158	51.6
Confident to stop adding sugar to my tea/coffee		
Agree	226	75.6
Disagree	73	24.4
Consuming Sugary beverages for prolonged use		
Agree	33	11.1%
Disagree	264	88.9%
Reason for drinking Soft Drinks		
Taste	69	39.4%
Caffeine	19	10.9%
Refreshment	36	20.6%
Brand loyalty	4	2.3%
For digestion	33	18.9%
Along with the meal	14	8.0%
Persuade friends to reduce their consumption		
Agree	199	64.0%
Disagree	112	36.0%
Persuade Family to reduce their consumption		
Agree	200	65.6%
Disagree	105	34.4%

4.6. Consumption Pattern of SSBs Among Participants

The consumption pattern of SSBs is listed as cold beverages and hot beverages. The consumption pattern of cold beverages include regular soft drinks, light/diet soft drinks and other cold drinks such as energy drinks, milkshakes and flavored milk. The consumption pattern of hot beverages include coffee, tea and sweetened coffee and tea.

4.6.1. Consumption Pattern of Cold Beverages Among Participants

The consumption pattern of cold beverages listed on table 9, describes non-consumers, the consumers on monthly, weekly and daily basis and the total participants. The highest percentage of students belong to the non-consumers category. There is a trend shown by the consumers where the percentage decreases from once per month to 5-6 times per day. The most frequently consumed cold beverages was packaged fruit juice, out of 48.2% consumers, 12.7% students consumed 1-3 times per month and 9.9% students consumed one time per day. Coke is the second most consumed cold beverages among the students, with 34.8% students as consumers. 10.8% students consumed Coke 1-3 times per months, 6.8% students consumed twice per week and 3.4% students consumed once per day. The other frequently consumed cold beverages include milkshakes with almost 30% consumers, 23.7% consumers of iced tea, 20.6% lemonade consumers and 20.3% consumers of flavored milk, 20% were consumers of Fanta and 15% students consumed Fused tea. 14% consumed Energy drinks, 13% consumed Pepsi and fruity sodas accounted for 11%. The lowest consumers were light soft drinks adding up to approximately 9% students.

Table 9. Consumption Pattern of Cold Beverages.

1 cup of cold beverages (330ml / 0.3 L)	Non-consumers	(Consumers)									
		1-3 times per month	1 times per week	2 times per week	3-4 times per week	5-6 times per week	1 times per day	2 times per day	3-4 times per day	5-6 times per day	Total participants
Packaged Fruit juice	(51.9) 168	(12.7) 41	(6.2) 20	(6.5) 21	(7.7) 25	(1.2) 4	(9.9) 32	(3.1) 10	(0.3) 1	(0.6) 2	324
Coke	(65.2) 212	(10.8) 35	(4.6) 15	(6.8) 22	(4.6) 15	(0.3) 1	(3.4) 11	(2.5) 8	(1.8) 6	(0.0) 0	325
Pepsi	(87.0) 282	(4.3) 14	(1.5) 5	(1.2) 4	(2.5) 8	(0.0) 0	(0.9) 3	(0.9) 3	(1.2) 4	(0.3) 1	325
Fanta	(80.0) 260	(7.7) 25	(2.2) 7	(3.1) 10	(3.7) 12	(0.0) 0	(1.5) 5	(1.2) 4	(0.6) 2	(0.0) 0	325
Fused tea	(84.3) 274	(3.1) 10	(3.1) 10	(1.8) 6	(1.8) 6	(0.9) 3	(3.1) 10	(1.2) 4	(0.6) 2	(0.0) 0	325
Iced tea	(76.3) 248	(6.5) 21	(5.2) 17	(2.5) 8	(2.5) 8	(0.6) 2	(4.6) 15	(1.2) 4	(0.3) 1	(0.3) 1	325
Fruity Soda	(88.3) 287	(3.1) 10	(0.9) 3	(1.8) 6	(1.8) 6	(0.3) 1	(2.5) 8	(0.6) 2	(0.3) 1	(0.3) 1	325
Lemonade	(79.4) 258	(5.8) 19	(2.2) 7	(3.4) 11	(3.4) 11	(0.9) 3	(4.0) 13	(0.6) 2	(0.3) 1	(0.0) 0	325
Other soft drinks	(97.2) 316	(0.9) 3	(0.6) 2	(0.0) 0	(0.3) 1	(0.0) 0	(0.0) 0	(0.0) 0	(0.9) 3	(0.0) 0	325
Coca (light)	(89.5) 291	(2.5) 8	(0.9) 3	(2.2) 7	(2.5) 8	(0.6) 2	(0.6) 2	(1.2) 4	(0.0) 0	(0.0) 0	325
Pepsi (light)	(96.0) 312	(1.2) 4	(0.6) 2	(0.6) 2	(0.6) 2	(0.0) 0	(0.3) 1	(0.3) 1	(0.3) 1	(0.0) 0	325
Fused tea (light)	(90.2) 293	(0.6) 2	(3.4) 11	(1.5) 5	(1.2) 4	(0.0) 0	(1.5) 5	(0.9) 3	(0.6) 2	(0.0) 0	325
Iced tea (light)	(91.4) 297	(1.5) 5	(2.5) 8	(0.9) 3	(0.9) 3	(1.5) 5	(0.6) 2	(0.3) 1	(0.0) 0	(0.3) 1	325
Lemonade-homemade	(84.6) 275	(4.3) 14	(1.5) 5	(1.8) 6	(1.5) 5	(0.6) 2	(3.4) 11	(0.9) 3	(1.2) 4	(0.0) 0	325
Other light drinks	(94.2) 306	(1.2) 4	(0.3) 1	(0.6) 2	(0.9) 3	(0.3) 1	(0.6) 2	(1.2) 4	(0.6) 2	(0.0) 0	325
Energy drinks	(86.1) 279	(4.9) 16	(2.5) 8	(2.2) 7	(2.2) 7	(0.3) 1	(1.5) 5	(0.3) 1	(0.0) 0	(0.0) 0	324
Milkshakes	(71.1) 231	(12.6) 41	(4.9) 16	(3.4) 11	(3.4) 11	(0.9) 3	(2.8) 9	(0.3) 1	(0.6) 2	(0.0) 0	325
Cold-Coffee	(93.2) 303	(1.8) 6	(1.2) 4	(0.3) 1	(0.3) 1	(0.0) 0	(1.2) 4	(1.2) 4	(0.6) 2	(0.0) 0	325
Flavored Milk	(79.7) 259	(5.2) 17	(3.4) 11	(2.8) 9	(2.8) 9	(2.2) 7	(2.8) 9	(0.9) 3	(0.0) 0	(0.3) 1	325
Other cold drinks	(95.4) 310	(1.5) 5	(0.9) 3	(0.3) 1	(0.3) 1	(0.3) 1	(0.3) 1	(0.0) 0	(0.3) 1	(0.6) 2	325

(The percentage of consumption pattern is written in the bracket)

Figure 3 shows, most students consume the highest amount on a weekly basis, followed by monthly and then daily. The most frequently consumed cold beverage was packaged fruit juice with 156 students (48.1%), of which 41 students (12.7%) consumed a packed juice per month, while 70 students (21.6%) consumed per week and 45 students (13.9%) consumed daily. The second most consumed cold beverage was Coke with 113 students (34.8%), of which 35 students (10.8%) consume monthly, 53 students (16.3%) per week and 25 students (7.7%) only consume daily. 94 students (28.9%) were consumers of milkshake, of which 41 students (12.6%) consumed weekly and monthly but 12 students (3.7%) consumed daily. Moreover, 77 students (23.7%), 67 students (20.6%), 66 students (20.3%) and 65 students (20%) consumed Iced tea, Lemonade, Flavored Milk and Fanta respectively. In addition, 51 students (15.7%) consumed Fused tea, only 10 students (3.1%) per month, 25 students (7.6%) per week and 16 students (4.9%) per day. Of the 50 students (15.4%) consumed homemade lemon juice, 14 students (4.3%) per month and 18 students (5.4%) consumed weekly and daily. Also, 45 students (13.8%) consume energy drinks with 23 students (7.2%) consumed per week, 16 students (4.9%) consume a month while 6 students (1.8%) consume daily.

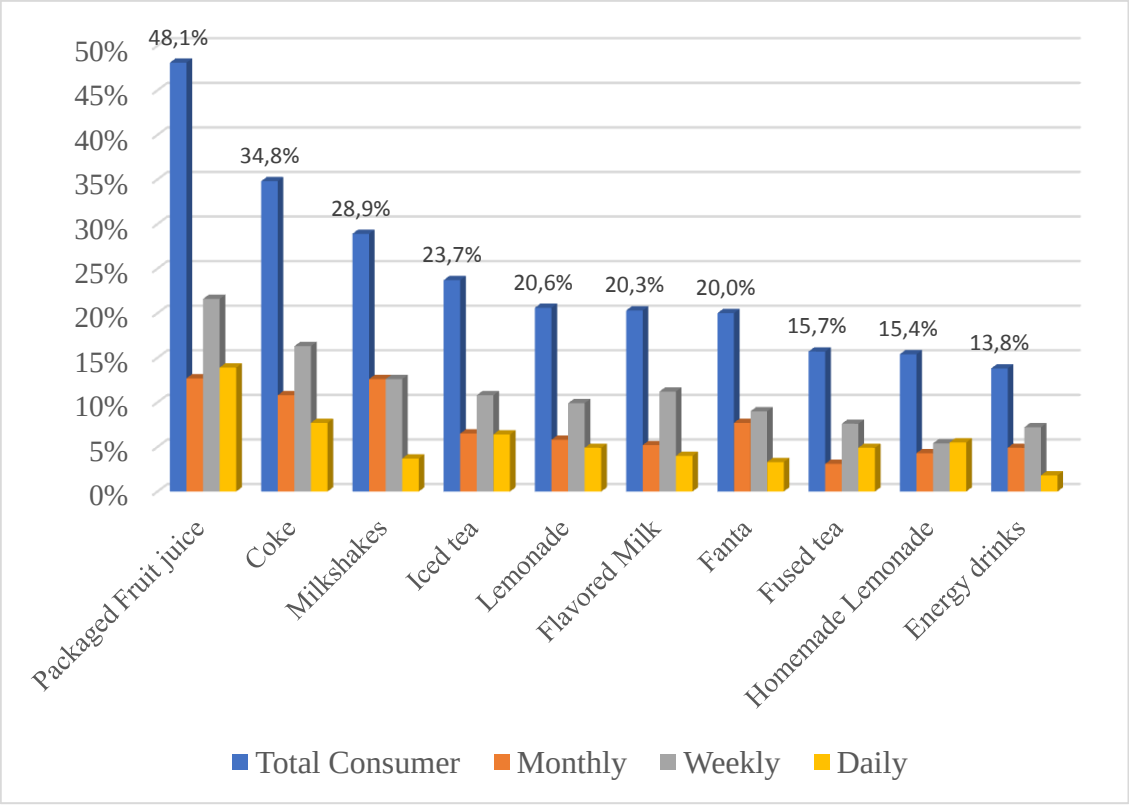


Figure 3. Frequently consumed cold beverages

4.6.2 Factors for Initiation of Soft Drink Consumption

The factors for the initiation of soft drink consumption as listed in table 10 were the availability criteria which includes how often students buy soft drinks at university. Almost 31.7% students bought soft drinks at the university campus, out of which 20.2% students bought soft drinks at campus every day, 69.2% students bought on weekly basis and 10.6% students bought soft drinks once per month. Moreover, some students purchased soft drinks along with fast food which accounted for 15.1% students as daily, 34.6% students as weekly and 35.5% students as monthly.

Table 10. Easy Availability of Soft Drinks

	Frequency (n)	Percentage (%)
Buy Soft Drinks at University		
Yes	103	31.7%
No	222	68.3%
Purchases in University Campus		
Everyday	21	20.2%
3-4 times per week	20	19.2%
1-2 times per week	52	50.0%
Once per month	11	10.6%
Availability at home		
Never	228	70.2%
Rarely	22	6.8%
Sometimes	63	19.4%
Always	12	3.7%
With Fast-food Consumption		
Daily	49	15.1%
Weekly	112	34.6%
Monthly	115	35.5%
None	48	14.8%

4.6.3 Quantity of Soft Drinks Consumed by Study Participants

Figure 4 illustrates the quantity of sugary beverages consumed by the students. Half of the students accounting for 50.6% consumed in the quantity of one can(330ml), while 21.7% consumed in small cup and 17.5% students consumed in medium cup while 3.0% students consumed in large cup and 3.6% students consumed in 500ml bottle. Those students that consumed 1 liter, 1.5 liter and more than 2 liters accounted for 1.8% students, 0.6% students and 1.2% students respectively.

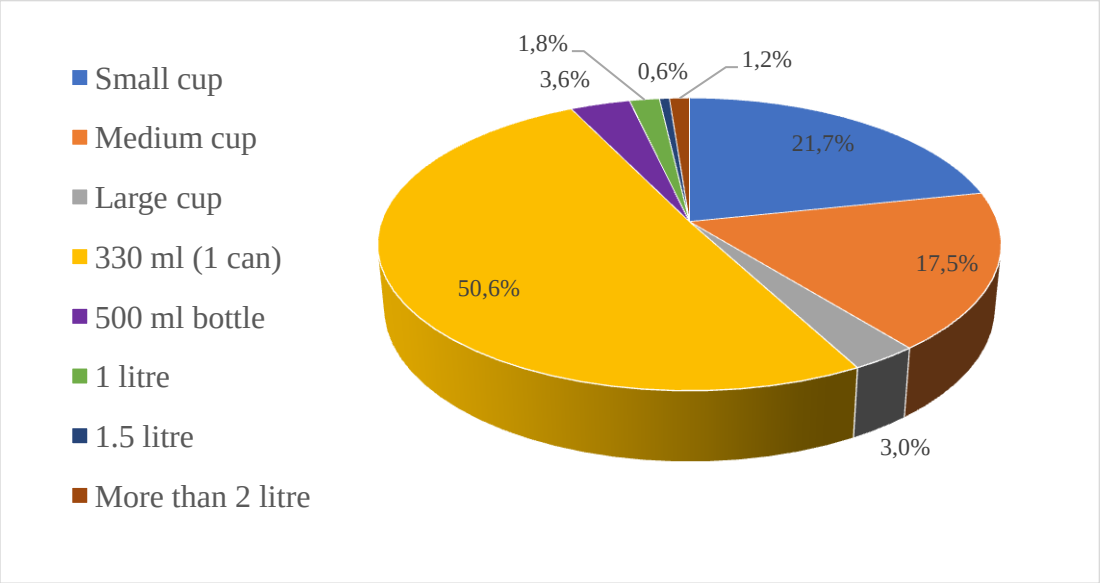


Figure 4. Quantity of soft drinks consumed at single time

4.6.4 Occasion for Consumption of Sugary Beverages by the Study Participants

Table 11 shows that 61% of students preferred to drink sugary drinks during and after meals, 38.2% of students and 32.9% of students consumed during school and on campus respectively. Less than 10% of students prefer to eat snacks, with friends, at parties, at work, while playing, while welcoming guests at home for no reason.

Table 11. Occasion for Consumption of Sugary Beverages.

	Frequency (n)	Percentage (%)
Occasion for consuming sugary beverages		
Feeling thirsty	12	3.7%
Party/celebration	24	7.4%
During / after meals	199	61.2%
While studying	124	38.2%
At the university	107	32.9%
Having guests at home	19	5.8%
While travelling	12	3.7%
With snacks	28	8.6%
After playing	6	1.8%
At work	6	1.8%
With friends	10	3.1%
Without any reason	27	8.3%

4.6.5 Influence of Family and Friends on SSBs Consumption

The results given in table 12 are described as the consumption of sugar-sweetened beverages of family and friends which accounted for 88.3% and 88.0% respectively.

Table 12. Family and Friends Consumption Pattern.

	Frequency (n)	**Percentage (%)**
Family's Consumption		
Yes	286	88.3%
No	38	11.7%
Friends' Consumption		
Yes	286	88.0%
No	39	12.0%
Family discourage me from drinking SSBs		
Never	157	51.0%
Rarely	18	5.8%
Sometimes	99	32.1%
Always	34	11.0%
Friends discourage me from drinking SSBs		
Never	171	54.6%
Rarely	18	5.8%
Sometimes	98	32.1%
Always	26	8.3%

Figure 5 shows the extent to which family and friends influence students. 51.0% of family members and 54.6% of friends never encouraged students to drink SSBs. On the other hand, only 5.8% of family and friends rarely discourage students to drink SSBs.

Furthermore, 32.1% of family members and 31.3% of friends sometimes discouraged students from drinking excessive sugary drinks. Almost 8 per cent of friends and 11 per cent of family members always demotivate students from drinking too many sugary drinks.

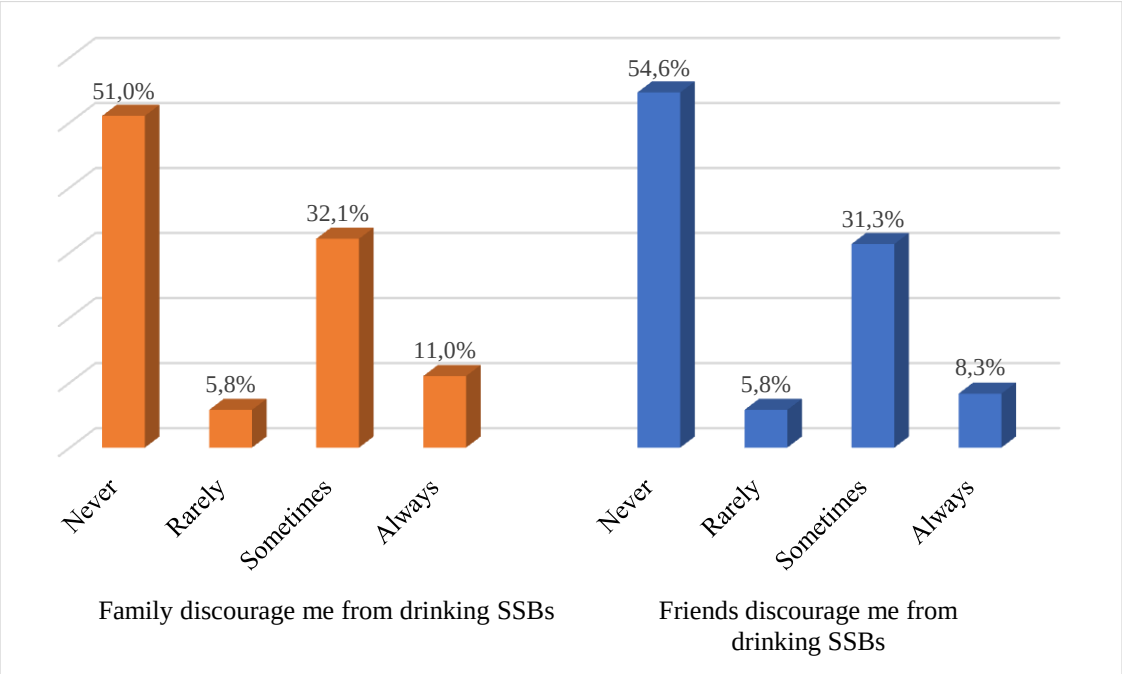


Figure 5: Influence of family and friends on consumption pattern of SSBs

4.6.6 Consumption Pattern of Hot Beverages among Participants.

The consumption pattern of hot beverages listed on table 13, describes non-consumers, the consumers on monthly, weekly and daily basis and the total number of study participants For the hot beverages, listed in table 13, the highest percentage were the tea consumers approximately 73% students that mostly consumed on daily basis, accounting for 17.5%, 14.2%, 12.6% and 10.1% one-time per day, two times per day, 3-4 times per day and 5-6 times per day respectively. The second most preferred hot beverage was Nescafe coffee, compromising of 51.5% students, out of which 14.8% students consumed once per day, 7.7% for 1-3 times per month, and 7.4% students consumed twice per week. 6.5% students consumed on 3-4 times per week and 3.7% students consumed twice per day. 18.5% students consumed Turkish coffee, out of that 6.2% students consumed 1-3 per month, 2.8% students consumed twice per week and 2.2% consumed once per day. Approximately 11% of students consumed Somali tea, 3.1% students consumed twice a day and 2.5% students consumed once per week. The consumption pattern for green tea and fruity teas accounted for approximately 8% and 11% students.

Table 13. Consumption Pattern of Hot Beverages among Study Participants

I cup of hot beverage (200ml/0.2L)	Non-consumers	Consumers									
		1-3 times per month	1 times per week	2 times per week	3-4 times per week	5-6 times per week	1 times per day	2 times per day	3-4 times per day	5-6 times per day	Total participants
Latte	(74.8) 243	(6.2) 20	(4.3) 14	(3.8) 12	(3.1) 10	(0.3) 1	(5.2) 17	(1.8) 6	(0.6) 2	(0.0) 0	325
Nescafe coffee	(49.5) 161	(7.7) 25	(3.7) 12	(7.4) 24	(6.5) 21	(1.8) 6	(14.8) 48	(3.7) 12	(4.6) 15	(0.3) 1	325
Turkish coffee	(81.5) 265	(6.2) 20	(1.8) 6	(2.8) 9	(1.8) 6	(0.9) 3	(2.2) 7	(0.9) 3	(0.6) 2	(1.2) 4	325
Black tea	(27.4) 89	(2.5) 8	(3.1) 10	(5.2) 17	(4.9) 16	(2.5) 8	(17.5) 57	(14.2) 46	(12.6) 41	(10.1) 33	325
Green tea	(91.7) 298	(1.5) 5	(0.6) 2	(0.9) 3	(0.3) 1	(0.6) 2	(1.5) 5	(1.5) 5	(0.9) 3	(0.3) 1	325
Fruity teas	(88.9) 289	(2.5) 8	(0.9) 3	(0.6) 2	(0.6) 2	(0.3) 1	(2.2) 7	(1.5) 5	(1.5) 5	(0.9) 3	325
Somali tea	(89.2) 290	(0.3) 1	(2.5) 8	(1.2) 4	(0.3) 1	(0.3) 1	(1.8) 6	(3.1) 10	(0.6) 2	(0.6) 2	325

(The percentage of consumption pattern is written in the bracket)

Figure 6 shows the consumption pattern of hot drinks with sugar and non-sugar consumers. The total consumers for coffee were, 164 students (50.5%) consumed Nescafe coffee and 60 students (18.5%) consumed Turkish coffee. The total consumers for black tea was 236 students (72.6%), 36 students (11.1%) drank fruit tea and 27 students consumed green tea (8.3%).

For black tea, 192 students (59.5%) added sugar and 44 students (13.1%) did not add sugar. 131 students (40.2%) consumed sugar with Nescafe coffee, and 33 students (10.3%) were non-sugar consumers. For Turkish coffee, 29 students (8.8%) preferred to take sugar and 31 students (9.7%) did not add sugar. Furthermore, only 26 students (8%) were consumers of sugar in green tea and, and 17 students (5.2%) were consumers for fruity teas while 1 student (0.3%) did not add sugar with green tea and 19 students(5.9%) did not add sugar with fruit teas.

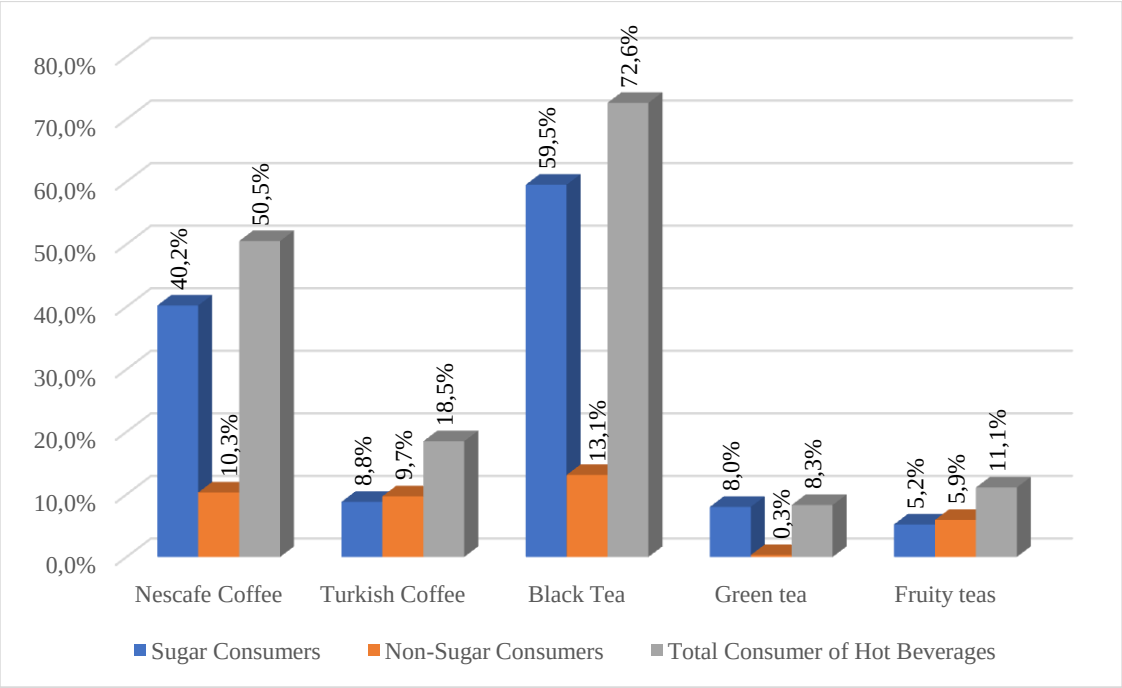


Figure 6. The pattern of consumption of hot drinks with sugar and non-sugar consumers

4.6.7 Consumption Pattern of Hot Beverages with Sugar Among Participants

As shown in Table 14 and figure 7, sugar consumption in hot drinks. Black tea was the most common sugar consumer among students, 192 students added sugar with black tea, of which 70 students added two cubes of sugar, 41 student's added three cubes of sugar, and 29 students added two cubes. The second favorite was the Nescafe coffee with 131 students. 55 students add two cubes, while 30 students add three cubes and only 27 students add one cube of sugar in Nescafe coffee. Turkish coffee, green tea and fruit tea were less favorable among students with 29 students, 26 students and 17 students, respectively. The amount of sugar added was also very less as compared to black tea and Nescafe coffee.

For those students who add sweeteners in tea coffee are very rare, only 6 students (1.9%) add sweeteners while 316 students (97.5%) do not add sweeteners in their hot beverages (tea and coffee).

Table 14. Consumption of Hot Beverages with Sugar among Study Participants

Sugar in hot Beverages	Nescafe Coffee	Turkish Coffee	Black Tea	Green tea	Fruity teas
One cube	(8.3) 27	(1.8) 6	(11.1) 36	(3.1) 10	(1.2) 4
Two cubes	(16.9) 55	(4.9) 16	(21.7) 70	(2.2) 7	(2.2) 7
Three cubes	(9.2) 30	(1.8) 6	(12.7) 41	(1.2) 4	(0.0) 0
Four cubes	(3.1) 10	(0.3) 1	(9.0) 29	(0.6) 2	(1.2) 4
Five cubes	(1.5) 5	(0.0) 0	(2.8) 9	(0.6) 2	(0.6) 2
>Five cubes	(1.2) 4	(0.0) 0	(2.2) 7	(0.3) 1	(0.0) 0
Total sugar	(40.2) 131	(8.9) 29	(59.5) 192	(8.0) 26	(5.2) 17

(The percentage of consumption pattern is written in the bracket)

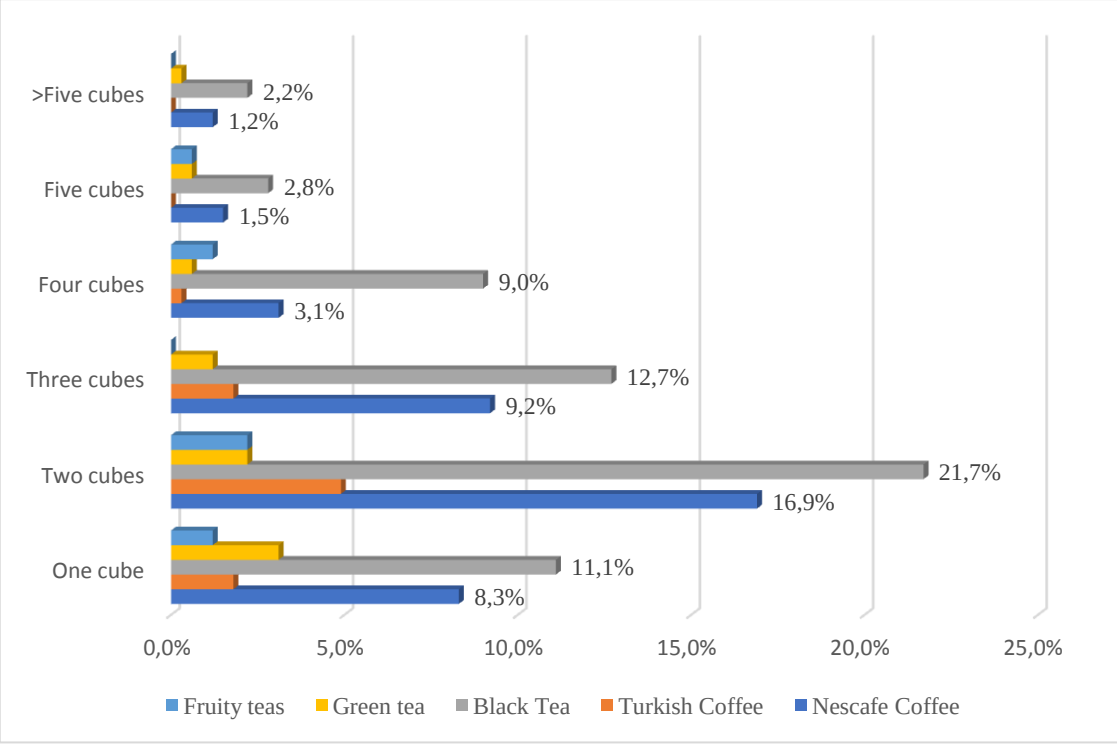


Figure 7. Amount of sugar in hot beverages

4.7 Association between Consumption Pattern of SSBs, Socio-demographic and Socio-economics Characteristics.

The tables 15-19 describes the correlation between the consumption pattern of all sugar-sweetened beverages and sociodemographic as well as socioeconomics characteristics.

4.6.2 Percentile Group of Total Sugar Consumption in Regular Soft Drinks and Characteristics

As described in table 15, the association between total sugar consumed in regular soft drinks and sociodemographic, there is a significant correlation ($p<0.000$) between university by city and total sugar consumed in regular soft drinks. For socioeconomics characteristics, there is significant correlation between education field ($p<0.000$), accommodation ($p<0.000$), living expenses ($p<0.003$), school achievement ($p<0.000$) and mother's education status ($p<0.038$) and total sugar consumed in regular soft drinks.

Table 15.1. The Associations of Sociodemographic Characteristics with Total Sugar Consumption in Regular Soft Drinks.

Sociodemographic	**Percentile group of total sugar in soft drinks**			
Gender	**Low users#**	**Medium users**	**High users**	**p-value***
Male	34.9%	27.2%	37.9%	0.081
Female	44.2%	29.5%	26.4%	
Age				
<=22	39.8%	21.4%	38.8%	0.252
23-24	34.8%	31.5%	33.7%	
>=25	42.9%	30.2%	27.0%	
Marital status				
Single	37.8%	28.4%	33.8%	0.901
Married	42.3%	26.9%	30.8%	
Geographic place of birth				
East Africa	39.8%	28.4%	31.8%	0.230
Middle East	27.8%	22.2%	50.0%	
Europe	16.7%	16.7%	66.7%	
University by city				
Istanbul	39.4%	29.0%	31.5%	0.000
Ankara	55.8%	27.9%	16.3%	
Mersin	8.6%	25.7%	65.7%	
Others	60.0%	0.0%	40.0%	

*p-value for chi-square test
percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

Table 15.2. The Associations of Socioeconomic Characteristics with Total Sugar Consumption in Regular Soft Drinks.

Socioeconomics				
Education field	**Low users[#]**	**Medium users**	**High users**	**p-value***
Health faculty	50.9%	31.5%	17.6%	0.000
Engineering faculty	26.2%	27.7%	46.2%	
Political science	38.5%	33.3%	28.2%	
Social science	30.3%	23.2%	46.5%	
Preparatory school	61.5%	23.1%	15.4%	
Level of education				
Undergraduate	37.9%	25.3%	36.8%	0.142
Postgraduate(masters)	38.0%	29.5%	32.6%	
Postgraduate(PhD)	47.6%	42.9%	9.5%	
Accommodation				
Dormitory	49.1%	28.6%	22.4%	0.000
Residence house	28.2%	27.6%	44.2%	
Living Expenses				
Scholarship	43.0%	37.2%	19.8%	0.003
Family income	32.3%	24.5%	43.2%	
Own income	45.6%	24.1%	30.4%	
Occupation Status				
Only student	39.0%	26.3%	34.7%	0.464
Working + student	37.5%	33.3%	29.2%	
School achievement status				
Much above average	49.0%	27.2%	23.8%	0.000
Slightly above average	27.8%	38.9%	33.3%	
Average and lower	30.2%	20.9%	48.8%	
Perceived household income				
High income	38.8%	30.6%	30.6%	0.220
Just get by	51.6%	23.4%	25.0%	
Low income	26.9%	42.3%	30.8%	
Father's employment status				
Employed	41.2%	25.5%	33.3%	0.110
Retired	25.6%	32.6%	41.9%	
Unemployed	22.2%	11.1%	66.7%	
Mother's employment status				
Employed	38.1%	25.8%	36.1%	0.354
Retired	10.0%	50.0%	40.0%	
Housewife or unemployed	39.5%	27.9%	32.6%	
Father's education status				
No formal education	34.9%	34.8%	21.2%	0.128
Primary+ middle school	37.1%	28.6%	34.3%	
Completed high school	42.7%	18.3%	39.0%	
Completed university+ graduate degree	33.8%	32.3%	33.8%	
Mother's education status				
No formal education	44.3%	32.1%	23.6%	0.038
Primary+ middle school	32.3%	19.4%	48.4%	
Completed high school	40.8%	27.2%	32.0%	
Completed university+ graduate degree	28.9%	35.6%	35.6%	

*p-value for chi-square test

percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

4.7.2 Percentile Group of Liters in Light Soft Drinks and Their Characteristics

As described in table 16, the association between amount of liters in light soft drinks and sociodemographic, there is a significant correlation ($p<0.00$) between university by city and light soft drinks. For socioeconomics characteristics, there is significant correlation between education field ($p<0.03$), accommodation ($p<0.00$), perceived household income ($p<0.04$) and father's education status ($p<0.02$) and amount of liters in diet sodas.

Table 16.1. The Associations of Sociodemographic Characteristics with Amount of Liters in Light Soft Drinks

Sociodemographic	**Percentile group of amount of liters in light/diet beverages**			
Gender	**Low users#**	**Medium users**	**High users**	**p-value***
Male	77.0%	9.2%	13.8%	0.631
Female	81.4%	7.0%	11.6%	
Age				
<=22	78.6%	8.2%	13.3%	0.536
23-24	79.8%	5.6%	14.6%	
>=25	79.5%	11.0%	9.4%	
Marital status				
Single	77.8%	8.8%	13.5%	0.438
Married	88.5%	3.8%	7.7%	
Geographic place of birth				
East Africa	78.3%	9.0%	12.7%	0.644
Middle East	83.3%	0.0%	16.7%	
Europe	83.3%	0.0%	16.7%	
University by city				
Istanbul	82.2%	7.9%	9.9%	0.000
Ankara	97.7%	0.0%	2.3%	
Mersin	34.3%	22.9%	42.9%	
Others	60.0%	0.0%	40.0%	

*p-value for chi-square test
percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

Table 15 (b): The Associations of Socioeconomic Characteristics with Amount of Liters in Light Soft Drinks

Socioeconomics				
Education field	**Low users[#]**	**Medium users**	**High users**	**p-value***
Health faculty	85.2%	7.4%	7.4%	0.039
Engineering faculty	66.2%	9.2%	24.6%	
Political science	87.2%	5.1%	7.7%	
Social science	74.7%	10.1%	15.2%	
Preparatory school	92.9%	7.1%	0.0%	
Level of education				
Undergraduate	81.1%	7.4%	11.4%	0.689
Postgraduate(masters)	76.0%	10.1%	14.0%	
Postgraduate(PhD)	76.2%	4.8%	19.0%	
Accommodation				
Dormitory	89.4%	5.6%	5.0%	0.000
Residence house	68.3%	11.0%	20.7%	
School achievement status				
Much above average	85.7%	5.4%	8.8%	0.076
Slightly above average	75.0%	11.1%	13.9%	
Average and lower	70.9%	10.5%	18.6%	
Living Expenses				
Scholarship	82.6%	9.3%	8.1%	0.125
Family income	73.1%	9.0%	17.9%	
Own income	84.8%	6.3%	8.9%	
Occupation Status				
Only student	79.8%	7.9%	12.3%	0.684
Working + student	75.0%	9.7%	15.3%	
Perceived household income				
High income	77.6%	5.9%	16.5%	0.044
Just get by	90.6%	1.6%	7.8%	
Low income	76.9%	15.4%	7.7%	
Father's employment status				
Employed	78.0%	8.8%	13.2%	0.099
Retired	69.8%	11.6%	18.6%	
Unemployed	44.4%	11.1%	44.4%	
Mother's employment status				
Employed	77.6%	7.1%	15.3%	0.582
Retired	60.0%	20.0%	20.0%	
Housewife or unemployed	78.9%	8.4%	12.6%	
Father's education status				
No formal education	92.4%	3.0%	4.5%	0.028
Primary+ middle school	74.3%	8.6%	17.1%	
Completed high school	83.1%	9.6%	7.2%	
Completed university+ graduate degree	72.3%	10.0%	17.7%	
Mother's education status				
No formal education	87.9%	4.7%	7.5%	0.085
Primary+ middle school	71.0%	14.5%	14.5%	
Completed high school	78.6%	9.7%	11.7%	
Completed university+ graduate degree	73.3%	6.7%	20.0%	

*p-value for chi-square test.
percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

4.7.3 Percentile Group of Total Sugar Consumption in Other Cold Drinks and Characteristics

As described in table 17, the association between total sugar consumed in other cold drinks and sociodemographic, there is significant correlation between age ($p<0.05$), marital status ($p<0.000$), university by city ($p<0.000$) and sugar consumed in other cold drinks. For socioeconomics characteristics, there is significant correlation between education field ($p<0.038$), level of education ($p<0.035$), accommodation ($p<0.002$), school achievement status ($p< 0.018$), father's education status ($p<0.020$), mother's education status ($p<0.024$) and total sugar consumed in other cold drinks.

Table 17.1. The Associations of Sociodemographic Characteristics with Total Sugar Consumption in Other Cold Drinks

Sociodemographic	**Percentile group of total sugar in other cold beverages**			
Gender	**Low users#**	**Medium users**	**High users**	**p-value***
Male	46.7%	19.0%	34.4%	0.143
Female	57.4%	13.2%	29.5%	
Age				
<=22	56.1%	13.3%	30.6%	0.058
23-24	48.3%	12.4%	39.3%	
>=25	50.8%	23.8%	25.4%	
Marital status				
Single	52.0%	14.2%	33.8%	0.000
Married	34.6%	46.2%	19.2%	
Geographic place of birth				
East Africa	50.8%	16.7%	32.4%	0.546
Middle East	44.4%	16.7%	38.9%	
Europe	83.3%	0.0%	16.7%	
University by city				
Istanbul	55.6%	17.0%	27.4%	0.000
Ankara	58.1%	20.9%	20.9%	
Mersin	8.6%	11.4%	80.0%	
Others	60.0%	0.0%	40.0%	

*p-value for chi-square test.
percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

Table 17.2. The Associations of Socioeconomic Characteristics with Total Sugar Consumption in Other Cold Drinks

Socioeconomics				
Education field	**Low users[#]**	**Medium users**	**High users**	**p-value***
Health faculty	52.8%	17.6%	29.6%	0.038
Engineering faculty	39.1%	18.8%	42.2%	
Political science	51.3%	23.1%	25.6%	
Social science	50.5%	14.1%	35.4%	
Preparatory school	92.9%	0.0%	7.1%	
Level of education				
Undergraduate	58.0%	12.1%	29.9%	0.035
Postgraduate(masters)	44.2%	20.9%	34.9%	
Postgraduate(PhD)	33.3%	28.6%	38.1%	
Accommodation				
Dormitory	56.9%	20.0%	23.1%	0.002
Residence house	45.1%	13.4%	41.5%	
Living Expenses				
Scholarship	50.0%	18.6%	31.4%	0.072
Family income	51.3%	11.5%	37.2%	
Own income	48.7%	25.6%	25.6%	
Occupation Status				
Only student	53.0%	14.7%	32.3%	0.154
Working + student	43.1%	23.6%	33.3%	
School achievement status				
Much above average	58.2%	17.8%	24.0%	0.018
Slightly above average	43.1%	13.9%	43.1%	
Average and lower	40.7%	19.8%	39.5%	
Perceived household income				
High income	55.3%	15.3%	29.4%	0.013
Just get by	57.1%	15.9%	27.0%	
Low income	19.2%	23.1%	57.7%	
Father's employment status				
Employed	54.1%	14.6%	31.2%	0.067
Retired	41.9%	14.0%	44.2%	
Unemployed	11.1%	22.2%	66.7%	
Mother's employment status				
Employed	52.6%	12.4%	35.1%	0.204
Retired	40.0%	0.0%	60.0%	
Housewife or unemployed	50.5%	18.4%	31.1%	
Father's education status				
No formal education	60.6%	21.2%	18.2%	0.020
Primary+ middle school	42.9%	8.6%	48.6%	
Completed high school	56.1%	15.9%	28.0%	
Completed university+ graduate degree	43.1%	17.7%	39.2%	
Mother's education status				
No formal education	57.9%	18.7%	23.4%	0.024
Primary+ middle school	35.5%	22.6%	41.9%	
Completed high school	53.9%	14.7%	31.4%	
Completed university+ graduate degree	42.2%	11.1%	46.7%	

*p-value for chi-square test

percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

4.7.4 Percentile Group of Total Sugar Consumption in Hot Drinks and Characteristics

As described in table 18, for socioeconomics characteristics, there is a significant correlation between accommodation ($p<0.041$) and total sugar consumed in hot drinks.

Table 18.1. The Associations of Sociodemographic Characteristics with Total Sugar Consumption in Hot Drinks

Sociodemographic	**Percentile group of total sugar in hot drinks**			
Gender	**Low users#**	**Medium users**	**High users**	**p-value***
Male	35.8%	26.9%	37.3%	0.356
Female	34.1%	34.1%	31.8%	
Age				
<=22	36.1%	32.0%	32.0%	0.923
23-24	32.6%	29.2%	38.2%	
>=25	35.2%	28.8%	36.0%	
Marital status				
Single	35.3%	28.8%	35.9%	0.664
Married	36.0%	36.0%	28.0%	
Geographic place of birth				
East Africa	39.8%	29.0%	37.2%	0.230
Middle East	38.9%	25.0%	36.1%	
Europe	38.5%	34.1%	29.4%	
University by city				
Istanbul	34.2%	30.4%	35.4%	0.175
Ankara	26.2%	28.6%	45.2%	
Mersin	54.3%	25.7%	20.0%	
Others	20.0%	40.0%	40.0%	

*p-value for chi-square test.
percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

Table 18.2. The Associations of Socioeconomic Characteristics with Total Sugar Consumption in Hot Drinks

Socioeconomics				
Educational field	**Low users#**	**Medium users**	**High users**	**p-value***
Health faculty	34.6%	29.9%	35.5%	0.666
Engineering faculty	36.9%	9.2%	33.8%	
Political science faculty	41.0%	17.9%	41.0%	
Social science faculty	33.3%	32.2%	35.1%	
Preparatory school	28.6%	50.0%	21.4%	
Level of education				
Undergraduate	32.8%	32.8%	34.5%	0.288
Postgraduate(masters)	37.0%	24.4%	38.6%	
Postgraduate(PhD)	42.9%	38.1%	19.0%	
Accommodation				
Dormitory	28.3%	32.7%	39.0%	0.041
Residence house	41.7%	27.0%	31.3%	
Living Expenses				
Scholarship	27.9%	31.4%	40.7%	0.077
Family income	39.0%	33.1%	27.9%	
Own income	35.9%	21.8%	42.3%	
Occupation Status				
Only student	32.8%	31.6%	35.6%	0.179
Working + student	43.7%	22.5%	33.8%	
School achievement status				
Much above average	33.8%	27.2%	23.8%	0.648
Slightly above average	27.8%	38.9%	33.3%	
Average and lower	30.2%	20.9%	48.8%	
Perceived household income				
High income	33.3%	33.3%	33.3%	0.095
Just get by	26.6%	25.0%	48.4%	
Low income	46.2%	11.5%	42.3%	
Father's employment status				
Employed	33.5%	29.6%	36.9%	0.568
Retired	46.5%	23.3%	30.2%	
Unemployed	33.3%	22.2%	44.4%	
Mother's employment status				
Employed	36.7%	28.6%	34.7%	0.991
Retired	30.0%	30.0%	40.0%	
Housewife or unemployed	35.1%	30.3%	34.6%	
Father's education status				
No formal education	34.9%	34.8%	21.2%	0.128
Primary+ middle school	37.1%	28.6%	34.3%	
Completed high school	42.7%	18.3%	39.0%	
Completed university+ graduate degree	33.8%	32.3%	33.8%	
Mother's education status				
No formal education	30.8%	27.7%	41.5%	0.281
Primary+ middle school	37.1%	28.6%	34.3%	
Completed high school	34.1%	23.2%	42.7%	
Completed university+ graduate degree	38.8%	34.1%	27.1%	

*p-value for chi-square test

percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

4.7.4. Percentile Group of Sugar Consumption in Total Sugary Drinks and Characteristics

As described in table 19, the association between total sugar consumed in told cold and hot drinks and sociodemographic, there is significant correlation between university by city ($p<0.029$) and sugar consumed in total cold and hot drinks. For socioeconomics characteristics, there is significant correlation between education field ($p<0.002$), accommodation ($p<0.000$), and total sugar consumed in told cold and hot drinks.

Table 19.1. The Associations of Sociodemographic Characteristics with Total Sugar Consumption in Hot and Cold Drinks

Sociodemographic	**Percentile group of total sugar in hot/cold beverages**			
Gender	**Low users#**	**Medium users**	**High users**	**p-value***
Male	29.5%	34.7%	35.8%	0.210
Female	38.8%	31.8%	29.5%	
Age				
<=22	32.0%	32.0%	36.1%	0.377
23-24	28.1%	37.1%	34.8%	
>=25	40.2%	30.2%	27.9%	
Marital status				
Single	31.8%	34.6%	33.6%	0.403
Married	44.0%	24.0%	32.0%	
Geographic place of birth				
East Africa	34.0%	34.0%	32.0%	0.108
Middle East	33.3%	27.8%	38.9%	
Europe	0.0%	16.7%	83.3%	
University by city				
Istanbul	35.9%	32.1%	32.1%	0.029
Ankara	38.1%	38.1%	23.8%	
Mersin	8.6%	37.1%	54.3%	
Others	40.0%	40.0%	20.0%	

*p-value for chi-square test.
percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

Table 19.2. The Associations of Socioeconomic Characteristics with Total Sugar Consumption in Hot and Cold Drinks

Socioeconomics				
Education field	**Low users[#]**	**Medium users**	**High users**	**p-value***
Health faculty	39.3%	39.3%	21.5%	0.002
Engineering faculty	21.9%	29.7%	48.4%	
Political science faculty	41.0%	35.9%	23.1%	
Social science faculty	27.1%	31.2%	41.7%	
Preparatory school	61.5%	15.4%	23.1%	
Level of education				
Undergraduate	32.6%	31.4%	36.0%	0.257
Postgraduate(masters)	31.0%	38.1%	31.0%	
Postgraduate(PhD)	52.4%	23.8%	23.8%	
Accommodation				
Dormitory	38.0%	39.2%	22.8%	0.000
Residence house	28.6%	28.0%	43.5%	
Living Expenses				
Scholarship	33.7%	37.2%	29.1%	0.579
Family income	31.6%	30.3%	38.2%	
Own income	35.1%	35.1%	29.9%	
Occupation Status				
Only student	31.2%	34.8%	34.0%	0.419
Working + student	39.4%	29.6%	31.0%	
School achievement status				
Much above average	38.5%	35.7%	25.9%	0.094
Slightly above average	27.8%	37.5%	34.7%	
Average and lower	29.4%	28.2%	42.4%	
Perceived household income				
High income	38.1%	33.3%	28.6%	0.268
Just get by	33.3%	38.1%	28.6%	
Low income	26.9%	23.1%	50.0%	
Father's employment status				
Employed	33.2%	33.2%	33.7%	0.576
Retired	25.6%	39.5%	34.9%	
Unemployed	22.2%	22.2%	55.6%	
Mother's employment status				
Employed	32.3%	31.2%	36.5%	0.195
Retired	0.0%	55.6%	44.4%	
Housewife or unemployed	35.6%	34.6%	29.8%	
Father's education status				
No formal education	41.5%	33.8%	24.6%	0.652
Primary+ middle school	28.6%	40.0%	31.4%	
Completed high school	31.6%	35.4%	32.9%	
Completed university+ graduate degree	31.8%	31.8%	36.4%	
Mother's education status				
No formal education	38.8%	34.0%	27.2%	0.082
Primary+ middle school	21.0%	37.1%	41.9%	
Completed high school	39.2%	32.4%	28.4%	
Completed university+ graduate degree	22.7%	34.1%	43.2%	

*p-value for chi-square test

percentiles were divided by tar tiles into three categories as high consumers, medium consumers and low consumers

4.8. Association Between Consumption Pattern of SSBs, BMI, and Behaviors

A spearman's correlation test was conducted with consumption pattern of SSBs as total sugar consumed in hot drinks, regular soft drinks, other cold drinks, total sugar in hot and cold beverages and liters of diet soft drinks with BMI. A slight significant negative relation (p-value 0.026) was found between BMI and sugar consumed in hot beverages (sweetened tea and coffee). No significance between BMI and consumption pattern of other cold drinks, regular soft drinks, as well as total cold and hot beverages. Mann-Whitney U test between dental problem and total sugar consumed in other cold drinks shows a significant relation with (p-value 0.05), while there was no significant relation between sleep problem and total sugar consumed in other cold drinks but a significant relation was found between total sugar consumed in other cold beverages, soft drinks, hot beverages and total sugary beverages. Furthermore a non-parametric Kruskal-Wallis test between school achievement and sugar consumed in hot beverages shows insignificant relation but there is significance in soft drinks, cold beverages and total sugary beverages.

Table 20. Spearman's Correlation Association Between BMI and Consumption Frequency of Sugary Beverages

BMI		
Consumption Frequency	**Spearman's Correlation(r)**	**p-value***
Total sugar consumption in soft-drinks per month	0.086	0.137
Total sugar consumption in other cold-drinks per month	-0.029	0.620
Total sugar consumption in hot beverages per month	-0.129	0.026
Total sugar in cold and hot beverages per month	-0.011	0.848
Amount of diet soft drinks consumed per month	0.041	0.474

*p-value for Spearman's Correlation test

Table 21.1. Associations Between Dental Problem and Consumption Frequency of Sugary Beverages

Dental problem	
Consumption frequency	**Mann-Whitney U test (p-value)***
Total sugar consumption in soft-drinks per month	0.95
Total sugar consumption in other cold-drinks per month	0.05
Total sugar consumption in hot beverages per month	0.78
Total sugar in cold and hot beverages per month	0.11
Amount of diet soft drinks consumed per month	0.91
Total sugar consumption in carbonated drinks per month	0.32

*p-value for Mann-Whitney U test

Table 21.2. Associations between Sleep Problem and Consumption Frequency of Sugary Beverages

Sleep problem	
Consumption frequency	**Mann-Whitney U test (p-value)***
Total sugar consumption in soft-drinks per month	0.02
Total sugar consumption in other cold-drinks per month	0.06
Total sugar consumption in hot beverages per month	0.02
Total sugar in cold and hot beverages per month	0.17
Amount of diet soft drinks consumed per month	0.22

*p-value for Mann-Whitney U test

Table 21.3. Associations between School Achievement and Consumption Frequency of Sugary Beverages

School achievement	
Consumption frequency	**Kruskal-Wallis test (p value)***
Total sugar consumption in soft-drinks per month	0.00
Total sugar consumption in carbonated drinks	0.01
Total sugar consumption in other cold-drinks per month	0.01
Total sugar consumption in hot beverages per month	0.01
Total sugar in cold and hot beverages per month	0.00
Amount of diet soft drinks consumed per month	0.01

*p-value for Kruskal-Wallis test

5. DISCUSSION

This chapter provides a detailed description of discussion regarding the consumption of sugar-sweetened beverages, their effect on Body mass index (BMI), socio-demographic and socio-economic differences among consumers of sugary beverages, objective knowledge, and attitudes towards sugary beverages.

5.1. Frequency Distribution of SSBs Consumption

Consumption pattern of sugary beverages was analyzed by using descriptive statistics in terms of mean and standard deviation. Firstly the mean and standard deviation for consumption of all SSBs (regular sodas, light sodas, other cold drinks and hot drinks) were calculated. The mean for frequency pattern of regular soft drink consumed in one month was 8.7±17.6, but 2.7±9.8 for diet soft drink. Majority of students preferred to drink regular sodas as compared to light sodas, which indicates the popularity of sweet preferences of the regular sodas. The other cold drinks that includes primarily of energy drinks, flavored milk, milkshakes and cold coffees was consumed less comparatively to other sugary beverages with a mean of 2.5±7.2. Moreover, the mean for the amount of sugar consumed in sugar-sweetened beverages was calculated as amount of sugar cubes in each beverage. In regular soft drinks, the mean for amount of cubes was 203.19±469.5, and 2.7±9.8 for diet soft drinks but 72.39±196.5 for other cold drinks, and 134.013±220.13 for hot beverages (sweetened tea and coffee). By this data, it shows that the highest amount of sugar consumed was in regular sodas and in hot drinks (sweetened tea and coffee).

Packaged juice was the most frequently consumed cold beverages among Somali students, and the second was Coca-Cola. Participants reported their primary reason for drinking soft drinks were taste (39%), refreshment (20.6%) and for digestion purposes (19%). Similar to previous studies, among college students, taste and price were among the top factors when choosing food and beverages (86). Moreover, almost half of student proportion consumed soft drinks in the quantity of can-330ml while remaining half consumed in small and medium cups. Approximately 61% of students preferred to consume sugary beverages after the meals, while less than 40% students consumed at university campus and less than 10% students consumed with friends and at social

gatherings. Similar to a study conducted on adolescents in US where peer pressure can also influence food and beverage selection (79).

Milkshakes, Iced tea, lemonade, flavored milk, Fanta and energy drinks are among other frequently consumed sugary beverages. Most sugary drinks was commonly consumed in the week as compared to monthly and daily. In addition, the largest number of hot drinks among the students was black tea, of which 236 consumers, 192 students add sugar with the tea. 164 students consumed Nescafe coffee where 131 students consumed Nescafe coffee with sugar. The students that add sweeteners in tea or coffee were only 6 students (1.9%) while 316 students (97.5%) did not add sweeteners in their hot beverages (tea and coffee).

5.2. Consumption Pattern of SSBs and Sociodemographic Characteristics

In this sample of Somali adults >18 years of age, we found that male students were high consumers of sugar sweetened beverages that includes regular and light soft drinks, other cold drinks and hot drinks as compared to the females. This was similar to study on Jordanian students reveals male students consumed more calories from SSBs compared to female students (p = 0.016) (87). Another study results using a food frequency questionnaire to assess the SSBs intake of 265 undergraduates at the University of Arkansas (2006) showed that males were more likely than females to report daily intake of SSBs (88). Based on the results of the aforementioned studies, it is possible that males consumed higher amounts of SSBs than females because they are less concerned with their body image compared to females (19).

The age group 23-24 years consumed more of diet soft drinks and other cold drinks while the age group between 18-22 years were high consumers of regular soft drinks and sweetened hot drinks. Moreover, East African-born students consume more sweetened tea and coffee than the Middle East and Europe. This refers to the Somali tea which is usually sweetened with large quantities of sugar, so the sweet preference is an important indicator of high sugar consumption in tea and coffee.

5.3. Consumption Pattern and Socioeconomic Characteristics

Consumption pattern and socioeconomic characteristics, there is a significant correlation($p<0.029$) between total sugar consumed in cold and hot drinks and universities by city, where the students of Mersin universities were high consumers of sugary beverages in comparison to students of Istanbul and Ankara universities. Undergraduate students were major consumers of regular soft drinks and sweetened hot drinks as compared to post-graduate students. The main reason for high consumption of soft drinks that influenced students was the availability environment where they were more likely to buy soft drinks at university and fast food outlets where soft drinks are served with meals.

In addition, there is significant correlation between the field of education ($p<0.002$). Social science students, engineering students and political science students were major consumers of cold and hot beverages compared to health faculty students. The reason being health students are more aware of the health consequences of sugary beverages therefore prefer healthy alternatives. Moreover, there was a significant correlation ($p<0.000$) between the student's accommodation and their consumption patterns, such as students living in residence houses were high consumers of sugary beverages compared to students residing in university dormitories.

5.4. Consumption Pattern of SSBs and BMI

There was significant but negative relation (p-value 0.026) between BMI and sugar consumed in hot beverages. No significance was found between BMI and consumption pattern of other cold drinks, regular soft drinks, as well as total cold and hot beverages. The negative relationship indicates that students of normal weight consume a large amount of sugary beverages compared to students who are overweight or obese. Overconsumption had a lower effect on their weight, and the reason was that 63% students showed a moderate level of physical activity. Our findings was in contrast to results from a study on Turkish students that showed refined sugar added a significant amount of beverage per day and may likely to contribute to a higher BMI. In other words, the average consumption of refined sugar added the traditional tea and/or coffee (14.7 g/d) in subjects were an increase in BMI of 0.13 kg/m^2 (89). Another study that

was performed among Tehrani adolescents showed that 85% of adolescents knew that consuming soft drink and beverages caused overweight or obesity, but in practice only 4.5% of them did not drink them (90).

Furthermore, non-parametric test correlation was done between frequency of consumption of sugary drinks, dental problem, sleep problem, and school achievement. Mann-Whitney U test shows that the dental problem and total sugar consumed in other cold drinks have a significant correlation of 0.05. Students with a sleep problem had significant relationship with total sugar consumed in regular soft drinks, other cold drinks, hot drinks and total sugary beverages. This states that students who were high consumers of regular soft drinks and hot beverages (sweetened coffee or tea) had more sleep problem than non-consumers or low consumers. Furthermore a non-parametric Kruskal-Wallis test between school achievement and sugar consumed in hot beverages, shows a significance in soft drinks, cold beverages and total sugary beverages.

5.5. Consumption Pattern of SSBs and Knowledge Among Study Participants

In this study, 94.2% of students reported that sugar is harmful to health, females had high nutritional knowledge than males. 66.7% of health students have a high level of knowledge as compared to non-health students. This shows that health students have been taught about nutrition. The health impact of sugar on health shows that more than 90% students agreed that excess sugar causes diabetes and dental erosion, while more than 80% of students agreed that excess sugar caused overweight and hyper tension, and 76% students agreed that excess sugar causes osteoporosis. Previous similar studies were conducted in different African countries such as South Africa where the determinants of the knowledge, attitude and consumption of SSBs in which 70% of respondents had an acceptable level of knowledge on the types of SSBs and possible health conditions if consumed excessively (91).

For the statement of knowledge of the ingredients, above 60% students identified sweeteners, and carbon dioxide, while nearly 60% students identified flavor enhancers, and students below 50% identified color additives, additives, and preservatives. In this study the students had adequate knowledge for the ingredients in soda. This study results are in contrast with those of a study conducted in 2013 on 110 medical students

in India, only 5.5% of them knowing all the contents printed on soft drinks bottles which proves that students had poor knowledge about ingredients of soft drinks, and misunderstood about the benefits of carbonated soft drinks to human body and the health risks related to soft drinks consumption (92).

5.6. Consumption Pattern and Attitude Among Study Participants

In this study, 76.6% students showed positive attitude as they tried to reduce the consumption of excess sugary drinks. Nearly 50% of students tried to quit drinking sugary beverages. Moreover, 75.6% students were confident of reducing the addition of sugar to hot drinks. In contrast to our study results, there is a study showed that only eleven percent of participating students mentioned that they tried to limit and avoid added sugars, although, 61% of those considered limiting sugar- sweetened beverages to help maintain a healthy weight (32). Another study that was conducted in South Africa indicates that almost half (46%) respondents had a positive attitude toward the consumption of SSBs. Those with poor knowledge and attitude consumed significantly more SSBs ($P < 0.01$) than those with higher levels of knowledge and attitude (91) .

6. CONCLUSIONS AND RECOMMENDATIONS

University years are a critical period in young people's life, with many habits evolving, including nutrition and drink choices. Studies targeting university students who need to reduce their sugar consumption are extremely rare. Understanding students' attitudes and behaviors towards the consumption of sugary drinks will help us find ways to enhance community nutrition, leading to a healthy community, which will be the main body for families and professionals. Therefore, this study provided educational guidelines for the students to reduce the excess sugar intake in homes and universities.

6.1. Conclusions

This research was conducted according to the knowledge-attitude-practice model. In this study, it was found that knowledge about the health effects of excessive consumption of SSBs was adequate among students, but a high proportion of students were consuming SSBs frequently. Firstly, there are many factors that influenced adult's knowledge and attitudes toward sugar, but to some extent only. Second these factors included individual (admiration of sugary food), inter-personal (peer attitudes) and environmental factors (ease of availability of soft drinks at university campus, frequent visits to fast food outlets) and lack of attention to the effect of excessive sugar on health.

Moreover, this study concludes that knowledge and attitudes are only factors that may affect the intake of sugar, thus promoting knowledge strengthens their attitude and thus improves their diet. If the problem of sugar consumption is higher than the recommended levels should be solved, we need to address the causes of sugar intake beyond the individual factors. One possible public health option is to address the preference for human sweet taste by reducing HFCs. It has become increasingly clear that sugary drinks may be an important contributor to the obesity epidemic, in part through larger volumes of these drinks and high fructose intake of HFCS in carbonated soft drinks and sucrose in sweetened tea and coffee. By reducing HFCS and sucrose may help to reduce the epidemic. In addition, findings of this study can be presented as background information for the development of effective nutrition and health interventions for sugar consumption of sugary beverages among Somali adults.

Continuous campaigns and advertising about the harmful effects of excessive consumption of SSBs among students should be intensified. Also, the government needs to regulate production and consumption of SSBs through policy to prevent increased consumption.

6.2. Limitations of the Study

Due to respondents self-reporting information, which is subject to recall bias mistakes and portion size estimation, the findings of this research may be restricted. Another limitations of this research is the use of a single re-call to validate the FFQ for SSB usage; it may be more precise to use food records. The generality of the outcomes of the research on the Somali adult population in Turkey may also be restricted, as the adolescents in this research were university students.

6.3. Recommendations

Further research is necessary to assess the dietary practices of Somali students in other cities of Turkey, and also in Somalia. Moreover, the adolescents and children can be assessed for their lifestyle and dietary behaviors. Interventions must begin at university and home level. However, interventions at the level of the food industry, the media, the government, and the health care sector, must play a role.

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T.C. YEDİTEPE ÜNİVERSİTESİ

Sayı : 37068608-6100-15- 1581 **10/01/2019**
Konu: Klinik Araştırmalar
Etik kurul Başvurusu hk.

İlgili Makama (Saido Abdirahman Mohamud Gedi)

Yeditepe Üniversitesi Halk Sağlığı Anabilim Dalı Dr. Öğr. Üyesi Hale Arık Taşyıkan'ın sorumlu olduğu **"Nutritional Knowledge, Attitude and Consumption Pattern of Suger Sweetened Beverages Among Somali Students in Turkey"** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (**1551** kayıt Numaralı KAEK Başvuru Dosyası), Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **09.01.2019** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isimi belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (**KAEK Karar No: 934**).

Prof. Dr. Turgay ÇELİK
Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurulu Başkanı

UMASET
URURKA MIDOWGA ARDAYDA
SOOMAALIYEED EE TURKIGA

Kültür mah. Mithatpaşa cad.
No: 47/10, Çankaya/Ankara
Ankara, Turkey
umaset100@gmail.com

Date: 09-Aug-2018
Ref: Aug/U18/002

TO WHOM IT MAY CONCERN

Dear Supervisor Hale ARIK,

I hereby confirm that your master student **Sadio Abdirahman Mohamud Gedi**, has the right to interview with the Somali students in Turkey for her research paper.

As the Chairman of the Somali Student Association in Turkey, I declare that Mrs Gedi will do her research at our organization's center in Istanbul.

Have you got any clarifications, please do not hesitate to contact me through email or the phone number +90 (554) 945 40 89.

Kindly Regards,

Husni Osman SAMATAR

Chairman of Somali Students Association in Turkey.

UMASET
URURKA MIDOWGA ARDAYDA
SOOMAALIYEED EE TURKIGA

UMASET
Aug-2018

Informed Consent

Study Title: Nutritional knowledge, Attitudes and Consumption Pattern on Sugar Sweetened Beverages among Somali Students in Turkey

Principal Investigator: Saido Abdirahman Mohamud Gedi

You are being invited to participate in a research study. This consent form will provide you with information on the research project, what you will need to do, and the associated risks and benefits of the research. Your participation is voluntary. Please read this form carefully. It is important that you ask questions and fully understand the research in order to make an informed decision. You will receive a copy of this document to take with you.

The purpose of this study is to assess the consumption pattern of Sugar Sweetened Beverages (SSBs) among Somali students studying in different universities in Turkey. Participation in this study typically takes 15-25 minutes and is strictly anonymous. Participants will be interviewed by the researcher. Participating students will complete a detailed interview comprising of two sections. The first part includes questions on personal characteristics such as gender, age, education, occupation, income and household composition, as well as weight and height. The second part includes questions related to their consumption pattern, level of knowledge, attitude of SSBs. The participants only have to answer the questions and there are no follow-up requirements.

All responses are treated as confidential, and in no case will responses from individual participants be identified. Rather, all data will be pooled and published in aggregate form only. Taking part in this research study is entirely up to you. You may choose not to participate, or you may discontinue your participation at any time. You will be informed of any new, relevant information that may affect your willingness to continue your study participation.

If you have any questions about your rights as a research participant or complaints about the research, you may call +90 505 043 43 56.

If you are 18 years of age or older, understand the statements above, and freely consent to participate in the study, click on the "I Agree" button to begin the interview.

I Agree I Disagree

Participant		Signature
NAME & SURNAME		
ADRESS		
TEL.		
DATE		

Researcher		Signature
NAME & SURNAME		
DATE		

Nutritional knowledge, Attitude, and Consumption Pattern of Sugar sweetened *Beverages among Somali Students in Turkey*

Research Questionnaire

Participant no:

Interviewer name:

Date of the interview:

University name:	
Department:	
Class:	
Please specify your date of birth (Day, month, year).	…/…/…….
Where were you born?	o Country: …….. o City: ……. o Town/village: …….
Your Gender	o Male o Female
Height (Meter):	
Weight (Kilogram):	
What is your marital status?	o Single o Married o Divorced o Separated o Living together o Deceased o Widowed o Don't know o Refuse to answer
How many years of education were you completed (except kindergarten and preschool)?	o …….. o Don't know o Refuse to answer
What is your current educational level?	o Undergraduate o Graduate (master) o Graduate (doctorate) o Don't know o Refuse to answer
What is your occupational status?	o Only Student o Full time (30 hours a week or more) + student o Part time (less than 30 hours a week) + student o Student + self- employed o Unemployed (seeking for work) + student o Unemployed (not seeking for work) + student o Don't know o Refuse to answer

How do you cover your living expenses in Turkey?	○ Scholarship (from the institutions in Turkey) ○ Scholarship (from your own country) ○ Family's income ○ Your own income ○ Other, please specify: ……
What's your father's education status?	○ No formal education – Non-literate ○ No formal education - Literate ○ Incomplete Primary School ○ Complete primary school ○ Incomplete middle school ○ Complete middle school ○ Incomplete high school ○ Complete high school ○ Two years technical education ○ Incomplete University without degree ○ Complete University with degree ○ Master's degree ○ Doctorate ○ Don't know ○ Refuse to answer
What's your mother's education status?	○ No formal education – Non-literate ○ No formal education - Literate ○ Incomplete Primary School ○ Complete primary school ○ Incomplete middle school ○ Complete middle school ○ Incomplete high school ○ Complete high school ○ Two years technical education ○ Incomplete University without degree ○ Complete University with degree ○ Master's degree ○ Doctorate ○ Don't know ○ Refuse to answer
What is the employment status of your mother now?	○ Full time (30 hours a week or more) ○ Part time (less than 30 hours a week) ○ Self-employed ○ Retired + full time ○ Retired + part time ○ Retired pensioned ○ Housewife not otherwise employed ○ Student ○ Don't know ○ Refuse to answer
What is the employment status of your father now?	○ Full time (30 hours a week or more) ○ Part time (less than 30 hours a week) ○ Self-employed ○ Retired + full time ○ Retired + part time ○ Unemployed ○ Retired pensioned ○ Student ○ Don't know ○ Refuse to answer
During the last year, did your family:	○ Save money ○ Just get by ○ Spent some savings ○ Spent savings and borrowed money ○ Don't know ○ Refuse to answer
Where do you live in Turkey?	○ Dormitory ○ Campus housing ○ Your own residence (house, apartment) ○ Rented residence (house, apartment) ○ Other, please specify: ……

How is your school achievement?	○ Much above average ○ Average ○ Slightly below average ○ Don't know ○ Refuse to answer
Do you have any of the following health problems?	○ High blood cholesterol levels ○ Cardiovascular/heart disease ○ Type of cancer ○ High blood pressure ○ Food allergies ○ Overweight/Obesity ○ Diabetes ○ Other.....
Does anyone in your family have any of the following health problems?	○ High blood cholesterol levels ○ Cardiovascular/heart disease ○ Type of cancer ○ High blood pressure ○ Food allergies ○ Overweight/Obesity ○ Diabetes ○ Other.....
If yes, who has the problem?	_____
Do you have the habit of smoking?	○ Yes, regularly at least one cigarette per day ○ Yes, occasionally ○ I quitted ___ months ___ years ago ○ No, never smoked.
Have you had any problems with your teeth in the past year?	○ Yes ○ No
If yes, which one of the following?	○ Painful tooth ○ Missing tooth ○ Extracted tooth ○ Root-Canal therapy ○ Don't know
What is your duration of sleep in general?	○ More than 8 hours a day ○ 6-8 hours per day ○ Less than 6 hours ○ Don't know ○ Other_____
Do you have any sleeping problem?	○ Yes ○ No
Have you reduced your sugar intake since you arrived in Turkey?	○ Yes ○ No
How often do you eat fruits?	○ Daily ○ 5-6 times per week ○ 3-4 times per week ○ 1-2 times per week ○ 3-4 times per month ○ 1-2 times per month ○ Other_____
How often do you eat vegetables?	○ Daily ○ 5-6 times per week ○ 3-4 times per week ○ 1-2 times per week ○ 3-4 times per month ○ 1-2 times per month ○ Other_____
How often do you eat Fast-food?	○ Daily ○ 5-6 times per week ○ 3-4 times per week ○ 1-2 times per week ○ 3-4 times per month ○ 1-2 times per month ○ Other_____

Physical Activity Scale

Vigorous Physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least **10 minutes** at a time.	
During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?	_____ **days per week**
How much time did you usually spend doing **vigorous** Physical activities on one of those days?	_____ **hours per day** _____ **minutes per day** **Don't know/Not sure**
Moderate activities refer to activities that take moderate Physical effort and make you breathe somewhat harder than normal. Think only about those Physical activities that you did for at least **10 minutes** at a time.	
During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	_____ **days per week**
How much time did you usually spend doing **moderate** physical activities on one of those days?	_____ **hours per day** _____ **minutes per day** **Don't know/Not sure**
Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.	
During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?	_____ **days per week**
How much time did you usually spend **walking** on one of those days?	_____ **hours per day** _____ **minutes per day** **Don't know/Not sure**
The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.	
During the **last 7 days**, how much time did you spend **sitting** on a **weekday**?	_____ **hours per day** _____ **minutes per day** **Don't know/Not sure**

KNOWLEDGE ON CONSUMPTION OF SUGARY DRINKS

Q1: Did you take a nutrition class in high school or college?

- Yes
- No

Q2: Do you ever read the ingredient list on the back of SSBs?

- Yes
- No
- Don't know
- Refuse to answer

Q3: Do you think that Sugary beverages can be beneficial to your health?

- Yes
- No
- Don't know
- Refuse to answer

Q4: Do you think consuming sugary beverage provide you energy?

- Yes
- No
- Don't know
- Refuse to answer

Q5: Do you think adding sugar to tea/coffee gives you energy?

- Yes
- No
- Don't know
- Refuse to answer

Q6: Do you think consuming sugary beverage help digestion of the food?

- Yes
- No
- Don't know
- Refuse to answer

Q7: Do you think that sugary beverages can be harmful to your health?

- Yes
- No
- Don't know
- Refuse to answer

Q8: Do you think consuming a lot of sugary beverages lead to overweight and obesity?

- Yes
- No
- Don't know
- Refuse to answer

Q9: Do you think consuming a lot of sugary beverages lead to Dental (tooth) decay?

- Yes
- No
- Don't know

- Refuse to answer

Q10: Do you think consuming a lot of sugary beverages cause Diabetes?

- Yes
- No
- Don’t know
- Refuse to answer

Q11: Do. You think consuming a lot of sugary beverages cause Osteoporosis?

- Yes
- No
- Don’t know
- Refuse to answer

Q12: Do you think consuming a lot of sugary beverages cause high blood pressure?

- Yes
- No
- Don’t know
- Refuse to answer

Q13: Which ingredients are provided by SSBs?

- Sweeteners
- Carbon dioxide
- Flavor enhancer
- Additives
- Preservatives
- Color additives
- Others
- Don’t know

ATTITUDE TOWARDS SUGARY BEVERAGES

Q1: Do you think consuming sugary beverages is something that belongs to your routine?

- Yes
- No
- Don’t know
- Refuse to answer

Q2: Do you think consuming sugary beverages is something that I am used from my childhood?

- Yes
- No
- Don’t know
- Refuse to answer

Q3: Do you think consuming sugary beverages is something that learned from my parents?

- Yes
- No
- Don’t know
- Refuse to answer

Q4: Do you think consuming sugary beverage at meals is appropriate?

- Yes
- No
- Don’t know

- Refuse to answer

Q5: Do advertisements effect your attitude towards consumption of SSBs?

- Yes
- No
- Neutral
- Don't know
- Refuse to answer

Q6: Have you tried reducing your consumption of sugary beverages?

- Yes
- No
- Don't know
- Refuse to answer

Q7: Have you tried quitting consumption of sugary beverages?

- Yes
- No
- Don't know
- Refuse to answer

Q8: Are you confident to quit adding sugar/ honey in your tea or coffee?

- Yes
- No
- Don't know
- Refuse to answer

Q9: Would you like to continue consumption of SSBs for prolonged use?

- Yes
- No
- Don't know
- Refuse to answer

Q10: Why do you drink soft drinks?

- Taste
- Caffeine
- Refreshment
- Brand loyalty
- I do not drink soda
- Don't know
- Refuse to answer

Q11: Have you tried to persuade your friends to reduce the amount of sugary beverages?

- Yes
- No
- Refuse to answer

Q12: Have you tried to persuade your family to reduce the amount of sugary beverages?

- Yes
- No
- Refuse to answer

FREQUENCY/CONSUMPTION of SSBs

Q1: Please answer the following questions according to your last month of SSBs consumption prior to this study.

A) COLD DRINKS CONSUMPTION FREQUENCY

REGULAR SOFT DRINK 1 serving (330 mL)	No	Per Month 1-3 times	Per Week				Per day			
			1	2	3-4	5-6	1	2	3-4	5-6
Coca-Cola										
Pepsi										
Fanta/ sprite										
Fused Tea										
Ice Tea										
Fruity Soda Types										
Lemonade										
Other soft drinks										

B) CONSUMPTION FREQUENCY (LIGHT/DIET SODA)

SOFT DRINK (LIGHT/DIET) 1 serving Can (330 mL)	No	Per Month 1-3 times	Per Week				Per day			
			1	2	3-4	5-6	1	2	3-4	5-6
Coca-Cola(light)										
Pepsi (light)										
Fused Tea(light)										
Ice Tea (Light)										
Lemonade (home-made)										
Lemonade at home (Without sugar)										
Other light soft drinks										

C) OTHER COLD DRINKS CONSUMPTION FREQUENCY

OTHER COLD BEVERAGES 1 box (330 mL) 1 Box / Cup (200 mL)	No	Per Month 1-3 times	Per Week				Per day			
			1	2	3-4	5-6	1	2	3-4	5-6
Packaged fruit juice										
Energy Drinks (Red bull, Burn, etc.)										
Milkshake and Similar Drinks (Frappuccino)										
Cold Coffee										
Flavored Milk (Cocoa, Banana, Strawberry.)										
Other cold drinks										

Q2: Please answer the following questions according to your last month of SSBs consumption prior to this study.

A) HOT DRINKS

HOT DRINKS 1 cup (200 mL)	No	Per Month 1-3 times	Per Week				Per day			
			1	2	3-4	5-6	1	2	3-4	5-6
Latte										
Americano										
Mocha										
Nescafe										
Turkish Coffee										
Black tea										
Fruit Teas										
Other										

Q3: Do you have a habit of adding sugar/honey while consuming hot drinks?

- Yes
- No

Q4: if you add sugar in your hot drinks, choose the number of cubes?

HOT DRINKS 1 cup (200 mL)	No	1 cube of sugar/ 1 spoon	2 cube of sugar / 2 spoon	3 cube of sugar/ 3 spoon	4 cube of sugar/ 4 spoon	4+ cube of sugar/ 4+ spoon
Latte/ Nescafe						
1 cup Turkish Coffee						
1 cup Black tea						
1 cup Green tea						
Other						

Q5: Do you have a habit of adding sweeteners to your hot drink?

- Yes
- No

FACTORS INFLUENCING THE INITIATION OF SSBs

A) EASY AVAILIBILTY OF SOFT DRINKS:

Q1: Do you buy soft drinks from the university?

- Yes
- No

Q2: If yes, how many times do you buy soft drinks from the University cafeteria?

- 1-2 times per week
- 3-4 times per week
- Once per month
- Everyday
- Others_____

Q3: How often do you find SSBs in your house?

- Never
- Rarely
- Sometimes
- Usually
- Always

B) QUANTITY AND OCCASION FOR SUGARY BEVERAGES CONSUMPTION

Q1: At a single time, how much soft drink will you usually drink?

- Small glass
- Medium glass
- Large glass
- 300ml (1 can)
- 500ml bottle
- 1 liter bottle

- 1.5 liter bottle
- 2 liter bottle
- More than 2 liter

Q2: On what occasion do you drink SSBs?

- Feeling thirsty /As an alternative to water
- Party/celebration
- During/after the meals
- While studying
- While at university
- Family occasions
- When having guests to my home
- With snacks
- While travelling
- After playing
- Without any reason
- Other_____

C) SSBs CONSUMPTION OF FAMILY AND FRIENDS

Q1: Do your family members drink SSBs?

- Yes
- No

Q2: Do you have a habit of adding sugar/honey while consuming hot drinks?

- Yes
- No

Q3: Do your family members ever discourage you from drinking SSBs?

- Never
- Rarely
- Sometimes
- Usually
- Always
- Don't Know
- Refuse to answer

Q4: Do your friends ever discourage you from drinking SSBs?

- Never
- Rarely
- Sometimes
- Usually
- Always
- Don't know
- Refuse to answer

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

Personal Informations

Name	Saido Abdirahman	**Surname**	Mohamud Gedi
Place of Birth	Mogadishu	**Date of Birth**	07-02-1990
Nationality	Somali	**TR ID Number**	99725758440
E-mail	saeedaabdi14@gmail.com	**Phone number**	+905050434356

Education

Degree	Department	The name of the Institution Graduated From	Graduation year
Doctorate	-	-	-
Master	Public health	Yeditepe University, Istanbul Turkey	2019
University	Faculty of Dentistry	University of health sciences, Lahore Pakistan	2015
High school	Premedical	Omar binu Abdiaziz, Mogadishu Somalia	2009

[#] All the grades must be listed if there is more than one (KPDS, ÜDS, TOEFL; EELTS vs),

Languages	**Grades ([#]))**
English	IELTS band 7
Arabic	Advanced
Urdu	Advanced
Turkish	A2 level
Somali	Native language

Work Experience (Sort from present to past)

Position	Institute	**Duration (Year - Year)**
Public Health Advocate	Somali Voice Organization	2017-2019
General Dentist	Punjab Dental hospital,- Lahore, Pakistan Bidey specialist hospital, Alqudus Dental clinic and Deva international hospital- Mogadishu Somalia	2015-2017

Computer Skills

Program	**Level**
SPSS	Excellent
Microsoft office use	Average

***Excellent, good, average or basic**

Others (Projects / Certificates / Rewards)

Certificate of Attendance in International Meeting on Education & Research in Health Sciences (IMER-HS)
Certificate of Attendance in the fifth Turkish Medical World Congress
Certificate of Attendance for International Dental Expo Conference
Award for Panelist speaker 'Drought and Natural disaster in Somalia' at Somali Global Diaspora Conference
Award for advocacy of sugar reduction seminars by Somali student association
Certificate Of Volunteering In Dental Camps
Certificate of participation at ten-week ICYF diplomacy academy
Certificate of organizing team member for East Africa Developmental Forum-Somali-Turkish partnership

Scientific works

The articles published in the journals indexed by SCI, SSCI, AHCI

-

Articles published in other journals

-

Proceedings presented in international scientific meetings and published in proceedings book.

-

Journals in the proceedings book of the refereed conference / symposium

-