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YEDITEPE UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

**A CROSS-SECTIONAL STUDY: PREVALENCE OF  
OBESITY AND RELATED FACTORS  
(KNOWLEDGE, PERCEPTIONS, ATTITUDES AND  
BEHAVIORS) IN WOMEN AGED  $\geq 18$  YEARS IN  
MOGADISHU SOMALIA.**

MASTER THESIS

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## THESIS APPROVAL FORM

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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 ..... and numbered .....

Prof. Dr. Bayram YILMAZ

Director of Institute of Health Science

## **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.



25/08/2021

Bisma ABDULLAHI ALI

## **DEDICATION**

This thesis is dedicated to all those on whose shoulders I stood to make it this far in my life and my education especially to my beloved father whom I lost while doing this study. He was always proud of me, as I was of him and will always be. May Allah grant him Jannah and rest his Soul in Peace.



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## ABBREVIATIONS

|       |                                             |
|-------|---------------------------------------------|
| BMI   | Body Mass Index                             |
| BMR   | Basal Metabolic Rate                        |
| BMR   | Basal Metabolic Rate                        |
| CDC   | Center for Disease Control                  |
| CDC   | Communicable Disease Control                |
| CHD   | Coronary Heart Disease                      |
| CI    | Confidence Interval                         |
| CVD   | Cardio Vascular Disease                     |
| EFUIC | European Food Information Council           |
| IHD   | Schematic Heart Disease                     |
| IOTF  | International Obesity Task Force            |
| KDHS  | Kenya Demographic and Health Survey         |
| NIH   | National Institute of Health                |
| PCOS  | Polycystic ovary syndrome                   |
| SHDS  | Somali Health and Demographic Survey        |
| SPSS  | Statistical Package for the Social Sciences |
| SRS   | Simple Random Sampling                      |
| SSA   | Sub Saharan Africa                          |
| TDHS  | Turkey Demographic and Health Survey        |
| WC    | Waist Circumference                         |
| WHO   | World Health Organization                   |
| WHR   | Waist Hip Ratio                             |

## ABSTRACT

**Bisma A. Ali (2021). Prevalence of obesity and related factors (knowledge, perceptions, attitudes and behaviors) in women aged  $\geq 18$  years in Mogadishu Somalia. Yeditepe University, Institute of Health Science, Department of public health, MSc thesis, İstanbul.**

Although obesity is a well-researched topic in the developed world, it remains an unknown public health problem in Africa, especially in sub-Saharan countries. This study aimed to understand the prevalence of obesity and related factors in women aged  $\geq 18$  years in Mogadishu, Somalia. A cross-sectional survey was conducted on a sample of 370 adult women aged  $\geq 18$  years, who were visitors or accompanying patients from the four most prominent and selected hospitals in Mogadishu. They were interviewed face to face regarding socio-demographic factors, physical activity, food consumption patterns, perceptions, and knowledge about overweight and obesity. Body Mass Index (BMI), hip and waist circumference were also measured. Data were analyzed by SPSS version 16.0. The study findings show that prevalence of overweight and obesity was relatively high among Somali adult women with rates of 31.4% and 25.4% respectively. There was a significant association between the study respondents' age category and BMI status ( $p=0.001$ ). Obesity prevalence increased with age, the rate was lowest in the youngest age groups 18-22 and 23-27. Among the age group (18-27), married women were 5.5 times more likely to be obese than their single counterparts ( $p>0.001$ ). Among this same age group (18-27), obesity prevalence was significantly higher in women with lower education level than others (21.5% versus 6.5%,  $P=0.003$ ). Carbohydrates were the most common food meals, with 70% of respondents reporting daily consumption of Somali bread (Anjero). Also, meat was preferred and eaten by the majority of Somali women, with 64% reporting daily consumption. While at least 41.4% of the participants reported current use of a cola type drink, 88.9% were daily tea users, most of whom drink tea with excess sugar. In general, 6.2 % ( $n=23$ ) of the participants were cigarette smokers. About 8.6% of the respondents chewed khat. Obesity appeared to be an important public health problem among adult women in Mogadishu for which age, marital status and education are some of the important predictive factors.

**Key words:** Prevalence, Overweight, Obesity, BMI, Somali adult women

## ABSTRACT (TURKISH)

**Bisma A. Ali (2021). Mogadişu (Somali)'de 18 yaş ve üzeri kadınlarda obezite prevalansı ve ilişkili faktörler (Bilgi, algı, tutum ve davranışlar). Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Halk Sağlığı Anabilim Dalı.**

Obezite, Sahra Altı afrikası'nda ve Somali'de yeterli ölçüde ele alınmamış bir problemdir. Bu çalışma, Mogadişu'da erişkin kadınlarda obezite prevalansının ve obeziteyle bağlantılı bilgi, algı, tutum ve davranışların tahminine yönelik olarak tasarlanmış kesitsel tanımlayıcı bir çalışmadır. İl düzeyinde örneklem seçme ve çalışma zorlukları nedeniyle, çalışma örneklemi ilin dört büyük hastanesine, ziyaretçi, veya hastaya eşlik etme amacıyla gelen ve bu ankete cevap vermeyi gönüllü olarak kabul eden 18 yaş ve üzeri 370 sağlıklı kadın oluşturmuştur. Araştırmacı, araştırmaya katılma teklifini kabul eden kadınlarla yüz yüze görüşerek, bu çalışma için geliştirilmiş anketi uygulamıştır. Anket, sosyo demografik değişkenleri içerdiği gibi, fizik aktivite, gıda tüketim özellikleri, konuyla ilgili bilgi, algı, tutum ve davranışlar konularındaki soruları da içermiştir. Ağırlık, boy, bel ve kalça çevreleri araştırmacı tarafından ölçülmüştür. Veri SPSS Versiyon 16 yazılım programıyla analiz edilmiştir. Obezite ve normalden fazla kilolu (overweight) olma oranları, sırasıyla, %31,4 ve %25 olarak bulunmuştur. Beden kitle indeksi ile yaş arasında, yaşla prevalansın artışı biçiminde, anlamlı bir ilişki saptanmıştır. ( $p=0.001$ ). En düşük obezite oranı 18-22 yaş grubuna ( $n=88$ ) ait olup %4.5'dir, 23-27 yaş grubunda ( $n=11$ ) bu oran % 19'a çıkmıştır. (18-27) yaş grubunda ( $n=198$ ), evli olanlarda obeziteye rastlama oranı bekar olanlara göre 5.5 kat daha fazla görülmüştür ( $P<0.001$ ). Yine aynı 18-27 yaş grubunda, obezite oranı, eğitim düzeyi düşük olanlarda %21.5 iken diğerlerinde %6.8 bulunmuştur. Karbonhidratlar en yaygın tüketilen gıda grubu olup, Somali ekmeği olan Anjero 570 oranında her gün kullanılmaktadır. Et ve balık da günlük yaygın kullanılan gıdalar arasındadır. Katılımcıların en az %41.4'ü kola tipibir içecek tüketirken, %88.9'u her gün çay içmektedir. Çay içenlerin yarısından çoğu çayı aşırı şekerli kullanmaktadır. Katılımcıların %6.2'si halen tütün ürünü kullanırken % 8.6'sı khat kullanmaktadır. Obezite, Mogadişu'lu kadınlar için önemli bir halk sağlığı sorunu olup, yaş, eğitim durumu ve medeni durum (evlilik) önemli ilişkili değişkenler olarak ortaya çıkmıştır.

**Key words:** Prevalans, Obezite, BMI, Somali'li ilişkinkadınlar

# 1. INTRODUCTION AND PURPOSE

## 1.1 Introduction

Globally, obesity is a serious public health problem, affecting people of all ages in increasing number of countries worldwide (1). Furthermore, obesity is observed throughout human history, early human depictions from early sculptures appear obese (2). However, it was not until the 20th century that obesity became common — so much so that, in 1997, the World Health Organization (WHO) formally recognized obesity as a global epidemic (3). Obesity is defined as having a body mass index (BMI) greater than or equal to 30 kg/m<sup>2</sup>, and in June 2013, the American medical association classified it as a disease, with much controversy (4). Obesity is a condition in which the natural energy reserve, stored in the fatty tissue of humans and other mammals, is increased to a point where it is associated with certain health conditions or increased mortality (5).

Obesity is linked strongly to metabolic syndrome, a cluster of disease risk factors that includes hypertension, abdominal obesity, elevated triglycerides, low HDL, and hyperglycemia (or marked insulin resistance) (6). According to the WHO, the prevalence of obesity is not limited to the developed countries. It also noted that the issue is on the rise in developing nations, with over 115 million people in the world suffering from obesity (7). Numerous factors contribute to the rise of obesity and overweight. The key factor is urbanization, which reduces daily energy expenditure by reducing physical activity and shifting to a higher caloric content diet (8).

The prevalence of weight gain has increased in developed and developing countries and more noticeably in urban areas (9–11), estimating that as much as 20-50% of urban populations in Africa are overweight or obese (12,13). By 2025, about three-quarters of the world's obese population will reside in non-industrialized countries (14). Urbanization and socioeconomic transformation have resulted in an increase in the availability of ready-made meals, encourages eating out and snacking and less strenuous jobs, this has led to an increase in the number of individuals who become overweight or obese (12,15). Other factors associated with a higher risk of overweight and obesity includes genetic predisposition, metabolic disorders, gender, and physical environmental factors (13–16).

The present study examines the problem of obesity in Mogadishu, Somalia, more specifically. It assessed the prevalence of obesity and related factors (knowledge, perceptions, attitudes, and behaviors) in women aged  $\geq 18$  years in Mogadishu, Somalia.

This dissertation has six chapters; the introduction part, problem statement of the thesis, conceptual framework, study questions, and objectives of the paper presented in chapter one.

The study's literature review presented in chapter two, followed by the study's methodology in chapter three. In chapter four, critical research findings, lastly conclusion and recommendations based on this study's significant findings presented in chapter five.

## **1.2 Problem statement**

According to the WHO, obesity remains one of the most visible and neglected public health problems in the world (7). Thus, obesity has become a worldwide phenomenon-affecting people with high, low and middle-class residents, furthermore, as living standards continue to rise, the risk of developing obesity and weight gain increases globally (17).

Since 1975, obesity worldwide has almost tripled (18). In 2016, more than 2.0 billion adults, 18 years and older, were overweight, and of these, over 650 million were obese (18). The problem of overweight appears to have increased significantly in the African region, as in most parts of the world, in children and adults (18). The main risk factors for type 2 diabetes, high blood pressure, heart attacks, or various cancers include overweight and obesity especially in urban settings. There is also a common misunderstanding that obesity and other NCDs only occur in the rich (18).

Many communities around the world are experiencing double-down burdens of chronic and infectious diseases. For instance, women in sub-Saharan Africa are more prone to being obese than their male counterparts(19). Obesity contributes to women's poor health by lowering their quality of life and shortening their lifespan (20). Many obesity-related conditions are gender-based and mostly affect women, such as osteoarthritis, congenital disabilities, breast and endometrial cancers, cardiovascular and gall bladder diseases, infertility and gynecological complications, urinary stress incontinence, and stigma/discrimination (21).

In Somalia, NCD Risk Factor Collaboration reported a higher prevalence of overweight and obesity among women than among men; in one study, 48.2% of women and 24.2% were overweight or obese. Between 2000 and 2016, Somalia's female overweight and obesity prevalence grew substantially from 31.8 % to 48.2 % (24).

Although obesity has been widely studied in the developed world, its existence in sub-Saharan Africa and especially in Somalia remains unknown. This study aims to provide a comprehensive analysis of the factors that influence the development of obesity in Mogadishu Somalia.

### **1.3 Purpose of the study**

The purpose of this study was to assess the prevalence of obesity and related factors (knowledge, perceptions, attitudes and behaviors) in women aged  $\geq 18$  years in Mogadishu, Somalia.

### **1.4 Specific objectives**

1. To determine the prevalence and distribution of overweight and obesity among adult women in Mogadishu, Somalia.
2. To explore the perceptions, knowledge, attitudes, and behaviors of obesity among adult women in Mogadishu, Somalia
3. To study the factors associated with abdominal obesity among adult women in Mogadishu, Somalia.
4. To understand factors that influence current food practices, physical activity levels, and behaviors contributing to obesity among adult women in Mogadishu, Somalia.
5. To evaluate women's dietary patterns from different socioeconomic groups in Mogadishu, Somalia

### **1.5 Significance of the study**

The finding of this study may give guidance and understanding of the prevalence of obesity and related factors (knowledge, perceptions, attitudes, and behaviors) in women aged  $\geq 18$  years in Mogadishu, Somalia.

The study will also assess the risk mentioned and their implications to Somali women's health and wellness over 18 years living in Mogadishu. Moreover, explore the adult female's perception and attitude in the community; however, its findings can increase health awareness and identify multiple impediments to physical activity and healthy food practices.

The results can also help advise the health system and public health planners to mobilize and distribute resources to control and prevent overweight and obesity. Finally, this study's findings could form the basis for the formulation of guidelines and messages meant to counsel overweight and obese women in Mogadishu and others in similar circumstances in the country.

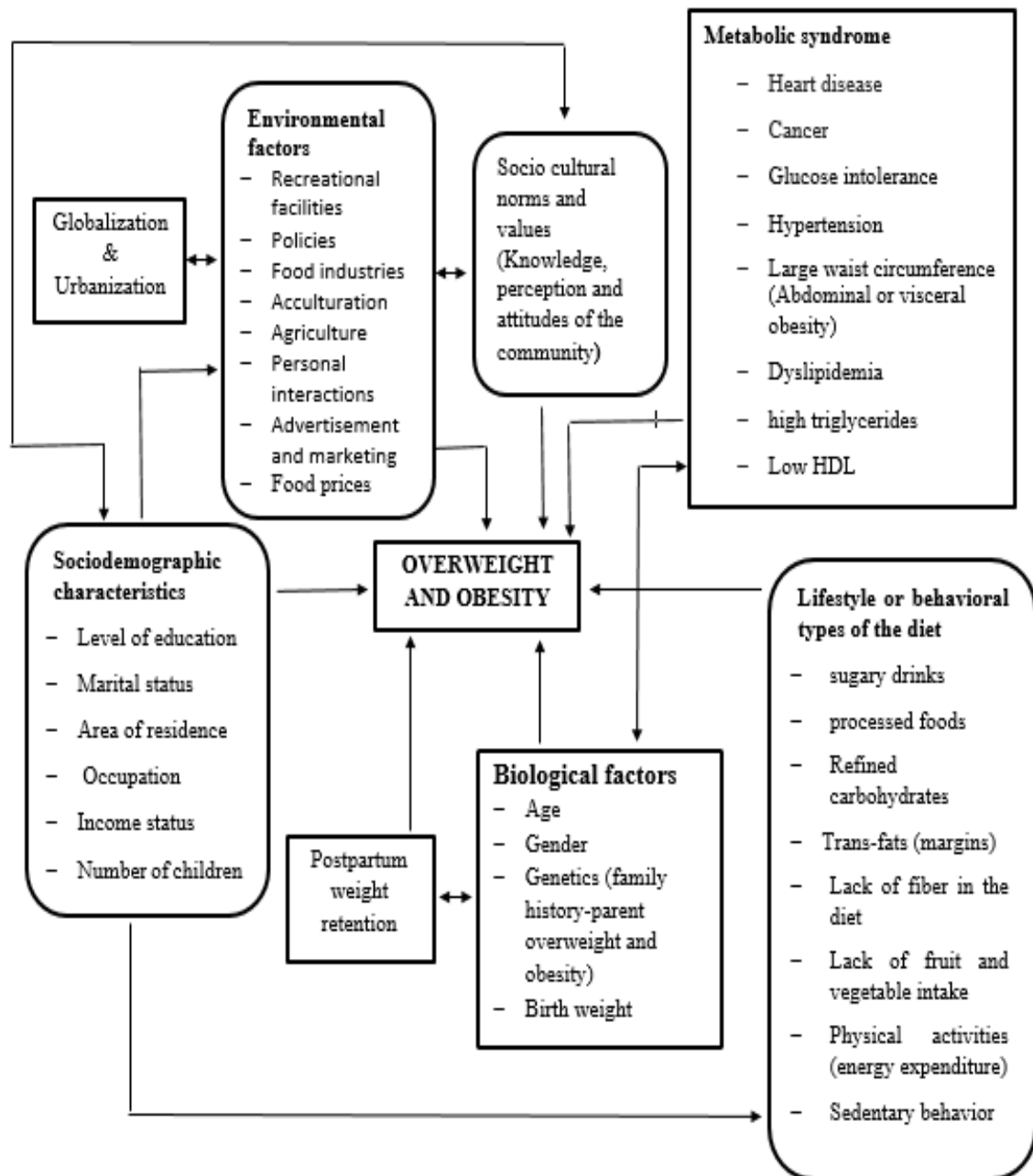
### **1.6 Scope of the study**

This study focused on Somali women's knowledge, attitudes, perceptions, and behaviors to understand the underlying factors of obesity. The conducted study was restricted to Mogadishu,

known locally as *Xamar* or *Hamar*, which houses the critical Somalia port, located just north of the Indian Ocean. The capital city is the most populous city of Somalia and has a population of 2,425,000 residents and located at 2°4'N 45°22'E.



## 1.7 Conceptual framework of the determinants of overweight and obesity among women



**Figure 1.1:** Conceptual framework

## **2. LITERATURE REVIEW**

### **2.0 Introduction**

First, this literature review focused on research studies of adulthood obesity with specific attention to adult Somali women. Therefore, a review of the current literature did not identify any Somali studies that examined the role of the prevalence, knowledge, perceptions, and attitudes in addressing adult women obesity. Therefore, this recent study attempted to outline and address the significant gaps regarding obesity research in Mogadishu, Somalia.

### **2.1. Concept of overweight and obesity**

Overweight and obesity are serious health problems since they are associated with other diseases, contributing to illness (25). The human body is divided into fat free mass and body fat (26). The fat-free mass comprises all body's non-fat tissues such as bones, water, muscles, teeth, and connective tissues (26). Body fat consist of essential and non-essential fats (26). Essential fats are crucial for normal body functioning such as provision of warmth, and carrying out metabolic activities and they make up 3% and 12% of the total body weight in men and women respectively(26).

Non-essential fat exists in adipose tissues located below the skin and surrounding organs. On the other hand, a adiposity of non-essential fats is a long-term energy surplus that occurs in the body when energy consumption exceeds energy expenditure (26). Excess non-essential fat in our bodies is what causes us to gain weight and become overweight (27).

Overweight and obesity are defined by the World Health Organization as "an abnormal or excessive accumulation of fat that poses a health risk; an individual is overweight if his or her BMI is equal to or greater than 25.0, and obese if his or her BMI is equal to or greater than 30.0."(28).

#### **2.1.1 Measures of Overweight/ Obesity**

Several ways to determine overweight/ obesity are practical anthropometric measurements. Moreover, the range from simple, such as weight, height, and Body Mass Index is derived, waist circumference, waist /hip ratio (29). This study used BMI, waist circumference measurement, and the waist-hip ratio as the indicators to estimate the pervasiveness of obesity in the study population.

### 2.1.2 Body Mass Index (BMI)

BMI is a simple index used to classify overweight and obese individuals. It shows the weight in kilograms divided by square of the height in meters ( $\text{kg/m}^2$ ) (29).  $\text{BMI} = \text{weight (kg)} / (\text{height metres})^2$ .

Although it has been considered a useful way to estimate healthy body weight, it does not measure body fat percentage (30). For instance, The BMI from a muscular man may have a high BMI but may not have much less fat than an unfit person; however, the BMI measurement can be a useful indicator for the average person (30). The following classifications were adopted by the WHO shown in table 2.1 below.

**Table 2.1:** Classification of Body Mass Index (BMI)

| Body Mass Index (BMI) |                                |
|-----------------------|--------------------------------|
| Classification        | Body score ( $\text{kg/m}^2$ ) |
| Underweight           | <18.5                          |
| Normal                | 18.5 - 24.9                    |
| Overweight            | 25.0 - 29.0                    |
| Obese                 | 30.0 - 40.0                    |
| Extreme Obese         | >40.0                          |

### 2.1.3 Waist, hip circumferences and waist-hip ratio

Waist circumference is the correct measure of the sum of visceral and subcutaneous adiposity around the belly. On the other hand, the size of the skeletal frame, adipose, and muscle mass in the buttocks and thighs assess the hip circumference (31,32).

Waist Circumference (WC) and Waist Hip Ratio (WHR) measurements considered alternatives both for research and for clinical practice. (33). In the study, though Waist Hip Circumference indicates abdominal fat distribution and obesity. The waist circumference is a simple and accurate measurement that can be used for assessing the risk factors for various chronic diseases and conditions. It can also be used as an initial screening tool (34). Furthermore, the survey suggests

that the waist-to-hip ratio is a valuable measure of central obesity and a credible anthropometric indicator for a wide range of risk factors and health problems (35).

**Table 2.2:** The Classification for Waist Circumference and Associated Risk Factors

| Risk of metabolic complications | Waist circumference (cm) |              |
|---------------------------------|--------------------------|--------------|
|                                 | Men                      | Women        |
| Ideal                           | <94                      | <80          |
| Increased                       | $\geq 94-101.$           | $\geq 80-87$ |
| Substantially increased         | $\geq 102$               | $\geq 88$    |

## **2.2 Types of obesity**

### **2.2.1 Fat storage**

Body fat distribution can be used to establish overweight and obesity. Some people tend to store fat in their upper bodies, while others do it in the lower bodies and this phenomenon has led to the development of two types of obesity: Android and gynoid (36).

#### **2.2.2 Android obesity (apple shape)**

Android obesity is a type of fat that is mainly accumulated in the abdominal area. It's usually linked to males as a waist circumference greater than 102 cm in men and more than 88 cm in non-pregnant women (36). It is a public health issue that has its roots in the involvement with disorders such as stroke, diabetes, and asthma. asthma, insulin resistance, breast cancer, stroke, diabetes and CVD (37).

#### **2.2.3 Gynoid obesity (pear shape)**

Gynoid obesity is a commonly observed female trend in which excess fat deposits accumulate in the periphery, which includes the thighs, hips, and bottom (38). Individuals with gynoid fat distribution (often referred to as "pear" shape), which means that much of their body fat spread across their hips, thighs, and bottoms are at greater risk of mechanical problems (38). The current study evaluated a deposition of abdominal fat by measuring their waist circumference to demonstrate the women at risk of the comorbidities associated with increased waist circumference measurements.

### **2.3. Prevalence of overweight and obesity among adult women**

Obesity, along with overweight, is a complicated, multifaceted, and generally preventable condition that affects more than a third of the world's population today (39,40).

The global obesity epidemic started in the US, and then spread to other developing countries(41,42). In 2016, more than two billion people were either overweight or obese (43). The rate of obesity is higher among women than among men worldwide (43). If secular trends continue, by 2030, an estimated 38% of the world's adult population will be overweight, and another 20% will be obese (29).

In the States, one in three adults obesity affected, and it doubled the rate for 20 years ago. For instanceethnicminorities, especially women, suffer the most, with 40% of Mexican American women and 50% of black American women having a BMI above 30 kg/m<sup>2</sup> compared to 30.6% of white women (36).

Similarly, over 17 years (1993-2009), obesity increased among Chinese women (44). Data source from Turkey Demographic and Health Survey (TDHS) reveals that obesity is a serious problem among women in Turkey (45). The obesity rate was 21.7% in 1998, rose to 34% in 2003 and 2008, fell to 26.5% in 2013 (45). Turkey observed to be very obese among women over 40 years old. Most were not working, had no education and living in the west or central and urban areas, lowest and low wealth level (45).

A large body of health studies shows that the prevalence of overweight and obesity among women in Sub-Saharan Africa is rising (9,46). The increasing prevalence of obesity is linked to urbanization, access and use of high calorie foods and reduced physical activity (47,48). Sub Saharan Africa has poor maternal and child health care outcomes. Women who are overweight or obese can have detrimental effects on these issues (49,50).

Money parts of sub-Saharan Africa, obesity rates are often linked to malnutrition (36). Seven sub-Saharan African countries (Burkina Faso, Ghana, Kenya, Malawi, Niger, Senegal, and Tanzania) reported a 5% increase in overweight and obesity per year between 1992 and 2005 (51). They also discover large variations in obesity levels in these countries, with South Africa having the highest rates, were mean BMI values for men and women of 22.9 kg/m<sup>2</sup> and 27.1 kg/m<sup>2</sup>, respectively. They did however; find that 42 percent of women have abdominal obesity. According to the South African health study, the obesity prevalence ranged from 8% for black males to 20% for white men. However, the figures vary from 20% for Indians/Asians to 30% for South African black women.

In Somalia, NCD Risk Factor Collaboration reported a higher prevalence of overweight and obesity among women than among men; in one study, 48.2% of women and 24.2% of men were overweight or obese, and between 2000 and 2016, female overweight and obesity prevalence of Somalia grew substantially from 31.8% to 48.2% (24). The obesity rate is higher for women, whereas the overweight for men is higher (34).

The prevalence of obesity in developing countries, especially among women, is on the rise. Most research in Africa has mainly focused on undernutrition and food insecurity while conceding obesity seriously because it can burden the health care systems and lower the quality of life.

#### **2.4. Factors contributing to weight gain and obesity among women**

The exact cause of obesity is unclear, since it is multifactorial and is affected by many causes. These factors consist of complex and unmodifiable factors. However, the underlying distinction is the energy surplus, where energy demand has surpassed energy expenditure for a significant period. Its complex includes associations between genetic history, hormones, and social and environmental influences, such as sedentary lifestyles and unsanitary eating habits.

Obesity is usually higher in women than in men in Africa (28). In 2006, obesity was 6 times more common in women than men in Ghana, four times more frequent in Morocco, and three times more prevalent in women than men in South Africa (42). Concerning the obesity-gender relationship, in most countries worldwide, the prevalence of obesity is more generous in women than in men (52). According to the WHO study, in the following regions, Africa, the EMR, and South East Asia, women estimated to have roughly doubled the obesity prevalence (39,53).

The aim of this study was to determine the prevalence of obesity and related factors (knowledge, perceptions, attitudes and behaviors) in women aged  $\geq 18$  years in Mogadishu, Somalia.

##### **2.4.1. Age**

Another factor influencing female weight change is age. It is evident in the results found by El-Hazmi and Warsy (2002) and Dake et al. (2010) that overweight and obesity are typical in older women (54,55). For example, it appears that, as women age, especially during menopause, hormonal and physical activity levels decrease, giving way to weight gain (56). Low et al. (2009) and El-Hazmi and Warsy (2002) confirmed that obesity is usually at its peak by 50 years among women in developing nations (54,57).

Besides, some studies have suggested that older women express less willingness to reduce weight irrespective of their health status (58). As one ages, the body's hormonal changes can increase obesity. Also, losing muscle mass can counteract the effects of fat gain (58).

In developed countries, the study found rise in body weight with age up to 50-60 years in both men and women. Similarly, identical circumstances are reported in undeveloped countries, however the highest overweight rates are about 40 years (59,60). Similarly, Amoah and Jackson et al. discovered a link between age and overweight and obesity. They discovered that middle-aged responders had the highest frequency of obesity, which began to drop after the age of 65 (61).

#### **2.4.2 Marital status**

On the continent, marital status is also a major determinant of obesity. Getting married raises the chances of being overweight or obese (62). A study conducted by the university of Ghana's School of Public Health stated that married people were about six times more likely to be obese than those who have never married (62). Similarly, in South Africa, studies reported that unmarried participants were at a lower risk of being overweight/obese than those currently married (63,64). Equally, another study in Kenya recorded that women who were currently married were 1.9 times overweight or obese relative to those who were not married (65).

Thus, being married can be a strong determinant of overweight and obesity. Nonetheless, others have presented the prevalence of obesity among women who have never married, providing possible explanations that some women become exposed to psychosocial stress, stigmatization, and depression that may compel them to overeat(66).

#### **2.4.3 Parity**

Parity is another aspect special to women, which leads to overweight and obesity. For example, motherhood is associated with more substantial weight gain, some of which are likely to be attributed to weight gain during pregnancy (67).

Similarly, the greater the numbers of children, the greater chance of women develop obesity. Thus, several studies have pointed out a close relationship between parity and excess weight in different populations (68,69).

For instance, a study conducted by Huayanay-Espinoza CA, et al. (2017) on Parity and obesity in Peruvian Women and the study founded a positive association between parity and obesity. Another study analyzed over 16,000 women and found evidence of a link between parity and

particularly in younger women; BMI was up to four units higher in rural areas and two units higher in urban regions. For example, the combination of parity with BMI in rural areas has the highest gradient among younger women (70).

#### **2.4.4 Socio-economic status**

In developed countries, high socioeconomic status has been shown to be negatively associated with overweight and obesity, especially among women, but positively associated with it in developing countries (13,71). In developing countries, the lower overweight and obesity rates found in lower socio-economic class groups related to poverty, obesity and viewed as indicators of affluence (72).

A rise in income is usually linked to a greater use of high-fat foodstuffs away from home (73). As people acquire higher incomes, their food preferences change as well. While formerly they ate grain-based diets high in fiber and low in fat content, they start to eat more fats, more sweeteners and more refined CHO's (74).

A research by Sodjinou et al. (2008) showed that the risk of obesity rose substantially with a rise in socio-economic status in the urban environment of Beninese. The possible reason for this was that people in higher socio-economic classes had higher access to food. They can maintain a positive energy balance over a long period while periodic food shortage may be common among the poor (75).

#### **2.4.5 Dietary and other lifestyle factors**

The main cause of the obesity crisis has been identified as the nutrition change caused by urbanization and affluence (76). Numerous types of literature have recorded a significant change in global dietary patterns (76,77). Major dietary changes include a higher energy density diet with a greater role for fat and added sugars in foods, greater saturated fat intake (mostly from animal sources), marked increases in animal food consumption, reduced intakes of complex carbohydrates and dietary fiber, and reduced fruit and vegetable intake (76,78).

This dietary modifications are compounded by lifestyle changes that indicate decreased physical exercise at work and in leisure time (17,79).

Civilisation has enhanced diets according to Popkin (77). The populations were subjected to a number of phases, from simple to considerably more complex diets (77). The added spices and flavorings along with the added fats from vegetable and animal origins have assisted in the process of weight gain and obesity (77). For instance, the mean body weight in rich countries has

increased substantially due to their income (80,81). Thus; diet changes associated with the consumption of fast food and ultra-processed food have been observed (82).

While several researchers contend that fast food eating has played a minor role in the obesity crisis (83,84), other studies have found the reverse to be true (118,119). A cohort study by Pereira et al. showed that participants who visited fast food restaurants more than twice a week at baseline and were still doing so at a follow-up 15 years later had gained an average of 4.5 kg(85). Another cross-national ecological study found a correlation between increased soft drink intake and higher rates of overweight and obesity. For example, consumption of soft drinks causes metabolic syndrome and cardiovascular risk based on the Framingham study (86). The consumption of fruit and soft drinks has increased significantly over time. Over the past 30 years, the number of calories consumed has increased (87).

The most extensive study to date examined the consumption of beverages was conducted in the US over two years. It analyzed data from over 73,335 individuals (87).

The co-occurrence of overweight and smoking has serious health implications. According to the Framingham research, obese smokers have a 13-year lower life expectancy than normal-weight non-smokers(88). The relationship between smoking and obesity is complex, and published studies have yielded contradictory findings. Some studies have shown that there is no substantial link between being a smoker and BMI. Others have suggested that smoking cessation could be linked to higher BMI (89,90).

Lifestyle factors associated with obesity among Spanish adults by Rodriguez *et al.* (2008) participated in subjects older than 15 years in Cádiz (Spain). The relationship between BMI and educational level has been shown. Higher BMI was associated with higher consumption of alcohol and television. On the other hand, the study observed a lower prevalence of obesity for those with active physical activity, with variability between sexes. Following slimming diet is more frequent in the obese, and women dedicate more hours than men to passive activities(91).

Obesity is also due to stress and dynamic brain networks. It is another means to promote excess weight gain, especially around the abdomen, by “comfort food” ingestion mediated by a chronic stress-response mechanism in the brain, resulting in depression (92).

When an individual is in this state, foods such as high sugar and fat are preferred (93,94). Depression is the cause; since depressed people tend to over eat such foods that result in weight gain, women exposed to chronic stress may be prone to overweight and obesity (95).

#### **2.4.6 Physical activity**

Physical inactivity induces obesity because it causes an energy disparity between calorie intake and expenditure(18). The WHO advises that adults 18 to 64 years old should do at least 150 minutes of moderate-intensity physical exercise a week in order maintain a healthy weight (96). It also recommends that adults should increase their physical activity to 300 minutes a week in order to have additional health benefits such as weight loss(96).

Many people, particularly women, find it difficult to be physically active. In the United States, for example, many women drop out of fitness plans after six months, the rates of physical activity for women are significantly lower than men's(97). Adequate physical activity has been shown to have many health promoting properties and has a direct, independent role in reducing CVDs mortality.

Inactivity is one of the critical factors that can fuel overweight and obesity. Thus, the scheduled regular physical exercise decreased due to the high degree of urbanization occurring across the African continent (98). For example,Public transport has replaced the traditional mode of walking in urban settings. Many people who work in cities and rural areas are not very active.

#### **2.4.7 Genetic and environmental factors**

Genes control how the body obtains, absorbs, and expends fat, which has a significant effect on overweight and obesity(99). However, genes do not work in isolation, Environmental factors affect them, and this gene-environment relationship can increase the risk of obesity (100). Thus, the specific dynamic relationships between genes, environment, and habits are additional causes of childhood and adult obesity (101). Excessive weight gain linked to endocrine problems, genetic syndromes, and medications (101). A person's body composition influenced by many factors, including genetics and lifestyle factors. These factors can affect both physical activity and diet (102,103). Therefore, genetically related obesity appears because of a positive energy balance involving any alteration in one or several genes; therefore, obesity runs in families (104,105). Several types of studies provide evidence for a genetic link to this predisposition. For instance, some research have shown that obese children often have obese parents (106).

#### **2.5. Knowledge and perceptions of obesity among adult women**

Obesity perceived differently depending on cultural and race beliefs within society (107). Thus, an individual's perception of weight status or attitude toward body weight influenced by sociodemographic characteristics such as ethnicity, age, and education; and, to a large extent, the existing social and cultural factors (108).

Overweight has been viewed differently in different cultures. For instance, in the western world, it was considered a disease, it seen differently in other cultures (109,110). As a result, in many areas, obesity is associated with wealth, health, and happiness. An excellent example in which the USA's case at the turn of the twentieth century, where, to quote Grivetti(111), 'fat cheeks and ample stomachs were visual cues that individuals were healthy, not infected with the dreaded slim tuberculosis' (111). These same issues are at play today in sub-Saharan Africa. HIV, tuberculosis, and other diseases associated with wasting are highly prevalent, along with undernutrition, chronic poverty, war, and natural disasters (110).

It used to believe that keeping a large body size among highly income individuals was a smart decision and this mindset change made after the second world war to lean body sizes (111). This perception is still common in Africa, where a preference for increased weight is observed among people who associate this status with good health and a wealthy status argued that being overweight was desired in urban Senegalese women, although obesity itself was seen as undesirable, associated with greediness and the development of diabetes and heart diseases(112).

Many African women prefer to have fuller bodies due to their association with beauty and wealth (112). A study conducted by Holdsworths has found that urban Senegalese women are more likely to be overweight than their rural counterparts (112). In a study conducted in 2013, researchers discovered that among slum dwellers in Nairobi, almost half of women and men underestimate their weight. They also found that women and men prefer body sizes that classified as overweight or obese (113).

The cultural perceptions about weight and obesity were a contributing factor to the high prevalence of both overweight and obesity. According to Muhihi et al. (2012), most people in Tanzania think that having obesity is an indicator of a person being free from HIV/AIDS. In addition to that, in Tanzania, obesity is culturally embraced, seen as a sign of wealth in most communities (114). Concerning gender, this review showed that women tend to have more biological risk factors of being obese (115).

The authors of Singh and Young (1995) and Renzo (2004) both described that in the western countries, people are more concerned about their bodies being slim. This is in contrast to other parts of the world where the desire for a bigger body is more prevalent. Thus, it also indicates the social rank, status, and power in sub-Saharan countries (116). In the Western, thinness in women is desirable and associated with beauty, while in sub-Saharan Africa associated with malnutrition. For example, terms such as "umuguta" in central Africa and "mkonda" in Kenya,

and in thin Somali lady, or “caatoqurantoy” used with negative connotations (117). Besides, the women who may otherwise be called “fat” in the Western often describe as “nzeleyavundese” in central Africa, beautiful lady.

Dorsey, Eberhardt, and Ogden (2009) discovered that education level affected people's perceptions of obesity and overweight people. individuals with lower level education were likely to perceive obesity and people being overweight positively while individuals with higher education level were likely to perceive obesity and people being overweight negatively (118).

Hernandez-Hons and Woolley (2012) explored the association between food perception and obesity in their research. These researchers performed a phenomenological analysis on emotional eating by women in California. Their study revealed that participants believed that food acted as a coping mechanism to help them deal with their insecurities and social judgments about being fat (119).

A prior study among young Somali women in England shows that while young Somali women are conscious about having a healthy body size, they were constrained by older Somalis' perception associating a large body size with self-esteem (120). Like many Western countries, Norway has large Somali immigrant communities. They have moved from farming to urban settings to create a more sedentary lifestyle (121). Traditional Somali food rotates around rice, pasta, injera bread, meat, and tea with much sugar, as this diet combined with a sedentary lifestyle can quickly lead to overweight or obesity (122).

Another research study conducted on Somali women living in Liverpool has indicated Most Somalis consider being overweight to be a healthy lifestyle. They eat meat and fat and cook with ghee(110). Although obesity is widely acknowledged in developed countries, it remains a public health problem in Sub-Saharan Africa (110).

## **2.6. Attitudes and behaviors of obesity among adult women**

Some people have different attitudes towards obese people. Consider obese people as worthless and lazy compared to normal-weight people (123–125). A study conducted in Minneapolis revealed that among people who were considered obese, 20% to 25% perceived them to be more emotional, less organized, and less likely to succeed in their work (126).

In the western world, social stigmatism toward obesity and a common fascination with staying slim have possibly helped restrict the incidence of increasing obesity to some extent; Despite the increasing number of African Americans who are obese, there is still a lack of social pressure to become thin and negative about being fat, especially in women (127,128). There

have been relatively few studies of behaviors against obesity in native African communities, with a few exceptions (112).

According to Ernersson et al., obesity behaviour and causes affect self-esteem, confidence, dedication, and willpower. In their research, Ernersson et al. discovered that one's personal attitude toward obesity determined whether or not one was able to engage in obesity prevention behaviors (129).

Many African countries have seen an increase in body fat levels, which has detrimental effects on various aspects of life (130). In contrast, thinness is often regarded as a negative sign of health and poverty, and it has been associated with the rise of AIDS (130). In disadvantaged communities such as those in South Africa, food insecurity exists; thus, food is highly valued (131). Culture is known to shape and serve as a mirror for interpreting experiences (132,133). Obesity is less stigmatized in some parts of Africa, people generally associating fatness with beauty, fame, and evidence of healthy living and health, especially in women (134,135).

In certain circumstances, women are fattened up before marriage as a symbol of beauty and fertility for suitors (136,137). Furthermore, African men tend to prefer overweight over thin women (61).

## **2.7 .Consequences and implication of overweight and obesity among women**

One of the leading factors that cause mortality globally is obesity(138). It relates following acute and chronic illnesses such as heart disease, blood pressure, maternal complications, and excess weight gains(138).

A Study revealed that weight gain increases the morbidity and mortality due to heart disease (IHD) (139). the same study attributed 27% of the incidence of IHD to weight gains  $\geq 5$  kg after the age of 18 years (139). Overweight and obesity have adverse effects on women's physical health. It is often a risk factor for non-communicable diseaseslike hypertension, diabetes, heart diseases (140), strokes (141), and cancers (142,143).

Furthermore, obesity is a risk factor for many health problems, including cardiovascular diseases (144,145); overweight women have an increased risk of complications during pregnancy and delivery (146,147). For instance, several previous studies in obese women recorded an increased risk of maternal and fetal complications, including gestational diabetes, hypertension, fetal distress, preeclampsia, postpartum hemorrhage, genital tract infection, intrauterine deaths. That increases the risk for a caesarean birth in the world (148,149). Above

complications results in disabilities or deaths, particularly in settings with limited resources and capacity to properly conduct safe surgery or manage surgical complications (150).

Furthermore, cancer in many organs is associated with the pathogenesis of obesity, including breast, liver, pancreas, kidney, colorectal, colon, ovary, endometrium, and corpus. Research evidence shows that obesity, abnormal glucose metabolism, and insulin resistance are associated with cancer prevalence (151). Women with a body mass index of 30 kg/m<sup>2</sup> or over are more likely to develop breast cancer, and 34 mg/m<sup>2</sup> are more likely to develop endometrial cancer (152).

The study of black South African women living in Soweto suggests that risk factors for elevated blood pressure and other NCDs are underlying the obesity crisis (153). Other countries in the SSA region are experiencing similar increases in obesity-related diseases, symbolic of countries moving through an epidemiological and nutrition transition (154).

### 3. MATERIALS AND METHODS

#### 3.1. Research Design

In this study, a cross-sectional study was conducted as a convenience sample of adult women aged  $\geq 18$  years in Mogadishu, the capital city of Somalia.

#### 3.2. Target population

The target population of the study were adult women aged  $\geq 18$  years who live and reside in Mogadishu, the capital city of Somalia, locally known as Hamar. The estimated total population of Mogadishu is 2,587,183 and geographically locate a latitude of 2.04 and a longitude of 45.34.

#### 3.3 Inclusion criteria

The study included Somali adult women aged  $\geq 18$  years who were visitors or accompanying patients from the four most prominent and selected hospitals in Mogadishu, Somalia.

#### 3.4 Exclusion criteria

The study excluded the following groups: pregnant or lactating women, women with a physical deformity, women who would come to seek treatments at the selected hospitals, non-residents of Mogadishu city, and the participants who would not want to participate in the study.

#### 3.5 Variables

The primary outcome measures are obesity in terms of the body mass index ( $\text{kg}/\text{m}^2$ ) and abdominal obesity (Waist Circumference), and hip circumference to reflect the type of obesity.

Independent variables included demographic characteristics (sex, marital status, educational level, and income level), lifestyle behavior (smoking, diet and eating behaviors, and physical activity), perceptions, and attitudes.

#### 3.6 Sample size calculation

This study's sample size was 384 women with a confidence interval of 95% calculated with the following formula.

$$n = \frac{z^2 p(1 - p)}{d^2}$$

Where,

n = required minimum sample size

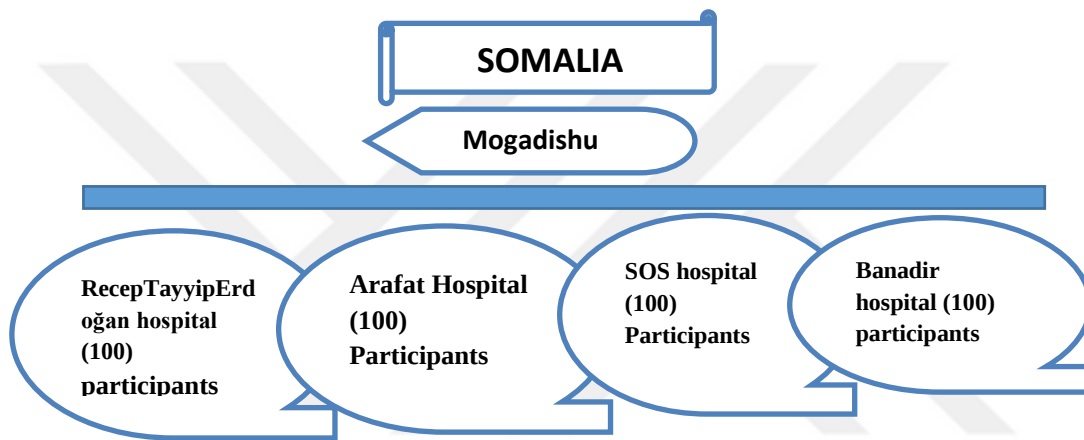
$Z$  = is the statistic corresponding to level of confidence

$P$  = is expected prevalence

$d$  = Desired precision

$$n = \frac{(1.96)^2(0.10)(1-0.10)}{(0.03)^2} = 384$$

As we have not had a sampling frame to choose the subjects randomly, we worked on healthy women from four-selected hospitals in Mogadishu, whereby they visited a patient or accompanied a person seeking treatment in the hospital.



**Figure 3.1:** Sample distributions and Study locations

### 3.7 Sampling

A convenience sampling method was used to obtain the total number of samples required. Eligible participants were 400 females aged  $\geq 18$  years who were visitors or accompanying patients from the four most prominent and selected hospitals in Mogadishu, Somalia. The selected respondents were contacted and given the details about the study for them to express their willingness to participate.

### 3.8 Pilot study

The questionnaire was pre-tested for precision and correctness before the primary analysis. 37 participants were selected for pre-testing with comparative characteristics and did not include the actual test utilized in the final survey. The pre-testing sample was done in Hodan district, a zone that was not be covered by the study. Furthermore, the study used the pre-test results for modification of the initial application.

### **3.9 Data collection**

Data was collected from the sample population using a structured questionnaire and anthropometry (BMI) measurements. After receiving informed consent from the respondent, we conducted a questionnaire to collect information from participants. The study used structured questionnaire to gather demographic details and information such as level of education, employment status, income, marital status, physical activities, duration of sedentary activities, which include watching television, and duration of sleep/day of each participant. In addition, the participant's weight and height were measured. The individuals' weight in kilograms was divided by their height in meter square to calculate their body mass index (BMI). Moreover, the anthropometric height, weight, waist, and hip circumference was recorded to assess prevalence of obesity.

### **3.10 Data analysis**

Completed questionnaires from the participants were both reviewed for consistency and completeness. The researcher edited and coded before data entry, and all the data were entered and analyzed using the SPSS computer software and presented in percentage, frequency, bar charts, and tables. Analyses of the dependent variable's and independent variables were done by cross-tabulation and testing by Chi-square test. A statistical association is significant when the effect measure's null value came within the confidence limit or a p-value less than 0.05.

### **3.11 Ethical consideration**

In accordance with permission obtained from Yeditepe University, Institute of Health Science, Ministry of Health of Somalia, and the selected hospitals, it was ethically and scientifically appropriate to conduct this study. Before administering the questionnaire, we explained to the participants the aim of the study and those accepted signed a written consent form see Appendix. For confidentiality, participants' anonymity and information obtained, whether orally or in writing, are strictly used for research purposes only.

## 4. RESULTS

### 4.1 Introduction

This chapter presents the findings of the study and discussions as per the objectives. The prevalence of overweight and obesity among women and the associated factors have been discussed. The study was hospital-based, and 370 (96.3%) women aged 18 years and older, and who were visiting selected healthcare units participating in the survey. Some participants did not complete all the questions and were recorded as "no response." Table 4.1 below summarizes the four main hospitals' quotient distribution of study.

**Table 4.1:** Percentage Distribution of Participants by Hospital

| No. | Name of the health facility | No of Respondents | Percentages |
|-----|-----------------------------|-------------------|-------------|
| 1   | ArafadHospital              | 99                | 26.8%       |
| 2   | RecepTayyipErdoğan Hospital | 88                | 23.8%       |
| 3   | Banadır Hospital            | 83                | 22.4%       |
| 4   | SOS Hopittal                | 100               | 27%         |
|     | Total                       | 370               | 100%        |

### 4.2 Demographic characteristics

Table 4.2, depicts the respondent's distribution by demographic characteristics. The study participants' mean age was 30 years and the median age was 27 years. The majority of them (55.4%) were in the age group of 18-27. Moreover, the minimum number of subjects was 3.8% from 53-73 age groups. The majority (51.1%) of respondents were married, and the rest were single (30.3%), divorce or separated (13.0%), and widowed (5.7%).

Our findings also indicated that most of the study respondents were illiterate at some stage, never attended school or college; about 25% of them were young and middle-aged adult females. The second highest, 24.1%, never attended school but managed to read and write. About 4.9% completed primary school education, 8.6% completed intermediate education. In

addition, 16.2% of the study participants completed high school education, while 21.1% completed college or university training. There was a significant association ( $p<0.001$ ) between the age category and their marital status and educational level.

**Table 4.2:** Socio-Demographic Characteristics of Respondents

| <b>Participant's Age group</b>            |           |           |           |           |           |          |                  |
|-------------------------------------------|-----------|-----------|-----------|-----------|-----------|----------|------------------|
|                                           | 18-22     | 23-27     | 28-32     | 33-42     | 43-52     | 53-73    | <b>Total (%)</b> |
|                                           | 91 (24.6) | 114(30.8) | 62 (16.8) | 47 (12.7) | 42 (11.4) | 14(3.8)  | <b>370 (100)</b> |
| <b>Marital status</b>                     |           |           |           |           |           |          |                  |
| Single                                    | 64(70.3)  | 41 (36.0) | 5(8.1)    | 0(0.0)    | 2(4.8)    | 0(0.0)   | 112 (30.3)       |
| Married                                   | 24(26.4)  | 54(47.4)  | 48(77.4)  | 36(76.6)  | 20(47.6)  | 7(50.0%) | 189 (51.1)       |
| Divorced                                  | 3(3.3)    | 19(16.7)  | 8(12.9)   | 7(14.9)   | 9(21.4)   | 2(14.3)  | 48(13.0)         |
| Windowed                                  | 0(0.0)    | 0(0.0)    | 1(1.6)    | 4(8.5)    | 11(26.2)  | 535.7)   | 21 (5.7)         |
| Chi-square: 190.5 &Df 15 .P=0.001         |           |           |           |           |           |          |                  |
| <b>Level of education</b>                 |           |           |           |           |           |          |                  |
| Can't read and Write                      | 10 (11.0) | 23(20.2)  | 20(32.3)  | 15(31.9)  | 15(35.7)  | 10(71.4) | 93(25.1)         |
| No formal education but at least can read | 21(23.1)  | 23(20.2)  | 15(24.2)  | 16(34.0)  | 11(26.2)  | 3(21.4)  | 89(24.1)         |
| Primary school                            | 1(1.1)    | 4(3.5)    | 5(8.1)    | 3(6.4)    | 5(11.9)   | 0(0.0)   | 18(4.9)          |
| Intermediate school                       | 3(3.3)    | 12(10.5)  | 6(9.7)    | 4(8.5)    | 7(16.7)   | 0(0.0)   | 32(8.6)          |

|                                  |          |          |          |          |          |         |           |
|----------------------------------|----------|----------|----------|----------|----------|---------|-----------|
|                                  |          |          |          |          |          |         |           |
| High school                      | 25(27.5) | 19(16.7) | 6(9.7)   | 7(14.9)  | 2(4.8)   | 1(7.1)  | 60(16.2)  |
| College/University               | 31(34.1) | 33(28.9) | 10(16.1) | 2(4.3)   | 2(4.8)   | 0(0.0)  | 78(21.1)  |
| <b>Number of Children</b>        |          |          |          |          |          |         |           |
| 0                                | 64(70.3) | 49(43.0) | 11(17.7) | 6(12.8)  | 1(2.4)   | 0(0.0)  | 131(35.4) |
| 1-2 Children                     | 18(19.8) | 39(34.2) | 15(24.2) | 3(6.4)   | 9(21.4)  | 2(14.3) | 86(23.2)  |
| 3-4 Children                     | 8(8.8)   | 15(13.2) | 11(17.7) | 6(12.8)  | 7(16.7)  | 2(14.3) | 49(13.2)  |
| 5-6 Children                     | 1(1.1)   | 9(7.9)   | 17(27.4) | 12(25.5) | 5(11.9)  | 4(28.6) | 48(13.0)  |
| More than 7 Children             | 0(0.0)   | 2(1.8)   | 8(12.9)  | 20(42.6) | 20(47.6) | 6(42.9) | 56(15.1)  |
| Chi-square: 24.8 &Df 15 .P=0.208 |          |          |          |          |          |         |           |

Tables in parentheses denote column percentages

Furthermore, the study identified parity as one of the factors influencing obesity in women. In this study, 65% (n=239) of the participants had children, out of those 23 % (n=89) had 1-2 children, 13% (n=49) had 3-4 children, 13% (n=48) had 5-6 children, and 15.1 % (n=56), had seven or more children. Parity increased with age. About 35.4% (n=131) women were without children, out of which 102 participants were single, and 29 were married.

#### 4.3. Distribution of Age, Marital status and BMI

To determine the prevalence of BMI, in table 4.3 presents a connection of BMI (obese and non-obese), by age groups and marital status. Obesity prevalence is lower in the age groups 18-22 and 23-27 than in the other age groups (28-53 and 53-73) regardless of their marital status. About 30% (n=107) of the respondents were single, while 70% (n=247) percent were ever married. Obesity prevalence among ever-married respondents is higher (7.5%) than among never-married respondents (33.2%). The study participants' marital status and their BMI status had a significant relationship (p=0.001). The ever-married group was nearly four times as likely as the single group to be obese.

**Table 4.3:** Distribution of Age, Marital Status and BMI

| Age Group                         | Marital Status | BMI category |          |             |
|-----------------------------------|----------------|--------------|----------|-------------|
|                                   |                | Non-Obese    | Obese    | Total       |
| 18-22                             | Single         | 61(100.0)    | 0(0.00)  | 61          |
|                                   | Ever Married   | 23(85.2)     | 4(14.8)  | 27          |
| Chi-square: 83.4 &Def. 1 .P=0.001 |                |              |          |             |
| 23-27                             | Single         | 36(90.0)     | 4(10.0)  | 40          |
|                                   | Ever Married   | 53(75.7)     | 17(24.3) | 70          |
| 28-52                             | Single         | 2(33.3)      | 4(66.7)  | 6           |
|                                   | Ever Married   | 83(61.0)     | 53(39.0) | 136         |
| 53-73                             | Ever Married   | 6(42.9)      | 8(57.1)  | 14          |
| Total                             | Single         | 99(92.5)     | 8(7.5)   | 107         |
|                                   | Ever Married   | 165(66.8)    | 82(33.2) | 247         |
| Total                             |                | 264 (74.6)   | 90(25.4) | 354(100.0 ) |

Values in parentheses indicate percentages

#### 4.4. Distribution of Age, education level and BMI

Table 4.4 shows the prevalence of obesity and the respondents' different levels of education. Obesity prevalence increased throughout the range and as the years of schooling decreased among different age groups. The prevalence of obesity was 9.4%, 3.7%, and 0%, for the age groups 18-22 with low, medium, and high levels of education, respectively. Compared with 28-52, age groups, 40%, 13%, and 4% with low, medium, and high levels of education respectively.

This indicates the age also has a role in determining obesity prevalence among different age groups of the study participants. As the age gets older and education gets lower, obesity prevalence gets high among different age groups and educational levels.

**Table 4.4:** Distribution of BMI (Kg/Ml), Age and Levels of Education

| Age Group | Level of Education | BMI category |          |            |
|-----------|--------------------|--------------|----------|------------|
|           |                    | Non-Obese    | Obese    | Total      |
| 18-22     | Low                | 29(90.6)     | 3(9.4)   | 32         |
|           | Medium             | 26(96.3)     | 1(3.7)   | 27         |
|           | High               | 29(100.0)    | 0(0.0)   | 29         |
| 23-27     | Low                | 34(70.8)     | 14(29.2) | 48         |
|           | Medium             | 27(90.0)     | 3(10.0)  | 30         |
|           | High               | 28(87.5)     | 4(12.5)  | 32         |
| 28-52     | Low                | 60(60.0)     | 40(40.0) | 100        |
|           | Medium             | 16(55.2)     | 13(44.8) | 29         |
|           | High               | 9(69.2)      | 4(30.8)  | 13         |
| 53-73     | Low                | 6(46.2)      | 7(53.8)  | 13         |
|           | Medium             | 0(0.0)       | 1(100.0) | 1          |
| Total     |                    | 264 (74.6)   | 90(25.4) | 354(100.0) |

Values in parentheses indicate percentages

#### 4.5 BMI distribution and household income of the respondents

Obesity prevalence varies by income among study participants, as seen in table 4.5, According to the findings, about 28.2% (n=42) and 28.3% (n=28) of the participants are obese, with monthly incomes ranging from \$100-299 and \$300-599, respectively. Obesity prevalence is lower 15.6% among participants who earn less than \$100 per month compared to those who

earn more than \$600 per month. In all, 25.1 % (n=87) of the respondents are obese. The income of the study participants had a significant relationship with their BMI status ( $p=0.003$ ).

**Table 4.5:** BMI Distribution and Household Income (\$) Of the Respondents

| Income (\$)   | BMI category |          | Total    |
|---------------|--------------|----------|----------|
|               | Non-Obese    | Obese    |          |
| 0-99          | 38(84.4)     | 7(15.6)  | 45       |
| 100-299       | 107(71.8)    | 42(28.2) | 149      |
| 300-599       | 71(71.7)     | 28(28.3) | 99       |
| More than 600 | 44(81.5)     | 10(18.5) | 54       |
| Total         | 260(74.9)    | 87(25.1) | 347(100) |

1. Values in parentheses indicate percentages.
2. 1.9% of the respondents refused to mention their monthly income

#### **4.6: Food consumption patterns among participants**

As shown in table 4.6, among the carbohydrates, the most preferred food was Anjero (written as canjeero or laxoox in Somali), where more than a third of the respondents (73.8%) reported to daily consumption. Anjero is one of the most popular foods in Somalia, consumed at breakfast and is similar to the Ethiopian Injera bread. However, the Somali version is smaller sized and thinner. The second highest consumed food (42.2%) was rice (written as baris in Somali), followed by bread, macaroni, and spaghetti (37.0%), (30.0%), and (27.6%) respectively. Somalis have a strong pasta culture because of Italian colonization. Only (3.8%) respondents consumed burgers/ pizzas and fried chips daily.

Furthermore, 18.6% participants consumed sweets, bakery, and biscuits daily; however 40% of the respondents consumed ice cream because of the hot weather. Somalis are meat driven where 64.1% participants reported daily consumption of meat (goat, beef, and lamb) followed by 20.3% fish and 15.9 % chicken plate. Beans were the most preferred legumes, 28.9% of the respondents reported daily consumption. Vegetarianism is relatively rare.

In addition, popular fruits that Somalis consume are banana, watermelon, mango, papaya, oranges, guava, and many other fruits. About 70% of participants consumed fruits. Somalis

serve banana with breakfast, lunch, and dinner as an optional choice, sliced and mixed with the rice or pasta. Consuming bananas with a meal is such an ingrained part of Somali culture, and it is not meant for dessert or garnish but as an essential condiment. In terms of vegetable consumption, about 62 percent and 70 percent of the respondents declared they consume vegetables for salad and meal purposes, respectively.



**Table 4.6:** Food Consumption Patterns among Participants

| Food Items                            | Do not consume | Once a month | 1-3 times per week | 4-6 times per week | Once a day | More than once per day | Total (%)<br>370 (100) |
|---------------------------------------|----------------|--------------|--------------------|--------------------|------------|------------------------|------------------------|
| Rice                                  | 16(4.3)        | 9(2.4)       | 90(24.3)           | 20(5.4)            | 156(42.2)  | 79(21.4)               |                        |
| Spaghetti                             | 18(4.9)        | 15(4.1)      | 113(30.5)          | 30(8.1)            | 102(27.6)  | 92(24.9)               |                        |
| Makaroni                              | 19(5.1)        | 24(6.5)      | 118(31.9)          | 23(6.2)            | 111(30.0)  | 75(20.3)               |                        |
| Bread                                 | 15(4.1)        | 41(11.1)     | 73(19.7)           | 55(14.9)           | 137(37.0)  | 49(13.2)               |                        |
| Canjelo                               | 12(3.2)        | 10( 2.7 )    | 22(5.9)            | 6(1.6)             | 273(73.8)  | 47(12.7)               |                        |
| Burgers/<br>Pizzas Any<br>Fried Chips | 200(54.1)      | 95(25.7)     | 31(8.4)            | 19(5.1)            | 14(3.8)    | 11(3.0)                |                        |
| Sweets,<br>Bakery And<br>Biscuits     | 82(22.2)       | 70(18.9)     | 60(16.2)           | 43(11.6)           | 69(18.6)   | 46(12.4)               |                        |
| Icecream                              | 57(15.4)       | 45(12.2)     | 55(14.9)           | 25(6.8)            | 151(40.8)  | 37(10.0)               |                        |
| Red Meat                              | 21(5.7)        | 17(4.6)      | 31(8.4)            | 12(3.2)            | 237(64.1)  | 52(14.1)               |                        |
| Fish                                  | 96(25.9)       | 78(21.1)     | 52(14.1)           | 49(13.2)           | 75(20.3)   | 20(5.4)                |                        |
| Chicken                               | 127(34.3)      | 87(23.5)     | 41(11.1)           | 41(11.1)           | 59(15.9)   | 15(4.1)                |                        |
| Beans                                 | 101(27.3)      | 55(14.9)     | 48(13.0)           | 20(5.4)            | 107(28.9)  | 39(10.5)               |                        |
| Eggs                                  | 86(23.2)       | 47(12.7)     | 46(12.4)           | 25(6.8)            | 132(35.7)  | 34(9.2)                |                        |
| Fruits                                | 18(4.9)        | 0(0.0)       | 46(12.4)           | 43(11.3)           | 98(26.5)   | 165(44.6)              |                        |
| Vegetables<br>(For Salad Purpose )    | 19(5.1)        | 43(11.6)     | 40(10.8)           | 12(3.2)            | 232(62.7)  | 24(6.5)                |                        |
| Vegetables(For Meals Purposes         | 3(.8)          | 5(1.4)       | 15(4.1)            | 4(1.1)             | 261(70.5)  | 82(22.2)               |                        |

Tables in parenthesis are percentages.

#### 4.7 Types of cooking oils

As shown in the table 4.7, 94.6% of the respondents consumed vegetable oils like sunflower oil and it is often an inexpensive choice that could be used for all kinds of cooking. About 17.0% of the respondents consumed ghee, which is made from goats' milk, not only for cooking, it is also used as a moisturizer for skin and hair (a well-known secret among Somali women). In addition, few respondents use butter (11.4%) for same purpose. The most common used cooking oil is vegetable oil (84.3%).

**Table 4.7:** Distribution Of the Types of Cooking Oils

|               | Frequently | Sometimes | Rarely  | Never     | Total (%)<br>370 (100) |
|---------------|------------|-----------|---------|-----------|------------------------|
| Vegetable oil | 351(94.9)  | 14(3.8)   | 2(.5)   | 3(.8)     |                        |
| Ghee          | 63(17.0)   | 82(22.2)  | 28(7.6) | 197(53.2) |                        |
| Butter        | 42(11.4)   | 38(10.3)  | 33(8.9) | 257(69.5) |                        |
| Margarines    | 0(0.0)     | 6(1.6)    | 9(2.4)  | 355(95.9) |                        |

Values in parentheses indicate percentage

#### 4.8. Consumption frequency of cold sugary beverages.

The consumption pattern of cold sugary beverages listed on table 4.8 is characterized into consumers as (daily, weekly and monthly) as well as non-consumers. In general, the findings indicated that 87% of the respondents take sugary beverages. Most of the participants consume the highest amount on a weekly basis, followed by daily then monthly. On a daily consumption sweetened homemade drinks were found to be the most consumed cold beverage with 176 (47.6%) participants. The second most consumed cold beverage was Coke with 11 participants (3.0%), 2.4% consumed Pepsi, 3.2% consumed Fanta, 3.0% consumed Fresh fruit juices, 1.4% respondents consumed Fuse tea or Ice tea, and (1.9%) consumed sweetened manufactured drinks. On a daily basis, sweetened homemade drinks patterns had the highest beverage intake (47.6%), but on a weekly basis, Coke patterns had the highest overall beverage intake (36.5%), compared to the other six groups. The lowest percentage of respondents fall within the monthly group.

**Table 4.8:** Consumption Frequency of Cold Sugary Beverages.

| <b>Beverage</b>                     | <b>None</b> | <b>Monthly</b> | <b>Weekly</b> | <b>Daily</b> | <b>Total (%)</b><br>370 (100) |
|-------------------------------------|-------------|----------------|---------------|--------------|-------------------------------|
| Coke                                | 217(58.6)   | 7(1.9)         | 135(36.5)     | 11(3.0)      |                               |
| Pepsi                               | 232(62.7)   | 8(2.2)         | 121(32.7)     | 9(2.4)       |                               |
| Fanta                               | 272(73.5)   | 8(2.2)         | 78(21.1)      | 12(3.2)      |                               |
| Fuse tea or Ice tea                 | 331(89.5)   | 4(1.1)         | 30(8.1)       | 5(1.4)       |                               |
| Fuse tea or Ice tea                 | 331(89.5)   | 4(1.1)         | 30(8.1)       | 5(1.4)       |                               |
| sweetened homemade drinks           | 74(20.0)    | 21(5.7)        | 99(26.8)      | 176(47.6)    |                               |
| Fresh fruit juices                  | 325(87.8)   | 4(1.1)         | 30(8.1)       | 11(3.0)      |                               |
| Other sweetened manufactured drinks | 318(85.9)   | 3(.8)          | 42(11.4)      | 7(1.9)       |                               |

Tables in parenthesis are percentages.

#### **4.9. Consumption Patterns of Hot Beverages (Tea, Coffee and Milk)**

As seen in the consumption patterns of hot sugary beverages listed on table 4.9, 4.10 and 4.11, tea is an essential culture to Somali people. It is called (**shaah**) in the Somali language. Somali tea is rich in spices, milk, and sweet. Somalis usually drink milky tea, but it is customary to serve black tea after consuming a heavy meal. It is called “Shaah bigays” in local language.

According to the findings, 70% of respondents drink 1-3 cups of tea per day. 14 percent of participants drink 4-6 cups of tea per day, 3% drink 7-9 cups per day, and 1.1 percent drink

more than 10 cups per day. Only 11.1 %, of participants do not drink tea at all, most of them were people with diabetes who avoided sugar. It is a tradition that Somali people make tea with sugar and there is no specific measure to know the amount of sugar, the respondents added to their tea. Other results suggest that most of the respondents (48%) add excess sugar to their tea.

The findings show that tea consumption was higher in older women than younger women. Tea is the most common drink, and drinking 1-3 cups of sweet tea is ordinary in Somalia.

**Table 4.9:** Number of Cups of Tea Pattern Drinks and the Amount of Sugar Use

| Tea Cups                | Amount of sugar use a cup of tea |          |          |           |            |
|-------------------------|----------------------------------|----------|----------|-----------|------------|
|                         | None                             | A little | Moderate | Excess    | Total      |
| Don't drink at all      | 0(0.0)                           | 0(0.0)   | 0(0.0)   | 0(0.0)    | 41((11.1)) |
| 1-3 cups a day          | 8(3.1)                           | 45(17.4) | 75(29.0) | 131(50.6) | 259(70.0)  |
| 4-6 cups a day          | 0(0.0)                           | 5(9.3)   | 15(27.8) | 34(63.0)  | 54(14.6)   |
| 7-9 cups a day          | 0(0.0)                           | 1(8.3)   | 2(16.7)  | 9(75.0)   | 12(3.2)    |
| More than 10 cups a day | 0(0.0)                           | 0(0.0)   | 0(0.0)   | 4(100.0)  | 4(1.1)     |
| Total                   | 8(2.2)                           | 51(13.8) | 92(24.9) | 178(48.1) | 370(100.0) |

Values in parentheses indicate percentages

Furthermore, 74% of the respondents do not consume coffee. The study uncovered that 22.4% of the respondents consumed 1-2 cups of coffee a day, while 3% consumed 3-4 cups of coffee a day, and 0.3% consumed more than 5 cups of coffee. The results show that 11.1% of respondents consumed excess sugar with coffee.

**Table 4.10:** Number of Cups of Coffee Pattern Drinks and the Amount of Sugar Use

| Coffee Cups            | Amount of sugar use a cup of coffee |          |          |          |            |
|------------------------|-------------------------------------|----------|----------|----------|------------|
|                        | None                                | A little | Moderate | Excess   | Total      |
| Don't drink at all     | 0(0.0)                              | 0(0.0)   | 0(0.0)   | 0(0.0)   | 275(74.3)  |
| 1-2 cups a day         | 15(18.1)                            | 13(15.7) | 21(25.3) | 34(41.0) | 83(22.4)   |
| 3-4 cups a day         | 0(0.0)                              | 3(27.3)  | 2(18.2)  | 6(54.5)  | 11(3.0)    |
| More than 5 cups a day | 0(0.0)                              | 0(0.0)   | 0(0.0)   | 1(100.0) | 1(0.3)     |
| Total                  | 15(4.1)                             | 16(4.3)  | 23(6.2)  | 41(11.1) | 370(100.0) |

Values in parentheses indicate percentage

On the other hand, milk from camels, goats and cows is a significant source of drink for Somali herdsmen and nomadic families. One of the preferred milk is camel milk, which is used as a source of calcium and protein.

Somalis believe that camel milk is the most nutritious source of animal milk as compared to goat and cow milk. 64.6% of the respondent's drink 1-2 cups of milk a day while 11.6% drink 3-4 cups of milk a day. 1.5% of the respondents drink more than 5 cups of milk a day, and 22 % of the respondents do not drink camel milk. Almost half of respondents (44.3%) of the respondents use excess sugar in their milk.

**Table 4.11:** Number of Cups of Milk Pattern Drinks and the Amount Of Sugar Use

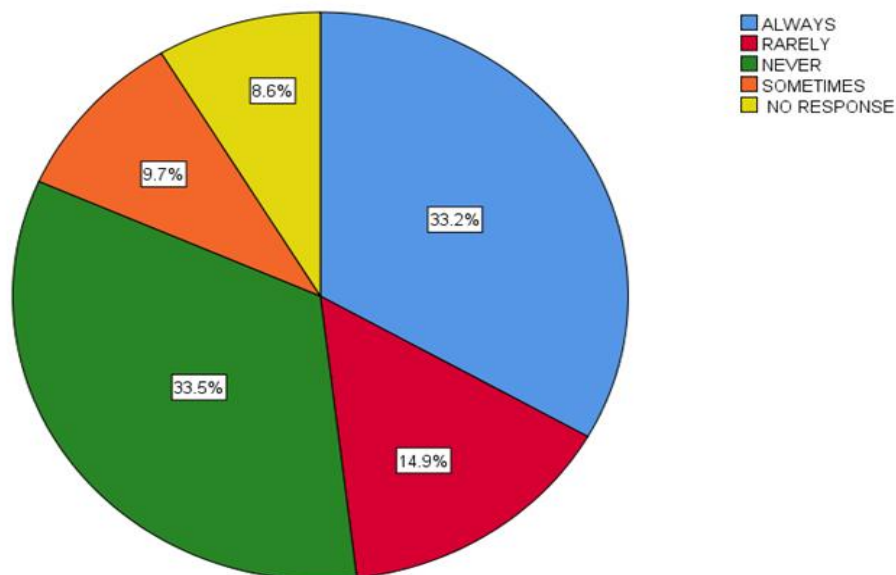
| Cups of Milk           | Amount of sugar use a cup of milk |          |           |           |             |
|------------------------|-----------------------------------|----------|-----------|-----------|-------------|
|                        | None                              | A little | Moderate  | Excess    | Total       |
| Don't drink at all     | 0(0.0)                            | 0(0.0)   | 0(0.0)    | 0(0.0)    | 82(22.2)    |
| 1-2 cups a day         | 13(5.4)                           | 38(15.9) | 51(21.3)  | 137(57.3) | 239 (64.6)  |
| 3-4 cups a day         | 0(0.0)                            | 7(16.3)  | 12(27.9)  | 23(53.5)  | 43(11.6)    |
| More than 5 cups a day | 0(0.0)                            | 0(0.0)   | 2(33.3)   | 4(66.7)   | 6(1.6%)     |
| <b>Total</b>           | 14(3.8)                           | 45(12.2) | 45(12.2)) | 164(44.3) | 370(100.0 ) |

Values in parentheses indicate percentages

#### 4.10. Discourage consumption of sugary beverages

According to figure 4.1, only 33.5% of the respondents mentioned that they never get discouragement or health awareness about anyone's sugar consumption. Approximately 33.2% of the respondents received health awareness about the sugar consumption from family and friends. 14.9% of the respondents indicated that they sometimes received discouragement while 9.7 % of respondents rarely received discouragement from sugar consumption. Few respondents gave no response.

**Figure 4.1:** Discourage consumption of sugary beverages



#### 4.11: Distribution of age and tooth related problems

As presented in table 4.12, participants were asked if they had a tooth extracted or filled. About 67% did not have any tooth extracted or filled; only 33% had a tooth extracted or filled. It was found that 31% (n=38) at the age group between 18-27 of participants had a tooth extracted or filled, whereas 70% (n=84) of the participants were above 28 years. The majority 82% of the respondents did not have any tooth problems like pain or swelling; however, 18% had tooth problems. A significant difference ( $p < 0.0001$ ) was found between the age group and the tooth extracted or filled and the tooth problems. This suggests that as people become older, their dental problems become more prevalent.

**Table 4.12:** Percentage Distribution of Age and Tooth Related Problems.

| Participant's Age group                      |           |           |           |           |           |          |                             |
|----------------------------------------------|-----------|-----------|-----------|-----------|-----------|----------|-----------------------------|
|                                              | 18-22     | 23-27     | 28-32     | 33-42     | 43-52     | 53-73    | Total (%)                   |
|                                              | 91 (24.6) | 114(30.8) | 62 (16.8) | 47 (12.7) | 42 (11.4) | 14(3.8)  | <b>Number (%) 370 (100)</b> |
| Tooth extracted or filled                    |           |           |           |           |           |          |                             |
| Yes                                          | 16(17.6)  | 22(19.3)  | 20(32.3)  | 29(61.7)  | 25(59.5)  | 10(71.4) | 122(33)                     |
| No                                           | 75(82.4)  | 92(80.7)  | 42(67.7)  | 18(40.4)  | 17(40.5)  | 4(28.6)  | 249(67)                     |
| Number of extracted teeth                    |           |           |           |           |           |          |                             |
| Never                                        | 75(82.4)  | 92(80.7)  | 43(69.4)  | 18(38.3)  | 17(40.5)  | 4(28.6)  | 249(67.3)                   |
| 1-2 teeth                                    | 15(16.5)  | 19(16.7)  | 14(22.6)  | 19(40.4)  | 13(31.0)  | 5(35.7)  | 85(23.0)                    |
| 3-4 teeth                                    | 1(1.1)    | 2(1.8)    | 4(6.5)    | 5(10.6)   | 8(19.0)   | 1(7.1)   | 21(5.7)                     |
| More than 5 teeth                            | 0(0.0)    | 1(0.009)  | 1(0.02)   | 5(0.11)   | 4(0.10)   | 4(0.29)  | 15(4.0)                     |
| Number of teeth filled                       |           |           |           |           |           |          |                             |
| Never                                        | 85(93.4)  | 106(93.0) | 57(91.9)  | 35(74.5)  | 32(76.2)  | 11(78.6) | 326(88.1)                   |
| 1-2 teeth                                    | 6(6.6)    | 7(6.1)    | 4(6.5)    | 8(17.0)   | 7(16.7)   | 2(14.3)  | 34(9.2)                     |
| 3-4 teeth                                    | 0(0.0)    | 1(0.9)    | 0(0.0)    | 3(6.4)    | 2(4.8)    | 0(0.0)   | 6(1.6)                      |
| More than 5 teeth                            | 0(0.0)    | 0(0.0)    | 1(0.01)   | 1(0.02)   | 1(0.02)   | 1(0.07)  | 4(1.1)                      |
| Current tooth problems like swelling or pain |           |           |           |           |           |          |                             |
| Yes                                          | 6(6.6)    | 19(16.7)  | 11(17.7)  | 12(25.5)  | 13(31.0)  | 6(42.9)  | 67(18.1)                    |
| No                                           | 85(93.4)  | 95(83.3)  | 51(83.3)  | 35(74.5)  | 29(69.0)  | 8(57.1)  | 303(81.9)                   |

Values in parentheses indicate percentage

#### 4.12. Eating behaviors of the respondents in some different situations

Table 4.13 shows the results of eating behaviors of the respondents. 47.0% of the respondents never had a habit of taking meals/snacks while watching TV, whereas 25.4 % always take meal /snacks while watching TV. Also, 15%, of respondents rarely had the habit of taking meal / snacks while watching TV. On the other hand, 10% of respondents sometimes ate snacks while 2.4 % of the respondents frequently consumed snacks and watched TV.

As regards the habit of taking meals/snacks while getting bored, 52.7% of the respondents never had that habit, while 17.6 % and 15.4 % of the respondents had that habit sometimes and rarely respectively. Few respondents of 7.3% and 7.0% also had the habit of eating when they get bored, frequently, and always—taking meals/snacks while getting upset or negative mood. The majority of the respondents (57.0%) never eat anything while they get angry. The rest had the habit of eating when their mood changed. Meanwhile, 21.9% of the participants rarely ate, 11.4% participants always ate, while 6.8% and 3.0% had that habit of eating while their mood changes sometimes and frequently respectively. Over half of the respondents 68% never ate late-night meals or snacks, whereas 31.5% ate snacks late at night

**Table 4.13:** Eating Behaviors of the Respondents in Some Different Situations

| <b>Eating behaviors</b>          | <b>Always</b> | <b>Frequently</b> | <b>Sometimes</b> | <b>Rarely</b> | <b>Never</b> | <b>Total (%)</b><br>370<br>(100) |
|----------------------------------|---------------|-------------------|------------------|---------------|--------------|----------------------------------|
| Eat something while watching TV  | 94(25.4)      | 9(2.4)            | 37(10.0)         | 56(15.1)      | 174(47.0)    |                                  |
| Eat when bored                   | 26(7.0)       | 27(7.3)           | 65(17.6)         | 57(15.4)      | 195(52.7)    |                                  |
| Eat Angry / upset /negative mood | 42(11.4)      | 11(3.0)           | 25(6.8)          | 81(21.9)      | 211(57.0)    |                                  |
| Eat snacks late at night         | 26(7.0)       | 16(4.3)           | 22(5.9)          | 53(14.3)      | 253(68.4)    |                                  |

Values in parentheses indicate percentages

#### 4.13. Physical activity levels of the respondents

In Table 4.14, the participants engaged in different physical activities such as house chores, walking, exercise, swimming and other activities (hiking). Almost 60% participants performed house chores as part of physical activity with 51.4% engaged in more than 7 hours a week. The second preferred activity was walking with a total of 19.5% participants and only 10% participants walked for more than 5 hours a week. Almost 8% of the respondents engaged in physical exercise with only 4.3% participant performing exercise for more than 5 hours a week. Swimming was chosen by less than 10% of respondents, while other activities were chosen by 4% of respondents. About 3.9% participants chose other activities such as hiking; with 2.4% participants doing hiking for more than 5 hours a week.

**Table 4.14:** Physical Activity Levels of the Respondents

| Type of activity          | Time frequency |                  |                  |                          |
|---------------------------|----------------|------------------|------------------|--------------------------|
|                           | None           | 1-3 hours a week | 4-6 Hours a week | More than 7 hours a week |
| House chores              |                |                  |                  |                          |
|                           | 163 (44.1)     | 12(3.2)          | 5(1.4)           | 190(51.4)                |
| Walking                   | None           | 1-2 hours a week | 3-4 Hours a week | More than 5 hours a Week |
|                           | 298(80.5)      | 30(8.1)          | 6(1.6)           | 36(9.7)                  |
| Physical Exercise         | None           | 1-2 hours a week | 3-4 Hours a week | More than 5 hours a Week |
|                           | 341 (92.2)     | 6 (1.6)          | 7(1.9)           | 16(4.3)                  |
| Swimming                  | None           | 1-2 hours a week | 3-4 Hours a week | More than 5 hours a Week |
|                           | 332 (89.7)     | 18(4.9)          | 13(3.5)          | 7(1.9)                   |
| Other activities (hiking) | None           | 1-2 hours a week | 3-4 Hours a week | More than 5 hours a Week |
|                           | 355 (95.9)     | 5(1.4)           | 1(.3)            | 9(2.4)                   |

Value in the parentheses denote percentages

#### 4.14. Lifestyle characteristics of the respondents

Table 4.15 illustrates the hours spent sleeping and watching television (TV) by study participants. To estimate time spent watching television (TV) and sleeping, study participants were asked: "How many hours do you often spend sleeping?" Around 22.2% (n=82) of the participants sleep for 4-6 hours per day, while 74.9 percent (n=277) sleep for 7-9 hours each day. Only 1.9 percent respondents slept more than 10 hours on a daily basis. In addition, participants were also asked how many hours per day they watch television (TV), and the estimated data indicates about 52.2 percent watch 1-3 hours per day. Around 36.6 percent (n=135) of the respondents do not watch television at all, which can be linked to households' lack of access to electricity and television. 9.7% of respondents said they spend 4-6 hours every day watching television. Finally, only 1.6 percent of people watch more than 7 hours of television.

**Table 4.15:** Lifestyle Characteristics of the Respondents

| <b>Sleep-duration</b>    | <b>Frequency</b> |
|--------------------------|------------------|
| 4-6 Hours                | 82(22.2)         |
| 7-9 Hours                | 277(74.9)        |
| More than 10 Hours       | 7(1.9)           |
| Total                    | 370(100.0)       |
| <b>TV-watching hours</b> |                  |
| Do not watch TV at all   | 135(36.5)        |
| 1-3 Hours                | 193(52.2)        |
| 4-6 Hours                | 36(9.7)          |
| More than 7 Hours        | 6(1.6)           |

Values in parentheses indicate percentages

#### 4.15. Distribution of respondents by smoking and use of chewing Khat

Smoking questions were based on whether the respondents had ever smoked at least 100 cigarettes in their lifetime or if they were current smokers. Ex-cigarette smokers were asked if they smoke regularly or occasionally. Current smokers were asked how many cigarettes they smoke per day and categorized as follows: current daily smokers, current non-daily smokers, former smokers, and never smokers.

In general, 6.2 % (n=23) of the participants were cigarette smokers. In comparison, 93.8% (n=347) of the participants never smoked cigarettes. It indicated that current daily smokers are only 3.0 %, followed by former smokers 1.8% participants, current non-daily smokers 1.4%, and almost 96% do not smoke at all. On the other hand, some respondents were asked whether they ever used or chew khat in their lifetime and whether they continue smoking currently or quitted. About 8.6% of the respondents chewed khat, while 91.4% never chewed it. Currently, 1.4% of the respondents regularly chew Khat, whereas 3.2% sometimes chew khat, and 94.4% do not chew it at all. Because of the low social acceptability and cultural norms towards females who chew khat and smoke, the majority of respondents were hesitant and ashamed to answer the smoke and khat-related questions. As a result, there may be biases in the number of females who chew khat and smoke.

**Table 4.16:** Distribution of Respondents by Smoking and Chewing Khat

| Consumption status                 | Frequency (n) | Percentage% |
|------------------------------------|---------------|-------------|
| Current daily smokers              | 11            | 3.0         |
| Current non-daily smokers          | 5             | 1.4         |
| Former smoker                      | 7             | 1.8         |
| Never smoker                       | 347           | 93.8        |
| Total                              | 370           | 100.0       |
| <b>How many cigarettes per day</b> |               |             |
| Don't smoke at all                 | 355           | 95.9        |

|                                   |     |       |
|-----------------------------------|-----|-------|
| 1-5 cigarettes a day              | 5   | 1.4   |
| 6-10 cigarettes a day             | 6   | 1.6   |
| 11-15 cigarettes a day            | 4   | 1.1   |
| Total                             | 370 | 100.0 |
| <b>Ever use or chewed Khat</b>    |     |       |
| Yes                               | 32  | 8.6   |
| No                                | 338 | 91.4  |
| Total                             | 370 | 100.0 |
| <b>Current chewing chat users</b> |     |       |
| I don't use at all                | 353 | 95.4  |
| I sometimes use chewing chat      | 12  | 3.2   |
| I regularly use chewing chat      | 5   | 1.4   |
| Total                             | 370 | 100.0 |

#### 4.16. Perception of Weight Status

This section addresses weight-related variables, including self-perceived weight status and measurements of weight, height, and BMI calculations.

Table 4.17 below indicates how respondents assessed their current weight status (perceived weight status) whether they considered themselves underweight, average weight, overweight, and obese. The BMI was calculated using the height and weight of the participant, and the WHO's BMI classification was applied.

Although less than 7 percent of the respondents had actual weight that classified them underweight, while nearly 18 percent of the participants classified their weight as underweight, including those whose current weight placed them in the normal, overweight and obese categories. For participants whose actual weight is in the normal category, 61.5 percent (n=80)

accurately perceived their present weight with their actual weight, while 29.2 percent (n=38) underestimated their weight status and 9.2 percent (n=12) overestimated their weight status. Those who were overweight, 34.2 percent (n=38) accurately perceived their present weight against their real weight; however, 64 percent (n=71) underestimated their weight and over 1.8 per cent (n=2) overestimated their weight. Study participants with a BMI of 30.0 were more likely to match their current and real weights correctly, while 20.0 (n=18) percent correctly matched their current and actual weights, and 80% (n=72) underestimated their current weights.

In all, 50% of individuals misjudged their current weight (weight status perceived), compared to 40% who matched the two weights correctly. Less than 10 percent cent were over estimated. The study found a significant association (Chi-square test,  $P < 0.001$ ) between the mean of the actual weight and the perception of current BMI.

**Table 4.17:** Participant's Self-Perception of Current Weight Compared to Their Actual BMI

|                                              |                          | SELF-PERCEPTION OF CURRENT WEIGHT |               |             |          | Total      |
|----------------------------------------------|--------------------------|-----------------------------------|---------------|-------------|----------|------------|
|                                              |                          | Underweight                       | Normal weight | Over weight | Obese    |            |
| <b>ACTUAL WEIGHT Kg/m<sup>2</sup> (BMI )</b> | Underweight <18.5        | 11(47.8)                          | 12(52.2)      | 0(0.0)      | 0(0.0)   | 23(6.5)    |
|                                              | Normal weight 18.5-24.9  | 38(29.2)                          | 80(61.5)      | 12(9.2)     | 0(0.0)   | 130(36.7)  |
|                                              | Overweight 25-29.9       | 8(7.2)                            | 63(56.8)      | 38(34.2)    | 2(1.8)   | 111(31.4)  |
|                                              | Obesity Obl.II.111 >30.0 | 6(6.7)                            | 32(35.6)      | 34(37.8)    | 18(20.0) | 90(25.4)   |
| <b>TOTAL</b>                                 |                          | 63(17.8)                          | 187(52.8)     | 84(23.7)    | 20(5.6)  | 354(100.0) |
| Chi-square: 115.7 & Df 9 .PV=0.0001          |                          |                                   |               |             |          |            |

Tables in parenthesis are percentages.

#### **4.16.1 Participants' perception of appropriate weight compared to the actual weight**

In this section, the respondents were asked about their understanding of healthy weights, such as underweight, normal weight, overweight and obese, compared to their actual weight.

According to the findings, 56.5 percent (n=13) of the participants gave appropriate weights in the underweight category, and almost 44 percent (n=10) in the overweight and obese category. 73.2 percent (n=93) of the participants perceive their weight as normal weight while 36.7% (n=127) of total participants fall under the normal weight category. 26.8 percent (n=34) respondents were in the overweight and obese categories. Thus, the majority of participants of average weight gave the correct weights within the normal range.

For overweight and obese category, 36.2 percent (n=71) of participants provided weights that placed them in the average category; nevertheless, 63.8 percent (n=125) considered an appropriate weight to be in the overweight category. Of 56.5% (n=13) participants who assessed their proper weights to be underweight, matched what they perceived as proper weight for them with their actual weight. About 43.5% (n=10) mismatched their actual weight in the overweight and obese category. Furthermore, 73.2% (n=93) respondents matched what they perceived as an appropriate weight for them with their actual weight of those who perceived their appropriate weights to be expected. 26.8% mismatched; their actual weight was in the overweight and obese category.

Finally, among those who thought being in the overweight category was appropriate for them, 63.8% (n=125) correctly matched their actual weight, whereas 36.2% mismatched; they were normal weight category. When matching perception of appropriate weight with actual examined weight, 65% of participants responded to actual weight categories; in other words, 65% considered their actual weight to be appropriate for them.

Interestingly, despite the fact that just 36.7 percent of the sample was of average weight, 73% of the sample gave appropriate weights in the normal range. However, approximately 30% provided weights that were in the overweight category and obese category. These figures demonstrate a predilection among a significant group (30%) for weights that have negative health implications and found a significant difference ( $p < 0.0001$ ) between the means of perception of appropriate weight and current actual weight. Only 2.5% respondents did not answer the perception of appropriate weight.

**Table 4.18:** Participants' Perception of Appropriate Weight Compared To Actual Weight

|                                             |                         | Perceived appropriate weight |               |                  | Total      |
|---------------------------------------------|-------------------------|------------------------------|---------------|------------------|------------|
|                                             |                         | Underweight                  | Normal weight | Overweight/obese |            |
| <b>ACTUAL WEIGHT Kg/m<sup>2</sup> (BMI)</b> | Underweight <18.5       | 13(56.5)                     | 0(0.0)        | 10(43.5)         | 23(6.6)    |
|                                             | Normal weight 18.5-24.9 | 0(0.0)                       | 93 (73.2)     | 34(26.8)         | 127(36.7)  |
|                                             | Overweight/Obesity >25  | 0(0.0)                       | 71(36.2)      | 125(63.8)        | 196(56.6)  |
| <b>TOTAL</b>                                |                         | 13(3.8)                      | 164(47.4)     | 169(48.8)        | 354(100.0) |
| Chi-square: 238.2 &Df 4 .PV=0.0001          |                         |                              |               |                  |            |

Values in parenthesis are percentages

#### 4.16.2. Participants' perceptions of husbands' opinion on weight compared to actual weight

Only those who currently married were asked about their husband's perception of her actual weight. Participants were asked about their husband's opinion into four categories: underweight, normal weight, overweight and obese. Twenty-six percent recorded perceptions of their husbands' opinions consistent with the participant's current weight category. While only 3.3% (n=6) were underweight, 15.6% (n=28) of the participants believed that their husbands considered them underweight. Other than that, only 2 participants who had an actual weight in the underweight category thought that their husbands considered their weight overweight. Of those that perceived their husbands' opinion on their weight to be of the normal weight category were (n=29), only 31% participants were of average weight, while 44% were overweight, and 23% were obese (BMI 30.0). Of those who perceived their husbands' opinion on their weight to be overweight, 42.5% were overweight; slightly more than half of the participants, 51.5% were obese and 6% average weight. Finally, those who perceived their husbands' opinions on their weight to be obese (n= 2) 100% were obese. About 13% of the respondents did not perceive their husband's opinions of their actual weight and reported it as an (unknown) category.

In summary, approximately 60 % of the participants stated that their husbands would classify their weight as less than their actual BMI. The study found a significant association ( $P < 0.001$ ) between the mean perception of husbands' opinions and actual BMI.

**Table 4.19: Participants' Perception of Husbands' Opinion of Weight Compared To Participants' Actual BMI**

|                                              |                          | Participants' perception of husbands' opinion on weight |               |             |        |          | Total      |
|----------------------------------------------|--------------------------|---------------------------------------------------------|---------------|-------------|--------|----------|------------|
|                                              |                          | Under weight                                            | Normal weight | Over weight | Obese  | unknown  |            |
| <b>ACTUAL WEIGHT Kg/m<sup>2</sup> (BMI )</b> | Underweight <18.5        | 2(33.3)                                                 | 2(33.3)       | 0(0.0)      | 0(0.0) | 2(33.3)  | 6(3.3)     |
|                                              | Normal weight 18.5-24.9  | 15(30.0)                                                | 29(58.0)      | 2(4.0)      | 0(0.0) | 4(8.0)   | 50(27.8)   |
|                                              | Overweight 25-29.9       | 7(10.3)                                                 | 41(60.3)      | 14(20.6)    | 0(0.0) | 6(8.8)   | 68(37.8)   |
|                                              | Obesity Obl.II.111 >30.0 | 4(7.1)                                                  | 21(37.5)      | 17(30.4)    | 2(3.6) | 12(13.3) | 56(31.1)   |
| Total                                        |                          | 28(15.6)                                                | 93(51.7)      | 33(18.3)    | 2(1.1) | 24(13.3) | 180(100.0) |
| Chi-square: 38.009 & Df 12 .PV=0.0001        |                          |                                                         |               |             |        |          |            |

Values in the parenthesis are percentages

#### 4.17: Distribution of respondents by waist circumference

Table 4.20 below presents the distribution of respondents by waist circumference, which is in line with WHO classification of the women's waist measurements and their average waist circumference recorded as <80 cm, increased 80-88cm, and substantially increased >88 cm. Equally, the waist circumference mean was  $92.26 \pm 14.950$  cm, respectively. The lowest waist circumference was 61.0 cm, while the highest was 138 cm. About 370 female respondents interviewed, the majority (58.7%) had a waist circumference above 88cm.

**Table 4.20:** Distribution of Respondents by Waist Circumference

|                                 |              | Frequency | Percentage |
|---------------------------------|--------------|-----------|------------|
| <b>WAIST CIRCUMFERENCE (CM)</b> | <80 cm       | 86        | 24.5       |
|                                 | 80-87 cm     | 59        | 16.8       |
|                                 | $\geq 88$ cm | 206       | 58.7       |
| Total                           |              | 351       | 100.0      |

5% of the respondents refused the waist circumference measurement

##### 4.17.1: Distribution mean waist circumference and age groups

Table 4.21 below presents an association of waist circumference by age groups. The findings revealed that 24.5% of the study participants had an average waist circumference. In comparison, 16.8% participants had increased waist circumference, and more than a half (58.7%) had extremely increased waist circumference, which categorizes them in the very high health risk group. The waist circumference indicates that the abdominal obesity rate is high among women over 35 years of age. The observed trend indicates the percentage of waist circumference with age. As age increases, so does the likelihood of high waist circumference. Thus, it found a significant difference between the study respondents' age category and their WC ( $p = 0.001$ ).

**Table 4.21:** Mean Waist Circumference and Age Groups

| Age Group                         | WAIST CIRCUMFERENCE (CM) |          |           | Total      |
|-----------------------------------|--------------------------|----------|-----------|------------|
|                                   | <80 cm                   | 80-87 cm | ≥88 cm    |            |
| 18-22                             | 46(53.5)                 | 17(19.8) | 23(26.7)  | 86(24.5)   |
| 23-27                             | 30(27.5)                 | 22(20.2) | 57(52.3)  | 109(31.1)  |
| 28-52                             | 10(7.0)                  | 17(12.0) | 115(81.0) | 142(40.5)  |
| 53-73                             | 0(0.0)                   | 3(21.4)  | 11(78.6)  | 14(4.0)    |
| Total                             | 86(24.5)                 | 59(16.8) | 206(58.7) | 351(100.0) |
| Chi-square: 86.6&Df 10 .PV=0.0001 |                          |          |           |            |

Values in parenthesis are percentages.

#### 4.17.2. Distribution of waist circumference and marital status

This study shows a much higher percentage of 70% of waist circumference in the ever-married group, noticing that the odds of ever-married participants have a much significantly higher waist than that of a single woman. Married women were more prone to have a large waist than non-married ones. There was crucial association ( $p<0.001$ ) between the study respondents' marital status and their WC. The married group was almost two times more likely to have a larger waist than the single group.

**Table 4.22:** Mean Waist Circumference and Marital Status

|                                     |          | MARITAL STATUS |              | Total      |
|-------------------------------------|----------|----------------|--------------|------------|
|                                     |          | Single         | Ever-married |            |
| <b>WAIST CIRCUMFERENCE (CM)</b>     | <80 cm   | 59(68.6)       | 27(31.4)     | 86(24.5)   |
|                                     | 80-87 cm | 19(32.2)       | 40(67.8)     | 59(16.8)   |
|                                     | ≥88 cm   | 27(13.1)       | 179(86.9)    | 206(58.7)  |
| Total                               |          | 105(29.9)      | 246(70.1)    | 351(100.0) |
| Chi-square: 89.307&Df 12 .PV=0.0001 |          |                |              |            |

Values in parenthesis are percentages.

#### 4.17.3. Distribution of the waist-hip ratio

The study combined the Waist and hip circumference, and the waist-hip ratio (WHR) ratio equaled to 0.85 ( $\pm 0.072$ ) for the female respondents and the cut-off points of <0.8 (Normal WHR) and >0.8 (High WHR) used for females.

#### 4.18. Health problems stated by respondents

Table 4.23, depicts health problems stated by respondents. Most participants were aware of obesity implications, including hypertension, diabetes, heart disease and high cholesterol. There was 7.8 percent of female subjects suffering from diabetes. About 2.2% heart diseases, 1.6% cancer, 6.5 % high blood pressure, 5.1% high cholesterol, 3.2% joint problem, and approximately 9% other health problems. There were almost 65% of female subjects who did not exhibit any health problems.

**Table 4.23:** Health Problems Stated By Respondents

|     | Diabetics | Heart disease | Cancer    | High blood pressure | High cholesterol | Joint problem | Other health problems |
|-----|-----------|---------------|-----------|---------------------|------------------|---------------|-----------------------|
| Yes | 29(7.8)   | 8(2.2)        | 6(1.6)    | 24(6.5)             | 19(5.1)          | 12(3.2)       | 33(8.9)               |
| NO  | 341(92.2) | 362(97.8)     | 364(98.4) | 346(93.5)           | 351(94.9)        | 358(96.8)     | 337(91.1)             |

Values in parenthesis are percentages.

#### 4.19. Health problems they stated in selected respondent's families

Table 4.24 shows the distribution of health problems stated in respondent's families. Participants were asked about their family's health problems. The results showed that 26.5% of respondents' families have diabetes, 7.6% had heart diseases, 4.1% had cancer, 26.2 % had high blood pressure, 10.5% had high cholesterol, 8.4% had joint problems and approximately 5% had other health problems. In Overall, only 13 % of the family members did not exhibit any health problems, while 87% are suffering from all kinds of diseases mentioned in the table below.

**Table 4.24:** Health Problems Stated In Selected Respondent's Families.

|     | Diabetics | Heart disease | Cancer    | High blood pressure | High cholesterol | Joint problem | Other health problems |
|-----|-----------|---------------|-----------|---------------------|------------------|---------------|-----------------------|
| Yes | 98(26.5)  | 28(7.6)       | 15(4.1)   | 97(26.2)            | 39(10.5)         | 31(8.4)       | 15(4.1)               |
| NO  | 272(73.5) | 342(92.4)     | 355(95.9) | 273(73.8)           | 331(89.5)        | 339(91.6)     | 355(95.9)             |

Values in parenthesis are percentages.

#### 4.20. Anthropometric measurements

Table 4.25 presents anthropometric measurements. In the study population, the BMI and the waist circumference mean are high, where the waist circumference mean is over 90 cm, and the body mass index falls into overweight category.

**Table 4.25:** Anthropometric Measurements

| VARIABLES                  | MEAN $\pm$ S.D     |
|----------------------------|--------------------|
| WEIGHT                     | 69.74 $\pm$ 16.96  |
| HEIGHT                     | 161.47 $\pm$ 6.69  |
| WAIST CIRCUMFERENCE        | 92.26 $\pm$ 14.950 |
| HIP CIRCUMFERENCE          | 108.33 $\pm$ 15.37 |
| WAIST TO HIP CIRCUMFERENCE | 0.85 $\pm$ 0.72    |
| BODY MASS INDEX (BMI)      | 26.72 6.140        |

## **5. DISCUSSION AND CONCLUSIONS**

### **5.1 Introduction**

There is no literature presenting evidence of the obesity prevalence among Somali women to the best of our knowledge. As a result, this study comprises sections that provide socio-demographic factors, physical activity, dietary intake, perception, attitude, and behaviors among adult women in Mogadishu, Somalia. Lastly, this research presents implications, recommendations, and directions for future research and education for Somali women over 18 years old.

### **5.2 Socio-demographic and socio-economic of the study population**

A total of 370 Somali women within the age of 18 years and above participated in the study. The study participants' mean age was 29.92 years and the median age was 27 years. In the current study, women of 35 years or more suffer from obesity and overweight; like China and Nigeria, overweight rates were also higher among middle-aged women (75,155).

Based on the BMI measurements, the distribution of both overweight and obesity among the study participants' age groups showed that obesity increased with age. Of the participants who were obese, 60% were of the age of 35 years and above. There was a significant association between the study respondents' age category and BMI status ( $p=0.001$ ). The study by Muhihi et al. also revealed that the prevalence of obesity increases with age. It is argued that age and obesity relation could not be separated because physical activities decrease as one ages (156).

There was a significant association between the study respondents' age category and BMI status ( $p=0.001$ ). Obesity prevalence increased with age, the rate was lowest in the youngest age groups 18-22 and 23-27. Among the youngest age group (18-27), married women were 5.5 times more likely to be obese than their single counterparts ( $p>0.001$ ).

Parity is highly significant for overweight women. It is especially significant for women who have five or more children. The respondents' education and occupation level were significantly associated with obesity ( $P<0.001$ ). It showed that women with a low level of education had the highest prevalence of obesity. This study's findings are similar to the study done by Grace and Ferdinand (2011) which states that those with no formal education had the highest obesity prevalence. Furthermore, in the current study, self-employed women and housewives were also found to be more obese. Moreover, monthly income had a positive association with the prevalence of obesity. Somali women who came from lower middle income had the highest prevalence ( $p>0.05$ ), parallel to several studies' findings. However, those who had a history of

obesity in their family had a mean BMI greater than those without a history of obesity in their family.

Carbohydrates were the most common food meals, with 70% of respondents reporting daily consumption of Somali bread (Anjero). In addition, meat was eaten by the majority of Somali women, with 64% reporting daily consumption. While at least 41.4% of the participants reported current use of a cola type drink, 88.9% were daily tea users, most of whom have tea with excess sugar. In general, 6.2 % (n=23) of the participants were cigarette smokers. About 8.6% of the respondents chewed khat. Obesity appeared to be an important public health problem among adult women in Mogadishu for which age, marital status and education are some of the important predictive factors.

### **5.3 Prevalence of overweight and obesity among adult women**

No previous studies were carried out in Mogadishu, Somalia, about obesity, making it difficult to compare. The first objective of this research study was to estimate and describe the prevalence of overweight and obesity among adult females in Mogadishu, Somalia. Almost seven percent of the study sample was underweight, 36.7% were of normal weight, 31.4 % were overweight, and 25.4% were obese.

According to a study done in seven African countries, the prevalence of overweight and obesity was very high in this population at 67.2% and complements studies showing the increase in overweight and obesity among the rural-urban populations as highlighted by study done in seven African countries; Malawi, Senegal, Kenya, Ghana, Tanzania, Niger and Burkina Faso (Ziraba et al., 2009; Martorell et al., 2000).

This study's finding indicated that more than half of the participants were overweight or obese. The study found that two thirds of the women (58.7%) had waist circumference measurements above  $\geq 88$  cm which categorizes them in the very high health risk group, with 16.8% having waist circumferences of 80-87 cm. A comparison of the mean waist circumference among different age groups showed that the older people were, the greater their waist circumference increased.

In all, 50% of the participants misjudged their current weight (weight status perceived), compared to 40% who matched the two weights correctly. Less than 10 percent participants were overestimated. The study found a significant association ( $P < 0.001$ ) between the mean of the actual weight and the perception of current BMI.

#### **5.4. Knowledge, perceptions, attitudes, and behavior about obesity**

To assess the participant knowledge of obesity, the study investigated the relationship between the following factors: obesity and beauty, obesity and power, obesity and wealth, obesity and health explained their opinions. Nearly half of the participants associate being obese beauty from an appearance point of view. Most of the participants mentioned that being obese or overweight is different from their style and their husbands support them in gaining weight.

Moreover, 25% of the participants mentioned that being obese is ugly, and 10% did not know the question while 20% did not respond. The results showed that 35 percent of the study participants agreed with power-related obesity i.e., when a person is obese or overweight it is a sign that an individual has some power and is valued in the community. Approximately 33% of the participants opposed the concept of obesity and power and indicated that obesity and power are two different factors that seemed to have no understanding or awareness of the issue. Only 20% of the participants did not respond to obesity and power.

More than 33% of the respondents believed that obesity was related to prosperity, which means being obese is a sign that shows one's wealth and respect. In comparison, 35% did not believe that obesity is a symbol of being rich. On the other hand, 10 percent of the participants did not know about the problem, and 20 percent did not answer.

This study also revealed that about 40% of participants know that obesity is a significant risk factor for NCDs, while about 30% agree that obesity is part of health. Ten percent of the participants did not know the question, and 20 percent did not respond.

Almost all of the articles that were analyzed commented on weight misperception. Almost all experiments discovered that certain overweight and obese respondents do not view themselves as overweight or obese, and thus underestimate their weight.

This demonstrates that many overweight and obese people do not perceive themselves as overweight or obese. Moreover, obese respondents were more likely to underestimate their weight than overweight respondents because of the essential difference found between the mean of the actual weight and the perceived of current BMI,  $p < 0.0001$ .

In overweight and obese respondents, a lack of knowledge about ideal body weight was associated with underestimating weight status, being dissatisfied with one's body, and having a lower desire to lose. Studies conducted in Africa reveal that white women tend to perceive themselves as overweight despite being normal, whereas black women tend to think of

themselves as obese (157). A study conducted in Bogalusa revealed that black women tend to feel thinner than their actual weight, while white women believe they are heavier (158).

The current study revealed that women are more likely to resemble the African women in Bogalusa, who think they are overweight. Thus, as a result, it can be deduced that women in Mogadishu accept being overweight as the norm because it's culturally and socially acceptable.

### **5.5. Study limitations**

Due to financial constraints, geographical coverage, and sample size, the study's size was minimal. The information collected might not be of a good representation of the study population. Furthermore, our subjects represented a convenience sample, and we could not accurately capture obesity prevalence. The physical activity tool was not evaluated for the study population; therefore, the primary findings could have been underestimated or inflated.

### **5.6 Recommendations**

This study conducted to produce recommendations for the Somali community. The study's findings led to several recommendations concerning overweight or obesity among adult women in Mogadishu, Somalia. The study highlights the need for awareness about the various types of obesity and its effects on urban women, the study points out a need for lifestyle changes related to improved physical activity and healthy eating.

Participants may need to comprehend the phenomena of obesity and being overweight, as well as the consequences they have on their health. The educational program would not only illustrate what obesity and being overweight are, but it would also cover the impact of their lifestyles, beliefs, attitudes, and perceptions regarding obesity.

Since childbirth is one of the causes of weight gain, mothers should be advised about postpartum exercises, which should preferably be learned before the mother is released from the hospital. Follow-up should be achieved anytime the mother brings her infant to the doctor for immunization. Along with the child's immunization card, a card for the mother may be issued. Women who are unable to control their weight may seek advice from a doctor.

The current study demonstrates that women who are overweight consider themselves thin. These perceptions related to overweight among women have to change considerably. Effective use of media like newspapers and television can educate women about the adverse health effects of obesity.

This study sample consumed a lot of sugar as part of their diet, both in their meals as well as in tea and drinks. To overcome the excess consumption of sugar, educational seminars and awareness programs are highly recommended at community level and government level.

Many individuals had difficulty answering physical exercise questions. A more practical and simple technology has to be developed to measure physical activity.

Similarly, there is need for a tool to be developed for diet purpose in hospital or community service settings. In the present study, some participants could not provide an accurate answer to a few simple questions about the food items that were asked.

The study showed that overweight and obesity in Mogadishu were not restricted solely to the high socio-economic classes. The issue persists in the lower socio-economic classes; therefore, it is essential to place reasonable measures affecting all socio-economic groups. This will help to clarify the main problem factors that contribute in particular populations to overweight and obesity. Solutions or measures can then be placed in context-specific and appropriate field. Community services, such as community centres or fitness facilities, for example, may be used. Infrastructure enhancement will produce a more favorable atmosphere for physical activity. These may be in the form of sidewalks where individuals may walk or work. This study should be repeated and a comparison to be made with similar studies conducted in other cities of Somalia to determine whether the issue of overweight and obese is widespread and not a particular problem for Mogadishu. This will assist in identifying the variables that lead to women's overweight and obesity in these other fields.

## 5.7 Conclusions

Overweight and obesity prevalence of adult Somali females from Mogadishu aged  $\geq 18$  years is almost 57%, the prevalence being highest among those of participants aged  $\geq 40$  and who are married, illiterate, and housewives had a family history of obesity.

The data provided here is essential. A serious public health issue that needs the attention of decision-makers and politicians in this country is that nearly 90 percent of Somali women of reproductive age and almost 33 percent of ever-married women are obese.

The prevalence of overweight and obesity was found to be 31.4 % and 25.4%, respectively. This study revealed an emerging public health problem of overweight and obesity in adult women in Mogadishu, Somalia.

Optimal health is imperative to all human beings' overall welfare. It promotes longevity, reduces the burden of healthcare costs, and increases life quality, promoting individual goals, expectations, and achievements.

To conclude, Somali adult women in Mogadishu have high levels of obesity and overweight. However, factors like age, occupation, and socio-economic status cannot be controlled; the perception towards overweight can be changed by early intervention so that weight reduction may be more comfortable.

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## 7. APPENDICES

### 7.1 Ethical Approval



**Sayı :** 37068608-6100-15- 1677  
**Konu:** Klinik Araştırmalar  
Etik kurul Başvurusu hk.

30/05/2019

İlgili Makama (Bisma Abdullah Ali)

Yeditepe Üniversitesi Halk Sağlığı Anabilim Dalı **Prof. Dr. Recep Erol Sezer**'in sorumlu araştırmacı olduğu "**Mogadishu'da  $\geq 18$  Yaş Üzeri Kadınlarda Obezite Prevalansı Ve İlişkili Faktörler**" (**Bilgi, Algı, Ve Davranışlar**)" isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (**1653**) kayıt Numaralı KAEK Başvuru Dosyası), Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **29.05.2019** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isimi belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir ( **KAEK Karar No: 1027**).

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

### 7.2 INFORMED CONSENT

**STUDY TITLE: Across-sectional study: Prevalence of obesity and related factors (Knowledge, Perceptions, Attitudes AndBehaviors) in women aged  $\geq 18$  years in Mogadishu, Somalia.**

The study is conducted by **Bisma Abdullahi Ali**, a Post Graduate student at **Yeditepe University, Istanbul Turkey**. Hereby I am conducting an interview to get related information for this research. 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.

The overall objective of this study is to understand prevalence of obesity and related factors (knowledge, perceptions attitudes behaviors) in women aged  $\geq 18$  years in Mogadishu Somalia. Participation in this study typically takes 20-30 minutes and is strictly anonymous. Participants will be interviewed by the researcher. The study Participants will complete a detailed interview comprising of two sections. The first part questions on personal characteristics such as level of education, employment status, income, marital status, regular habit of physical activities,, perception and knowledge related to overweight, obesity and so on. The second part includes measurements of Anthropometry such as height, weight (BMI), waist circumference and hip circumferences.

The information given by you shall not be disclosed to anyone under any circumstances anywhere in the public at any time. It shall be kept confidential and used for research purposes only. Participation is only voluntary nature. If at any time, you want to stop answering the questions or choose not to answer some of the questions you can refuse to do so. Your honest and sincere cooperation in responding to this questionnaire will be highly appreciated.

If you are  $18 \geq$  years of age, 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 Don't Agree

☐

| Participant       |  | Signature |
|-------------------|--|-----------|
| NAME &<br>SURNAME |  |           |
| ADRESS            |  |           |
| TEL.              |  |           |
| DATE              |  |           |

| Researcher        |  | Signature |
|-------------------|--|-----------|
| NAME &<br>SURNAME |  |           |
| DATE              |  |           |

### 7.3 QUESTIONNAIRE

**Name of the Hospital:** \_\_\_\_\_

**Area of the resident**

Urban area with a good living environment

Urban area with a bad living environment

**Year of birth** | \_\_\_\_\_ |

**Marital status**

Single

Married

Divorced

Widowed

**5. Level of Education:**

can't read and write

No formal education but at least can read

Primary school

Intermediate school

High school

College/University

**6. What is the highest level of schooling your mother attained?**

can't read and write

No formal education but at least can read

Primary school

Intermediate school

High school

College/University

I don't know

**7. What is the highest level of schooling your father attained?**

can't read and write

No formal education but at least can read

Primary school

Intermediate school

High school

College/University

I don't know

**8. What is your occupational status?**

Housewife

Self-employed (Specify please).....

Employed (Specify please).....

Unemployed

Student

**9. How much income does your family members get on average in a month?**

-----

**10. If you have children, what is the number of your children?**

-----

**11. Are you taking any medication regularly in specific condition?**

No

Yes (Please specify) \_\_\_\_\_

**12. Is any of your parents obese?**

One of the is obese

Both of them are obese

None of them is obese

**13. For each food item, indicate with a check mark (v) the category that best describes the frequency with which you usually eat that particular food item.**

| FOOD ITEM                         | Once a day | More than once per day | 1-3 times per week | 4-6 times per week | Once a month or less | NEVER |
|-----------------------------------|------------|------------------------|--------------------|--------------------|----------------------|-------|
| RICE                              |            |                        |                    |                    |                      |       |
| SPAGHETTI                         |            |                        |                    |                    |                      |       |
| MAKARONI                          |            |                        |                    |                    |                      |       |
| BREAD                             |            |                        |                    |                    |                      |       |
| CANJELO                           |            |                        |                    |                    |                      |       |
| BURGERS/PIZZAS<br>ANY FRIED CHIPS |            |                        |                    |                    |                      |       |
| SWEETS, BAKERY<br>AND BISCUITS    |            |                        |                    |                    |                      |       |
| ICECREAM                          |            |                        |                    |                    |                      |       |
| FRUITS                            |            |                        |                    |                    |                      |       |
| RED MEAT                          |            |                        |                    |                    |                      |       |
| FISH                              |            |                        |                    |                    |                      |       |
| CHICKEN                           |            |                        |                    |                    |                      |       |
| BEANS, CHICPEA                    |            |                        |                    |                    |                      |       |

|                                   |  |  |  |  |  |  |
|-----------------------------------|--|--|--|--|--|--|
| LENTIL AND PEAS                   |  |  |  |  |  |  |
| EGGS                              |  |  |  |  |  |  |
| VEGETABLES(FOR<br>SALAD PURPOSE ) |  |  |  |  |  |  |
| VEGETALES(FOR<br>MEALS PURPOSES   |  |  |  |  |  |  |

**14. What do you normally use for cooking?**

|               | FREQUENTLY | SAMETIMES | RERELY | NEVER |
|---------------|------------|-----------|--------|-------|
| VEGETABLE OIL |            |           |        |       |
| GHEE          |            |           |        |       |
| BUTTER        |            |           |        |       |
| MARGARINES    |            |           |        |       |

**15. Do you take sugary drinks?**

**Yes**

**No**

**16-.If Yes: On average, how many glasses of the following drinks do you take?**

| BEVERAGE<br><br>Note : 1 cup=200 ml                         | Per day/Per week/<br>per month |
|-------------------------------------------------------------|--------------------------------|
| Coca-Cola                                                   |                                |
| Pepsi- Cola                                                 |                                |
| Fanta/ sprite and other similar<br>sugar sweetened products |                                |
| Fused Tea/ Ice Tea with sugar                               |                                |
| Sweetened homemade drinks                                   |                                |
| Other sweetened manufactured<br>Drinks                      |                                |
| Fresh fruit Juices                                          |                                |

**17. How many cups of tea, coffee and milk do you drink a day and what about the amount of sugar you use?**

| CUPS YOU DRINK PER DAY | The Amount of sugar you use |
|------------------------|-----------------------------|
| TEA                    | A little                    |
|                        | Moderate                    |
|                        | Extra                       |
|                        | None                        |
| COFFEE                 | A little                    |
|                        | Moderate                    |
|                        | Extra                       |
|                        | None                        |
| Milk                   | A little                    |
|                        | Moderate                    |
|                        | Extra                       |
|                        | None                        |

**18. Have you ever-family members or friends discouraged you from adding sugar while consuming hot drinks or cold drinks?**

Always

Rarely

Never

Sometimes

Don't Know

**19. Have you ever had a tooth extracted or filled?**

Yes

No

**20. If yes how many**

Extracted .....

Filled.....

**21. Currently, do you have a tooth problem like a pain or swelling?**

Yes

No

**22. How frequently do the following eating behaviors occur for you? Tick as appropriate**

| BEHAVIOUR                           | ALWAYS | FREQUENTLY | SOMETIMES | RARELY | Never |
|-------------------------------------|--------|------------|-----------|--------|-------|
| Eat Something while watching the TV |        |            |           |        |       |
| Eat when bored                      |        |            |           |        |       |
| Eat when angry /upset/negative mood |        |            |           |        |       |
| Eat snacks late at night            |        |            |           |        |       |

**23. Are you participating in any physical activity addition to your daily living activities?**

Yes

No

**24. If yes, what physical activities do you engaged?**

| Type of activity (Over the last month) | Times/week | Duration /hours |
|----------------------------------------|------------|-----------------|
|                                        |            |                 |

**25. On average, how many hours do you sleep in a day?**

-----

**26. How many hours per day do you usually watch TV/video movies, or play video games like play station? -----.**

**27. Have you ever smoked at least 100 cigarettes or other tobacco products in your entire lifetime?**

Yes

No

**28. Do you currently smoke cigarettes or other tobacco products?**

Everyday

Some days

Not at all

**29. If yes, how many cigarettes per day/ week?**

-----

**30. Have you ever tried Chewing khat?**

Yes

NO

**31. Do you currently use Chewing khat?**

I don't use at all                      I sometimes use chewing khat ( specify please .....)

I regularly use chewing khat (specify please .....)

**32. How do you rate your body weight?**

Normal weight Underweight

Overweight Obese

**33. Are you satisfied with your current body weight?**

Yes No

**34. If No, in which way, would you like to change it?**

-----

**35. If you are married, what does your husband feel about your bodysize ?**

underweight

normal weight

overweight

obese

very obese

I don't know

**36. Do you have any of the following medical conditions? Check all that applies**

Yes      No

**37. If yes (You may choose more than one answer)**

Diabetes              High blood pressure

Heart disease              High cholesterol

Cancer              Joint problem

Other.....

**38. Is there a family history of the following medical conditions?.**

Yes                      No

**39. If yes (You may choose more than one answer)**

Diabetes                      High blood pressure

Heart disease                      High cholesterol

Cancer                      Joint problem

Other.....

|                                                                                                                                                           |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><b>40.</b> Could you give your opinion towards weight and beauty?</p> <p>Weight and power?</p> <p>Weight and prosperity?</p> <p>Weight and health?</p> |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**Your consent for the measurement of your weight, height and waist circumference and Hip Circumference is being sought for. Please kindly tick the box below as appropriate. Thanks.**

**[ ] I would like my weight, height, waist circumference and hip circumference to be measured**

**[ ] I would not like my weight, height, waist circumference and hip circumference to be measured**

**ANTHROPOMETRY (TAKE THE EXACT MEASUREMENTS)**

| Measurement                                                                                                         | 1st Reading | Average |
|---------------------------------------------------------------------------------------------------------------------|-------------|---------|
| <b>Weight (kg)</b> – Calibrate scale to zero, take to the nearest 100g, after removal of shoes and excess clothing. |             |         |
| <b>Height (cm)</b> – To the nearest 0.5 cm without shoes.                                                           |             |         |
| <b>BMI (kg/m<sup>2</sup>)</b> - Calculated as weight in kg divided by Height in meters squared.                     |             |         |
| <b>Waist Circumference (cm).</b>                                                                                    |             |         |
| <b>Hip Circumference (cm)</b>                                                                                       |             |         |