ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH

Assessment of association between Sleep quality and Overweight/Obesity among adults in Addis Ababa, Ethiopia

By: Muna Shemsu (BSc)

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirement for the Degree of Masters of Public Health in Public Health Nutrition

October, 2019
Addis Ababa, Ethiopia

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List of abbreviations

BMI	Body Mass Index
DALYs	Disability Adjusted Life Years
DM	Diabetes Mellitus
EDHS	Ethiopian Demographic Health Survey
FAO	Food and Agriculture Organization
FFQ	Food Frequency Questionnaire
GPAQ	Global Physical Activity Questionnaire
NHMS	National Health and Morbidity Survey
NSF	National Sleep Foundation
OR	Odd Ratio
PCA	Principal Component Analysis
PHQ	Patient Health Questionnaire
PSQI	Pittsburgh Sleep Quality Index
SNPs	Single Nucleotide Polymorphisms
SPSS	Statistical Package for the Social Sciences
TEM	Technical Error of Measurement
TPA	Total Physical Activity
WC	Waist Circumference
WHO	World Health Organization

Abstract

Background: - Worldwide an estimated 35.8 million (2.3%) of global Disability Adjusted Life Years are caused by overweight and obesity. Emerging evidence suggests that the contribution of factors such as sleep quantity and quality to obesity need to be studied in detail as sleep disturbance could contribute to alterations in energy balance. Yet the majority of the evidence on this topic is from wealthy nations, and remains poorly understood in developing countries including Ethiopia.

Objective: - The main aim of this study was to determine the relationship between overweight/obesity and sleep quality among adult population in Addis Ababa, Ethiopia.

Methods: - A community based cross-sectional study was conducted on 575 adults who were residents of Addis Ababa. Multi stage sampling method was employed to select the study participants. Data on socio-demographic characteristics and anthropometric measurements were collected. A validated Pittsburgh Sleep Quality Index (PSQI) and Global Physical Activity Questionnaire were used to evaluate sleep quality and physical activity of study participants. Depression was assessed with Patient Health Questionnaire-9. Qualitative Food frequency questionnaire and eating habit questionnaire were used for dietary assessment. Sleep quality was categorized in to poor and good based on global PSQI score. Body mass index was computed using weight and height (Kg/m^2). Bivariate and multivariate logistic regression analysis was employed to see association between sleep quality and other covariates with overweight/obesity.

Result: - A total of 548 adults were involved in this study and 161 (29.4%) of them were overweight/obese. A total of 177 (32.3%) respondents had poor sleep quality. After adjusting for multiple factors, we found that sleep quality was associated with being overweight/obese. Specifically, the odds of being overweight/obese were 3.8 times higher among adults with poor sleep quality [AOR 3.83: 95% CI: 2.33- 6.29] than the odds among adults with good sleep quality.

Conclusion and recommendation

This study documented a considerable prevalence of overweight/obesity and poor sleep quality among adults in Addis Ababa and further showed a significant association between sleep quality

and overweight/obesity. Therefore health promotion programs targeting established risk factors for poor sleep quality are needed. In addition to this, improvements in sleep habits should be considered as part of intervention to prevent obesity.

1. Introduction

1.1. Background

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in meters). A person with a BMI equal to or more than 25 is considered as overweight and a BMI of 30 or more is generally considered obese (1).

In the past, overweight and obesity were problems of high-income countries; however, currently it is dramatically on the rise in low and middle-income countries (2). Overweight/obesity has been officially recognized as a chronic disease as well as a major risk factor for serious problems including hypertension, hypercholesterolemia, type 2 diabetes, cardiovascular disease and some types of cancer (3).

Obesity/overweight arises from the interactions between an at-risk genetic profile, behavioral and environmental risk factors, such as physical inactivity, excessive caloric intake, medications, socioeconomic status, and possibly novel factors such as, endocrine disruptors, gastrointestinal microbiome and insufficient sleep (4).

Sleep is an important physiological process for humans and it is a state of energy restoration and replenishment. Although the direct benefit of sleep is not well quantified across many populations, it is understood that sleep deprivation has serious health consequences (5).

Studies have shown that poor sleep quality affects appetite regulating hormones leptin and ghrelin that leads to increased energy intake (6). Furthermore, poor sleep quality increases cortisol and decreases thyroid stimulating hormone which leads to fat deposition and decreases metabolism in our body (7). Insufficient sleep may also leads to the development/maintenance of obesity through diminished activity in higher-order cortical evaluation regions, combined with excess sub-cortical responsivity in the amygdala, resulting in selection of foods most capable of triggering weight-gain (8). In addition to this good sleep quality is an important contributor to a physically active life style (9).

1.2. Statement of the problem

Worldwide, the proportion of adults with a Body Mass Index (BMI) of 25 or greater increased between 1980 and 2013 from about 29% to 37% in men and from about 30% to 38% in women (10, 11). In 2014, more than 1.9 billion adults were overweight and of these over 600 million were obese (12).

In Sub-Saharan Africa, between 1992 and 2005, the prevalence of overweight and obesity increased by almost threefold. The prevalence ranged from 3.5% in Eritrea to about 64% in Seychelles in 2010. There has been a rapid increase of overweight in Southern African region since 1990 with average prevalence rate of 21% in 2015 (330% increase in the last 25 years) compared to other regions (12).

The prevalence of overweight and obesity are increasing among adults in Ethiopia (13-22).The prevalence ranged from 6.5% in Bona district, Sidama zone (13) to 48.6% in Gondar (14). The overall prevalence of overweight women living in Addis Ababa increased from 16.1% to 20.6 % while obesity increased from 3.0 % to 4.3% from 2000 to 2011 (22).

The increasing prevalence of overweight and obesity, coupled with their associations with death, disability and disease, has led to their identification as a major potentially preventable cause of premature morbidity and death (23). Worldwide, at least 2.8 million peoples die each year due to overweight and obesity and an estimated 35.8 million (2.3%) of global Disability Adjusted Life Years (DALYs) are caused by overweight and obesity (2, 24).

Energy imbalance is the major cause of overweight/obesity, due to this the majority of health interventions designed to tackle obesity have targeted on diet and physical activity. Unfortunately, despite concerted efforts to tackle obesity in this way, limited success has been achieved. Moreover recent meta-analysis showed non-significant effects of sufficient and regular physical activity and balanced nutrition on prevention against overweight/obesity (25-27). Therefore, a greater understanding of other factors is needed for effective prevention and control of the problem.

Emerging evidence suggests that the contribution of factors such as sleep quantity and quality to obesity need to be studied in more detail as sleep disturbance could contribute to alterations in

the energy balance (27, 28). Furthermore, sleep should not be over-looked in obesity research and should be included as part of the life style package in addition to diet and physical activity (27).

The sleep-obesity link is particularly relevant given that sleep problems are widespread in many countries, with less than half of adults regularly getting good sleep (29). The prevalence of poor sleep quality in low and middle-income countries in working age adults was 32.8% and 33.4% in older adults (30). It is also prevalent in Ethiopia (31-38). The prevalence ranged from 52.7 % in college students (31) to 65.4 % in the community of Jimma town (32).

A number of epidemiological studies have explored the association between sleep quality and overweight/obesity (27, 28, 39-44). Some of these studies showed that poor sleep quality is associated with an increased likelihood of being overweight/obese (27, 28), while others report no association (39, 40). Yet the majority of the evidence on this topic is from wealthy nations, and remains poorly understood in developing countries (40) including Ethiopia. Furthermore, these studies suffer from methodological drawbacks. For example, the use of self-report anthropometry to assess the nutritional status of the study participants (27, 41) and failed to account important factors such as diet, sedentary behaviors and physical activity (42, 43). Our review suggests that studies that use objective measurement of sleep assessed for few days, which is quiet small to evaluate habitual sleep pattern (28, 44). Some researches didn't use validated tool for assessment of sleep quality and other confounders (27, 40, 42). Hence, this study aimed to evaluate the association between sleep quality and obesity/overweight. It was hypothesized that poor sleep quality positively associated with increased risk of obesity/overweight.

1.3. Significance of the study

The findings of this study could be used for policy makers and relevant stakeholders to consider the diagnosis and treatment of sleep disorder for effective obesity prevention and management programs. Furthermore, the findings of the study could be used as a base line to understand sleep quality and its association with overweight and obesity in the study area and by filling the gaps, will contribute to the existing literature on sleep and obesity/overweight.

2. Literature review

2.1. Magnitude of overweight and obesity

The prevalence of overweight and obesity in adults has been increasing in all countries. Globally in 2014, 39% of adults aged 18 years and older (38% of men and 40% of women) were overweight (45). The prevalence of obesity nearly doubled from 6.4% in 1980 to 12.0% in 2008 and the highest rates of obesity were observed in women, in descending order of magnitude, in Southern Africa, North Africa and the Middle East, Central Latin America, North America (United States (US) and Canada) and Southern Latin America. In men, the top 5 regions were North America (US and Canada), Southern Latin America, Australia, Central Europe and Central Latin America (10, 46). Recently, the analyses of the global burden of disease study 2013, further documented that worldwide, the proportion of adults with body mass index (BMI) of 25 or greater increased between 1980 and 2013 from about 29% to 37% in men and from about 30% to 38% in women (10, 11).

In Sub-Saharan Africa also between 1992 and 2005, the prevalence of overweight and obesity increased by almost three fold. Among men its prevalence ranged from 3.5% in Eritrea to about 64% in Seychelles in 2010. The top five countries with the highest prevalence of overweight were Seychelles (64%) followed by Mauritius (44.8%), Cameroon (43.9%), Botswana (41.6%), and South Africa (41%) (12).

The prevalence of overweight and obesity is also increasing among adults in Ethiopia (13-22). In 2015, in Northwest region of Ethiopia particularly Bahir-Dar city and its rural districts 11.3% of adults were overweight and obese, of which about 9.3% and 2% of adults were overweight and obese, respectively (17). In Gonder, prevalence of overweight was 32.4% while the prevalence of obesity was 16.2% in 2014 (14). In Mizan Aman town 12.1% and 4.0% of adults were overweight and obese respectively (15). In addition high prevalence of overweight/obesity was found in Dessie (28.5%), Mekele (28.4%), in other study of Gonder (27.2%) and Hawassa (28.2 %) (18-21). According to 2016 Ethiopian Demographic Health Survey (EDHS) 8% of women were overweight or obese and 3% of men were overweight or obese (16). The overall prevalence of overweight women living in Addis Ababa increased from 16.1% to 20.6% while obesity increased from 3.0 % to 4.3% from 2000 to 2011(22).

According to the studies overweight/obesity is a global public health problem including Ethiopia. Hence, identifying the risk factors which contribute to the rapid increment of overweight and obesity have a paramount importance in the prevention and control of this public health problem. This study was tried to see a novel, recent and important factor for the problem.

2.2. Determinants of overweight and obesity

Obesity/overweight arises from combinations of different factors. In general, it results from the interactions between an at-risk genetic profile, behavioral and environmental factors.

2.2.1. Genetics

For the majority of the population obesity is multi-factorial and polygenic. Multiple genetic variants contribute to people's susceptibility to gain weight. So far, more than 200 common genetic variants have been identified (47). The heritability (proportion of inter-individual variation attributable to genetic factors) of BMI has been estimated to be 40%–70% (4). Similarly studies that have focused on inheritance patterns rather than on specific genes have found that 80% of the offspring of two obese parents were also obese, in contrast to less than 10% of the offspring of two parents who were of normal weight (48). However, while genetic factors undoubtedly contribute to individual weight gain susceptibility, the obesity-associated single nucleotide polymorphisms (SNPs) that have been identified to date explain less than 3% of the inherited susceptibility to develop an obese phenotype (49). This result is very far from the heritability estimates of BMI rounding 40% – 80% (4, 48, 49). This situation suggests that additional genetic loci (including low/rare frequency alleles), or other genetic variants predisposing to weight gain remain to be discovered. In addition to this, the interaction between gene–environment by epigenetics mechanisms is another approach that needs to be further investigated since genes rarely have by itself the power to determine an individual's anatomy, physiology or behavior. It is the interaction between genes and environment at all stages of the life cycle, which can influence and activate weight gain (49).

2.2.2. Socio-demographic and economic factors

Researchers on socio-demographic and economic factors have different ideas as determinant factor for obesity. For instance on sex some researchers found that females are more at risk than

males others argue the vice versa (17, 50). In Spanish the prevalence of overweight plus obesity is greater in men than in women, except for those aged 45-54 years (50). Contrary to this in Ethiopia, in northern part, shows the higher odds of being overweight/obesity were noted among females as compared to males and a higher odds of being overweight/obese were noted in the age category of greater than 50 years (17).

Regard to marital status, divorced Spanish adults were more overweight and obese than married (50). Whereas the National Survey of Midlife Development in the United States (MIDUS) shows that married men were heavier than divorced or separated men but did not weigh more than never-married men. However among women it was concluded that married women had body weight equivalent to separated or divorced women. Never-married women had higher BMI and a greater likelihood of being obese than married women (51).

Researches on level of education and income also have different ideas. Some researchers found that lower levels of education and incomes were generally associated with higher likelihood of obesity and higher mean BMI (52). Contrary to this the highest prevalence rate was observed among women in Addis Ababa who belong to the household with the highest wealth quintile and women with secondary or higher education were over twice as likely to be overweight or obese compared to their counterparts with no education (22).

The odds of being overweight/obese were 3.12 times higher in urban residents as compared to rural residents of Northwestern Ethiopia (17).

2.2.3. Life style factors

2.2.3.1. Diet

Energy-dense foods which have high concentration of calories per unit of measure, often high in refined grains, added sugars, and added fats, are palatable, inexpensive, and convenient. However, they have been associated with increased energy intakes and poor diet quality. In United States of America (USA) dietary energy density was independently and significantly associated with higher BMI and waist circumference (WC). Those with increased dietary energy density had 1.11 and 1.33 greater odds of having higher WC in women and men respectively (53, 54). Similarly a recent meta-analysis on association of dietary patterns and

overweight/obesity shows, compared to the lowest categories of a healthy dietary pattern, a reduced overweight/obesity risk was shown in the highest categories. While there was an increased overweight/obesity risk in the highest when compared with the lowest categories of a western/unhealthy dietary pattern (55). In addition to this among adults in Northwestern Ethiopia those who had consumed fruits and vegetables were 49% times less likely to develop overweight/obesity (17). Although it seems obvious that unhealthy dietary patterns may be associated with obesity, there are studies that have identified no positive relationship between obesity and unhealthy dietary patterns in both young and elderly adults (56, 57). Furthermore, the studies have been mostly conducted in high-income countries and as such these findings may not be directly applicable to low and middle-income countries, given the context-specific nature of dietary patterns (58).

2.2.3.2. Physical activity

The lack of physical activity is one of the main risk factor that leads to overweight and obesity. The level of physical activity may impact the amount of weight gain occurring over time (17, 59, 60). The 2015 National Health and Morbidity Survey (NHMS), a nationwide cross-sectional survey among Malaysian adults showed that an increased level of physical activity was significantly associated with a lower risk of overweight and obesity (59). Each 2-hour daily increment spent standing or walking was associated with 9% lower risk of obesity and overweight, whereas an hour per day of brisk walking was associated with 24% lower risk (60). Similarly in Northwestern Ethiopia adults those who had performed mild to moderate physical activity were 39.2% times less likely to develop overweight/obesity (17). Even though physical activity is one way of controlling and preventing obesity, research is needed to identify the influence of individual and environmental characteristics on physical activity intervention on obesity for better management (61).

2.2.3.3. Sedentary behaviors

Sedentary behavior is known to be associated with obesity independent of leisure-time physical activity. In Young Finns one additional hour of television viewing per day was associated with 1.8±0.4 and 2±0.4 cm greater WC in women and men, respectively (62). Similarly in Canada among men, the prevalence of obesity in television viewing rose from 14% of those who

averaged 5 or fewer hours per week to 25% of those averaging 21 or more hours a week. Similar results emerged for women, with the prevalence of obesity rising from 11% of those reporting 5 or fewer hours to 24% of those reporting 21 or more hours per week. The study also found those who used computers for at least 6 hours per week had increased odds of being obese (20% higher odds for men and 30% higher odds for women), compared with those who averaged 5 or fewer hours. Among women, those who reported reading 11 or more hours per week were slightly more likely to be obese than those who averaged 5 or fewer hours (18% versus 15%) (63). However, there are studies which report no association between sedentary behavior and obesity (64). Understanding the pattern in which sedentary time is accumulated has been identified as a research priority and may explain these disparities, since studies shows that more breaks in sedentary time are associated with lower adiposity (64, 65). In addition to this there is evidence gap whether minimizing screen time or introducing frequent interruptions in sedentary time better prevent the development of obesity (65). In addition to this more researches are needed whether sedentary behavior by itself or certain types of sedentary behaviors that are coupled with other obesogenic behaviors more linked to obesity (66).

2.2.3.4. Substance use (Smoking, alcohol drinking and chat chewing)

Studies on association of alcohol intake, cigarette smoking and obesity are inconsistent. Some researchers found positive association where as others negative association (50, 67-70). In cross sectional study conducted in Spain shows that those subjects who drink alcohol daily had 1.39 times likelihood of being overweight and obese (50). However longitudinal population based study in Finland shows alcohol use during adolescence has at most a minor effect on weight gain or development of abdominal obesity from adolescence to young adulthood (67). Furthermore a prospective cohort study among 19,220 US women aged ≥39 years, compared with non-drinkers, initially normal-weight women that consumed light to-moderate amount of alcohol experienced smaller weight gain and lower risk of becoming overweight and/or obese during 12.9 years of follow-up (68).

The amount of cigarette smoked was inversely associated with BMI among Chinese adults (69). Contrary to this in Switzerland Compared with non-smokers, the odds ratio for obesity vs. normal weight was 1.9 for ex-smokers, 1.3 for heavy smokers in men and 1.3 and 1.1 respectively, in women. Which suggest smoking is a risk factor for obesity (70).

chat extracts or cathinone also produces changes in terms of weight, fat mass, appetite, lipid biochemistry and hormonal levels (71, 72).

2.2.4. Depression

Depression was associated with significantly higher daily caloric intake and hence overweight and obesity (73, 74). Prevalence of obesity increased from 25.4% among those with no depressive symptoms to 57.8% among those with moderate to severe depression among women of living in USA (73).

2.3. Magnitude of Sleep quality

Approximately one third of human's lifetime is spent sleeping. Sleep is a state of energy restoration and replenishment (75). Sleep is important for maintaining good physical, mental, and emotional health (31). According to National Sleep Foundation (NSF), sleeping more time while in bed (at least 85 percent of the total time), falling asleep in 30 minutes or less, waking up no more than once per night, and being awake for 20 minutes or less after initially falling asleep are key indicators of good sleep quality (29).

NSF's recent sleep health index revealed that as many as 27 percent of people take longer than 30 minutes, on average, to fall asleep which is one of key indicator for sleep quality. Sleep problems are widespread in many countries, with less than half of adults regularly getting good sleep (29). The pooled prevalence of poor sleep quality or dissatisfaction in a systematic review and meta-analysis of the prevalence of poor sleep quality and sleep duration among 45 publications of low and middle-income countries in working age adults was 32.8% and 33.4% in older adults (30).

Even though studies on sleep are scarce in Ethiopia, findings show that poor sleep quality is also prevalent in Ethiopia (31-38). About 52.7% of students of Gonder and Haromaya university (31), 61.6% of Deberebrahn university students (35), and 65.4% of adults in Jimma town (32) had poor sleep quality. Furthermore in the study of adult patients in St-Paul hospital in Addis Ababa 60.2% of them had poor sleep quality (33, 34).

This shows that sleep quality should not be over looked in health research and needs further studies especially related with health consequences. This study tried to see its association with overweight and obesity.

2.4. Association of sleep quality and overweight/obesity

Increasing epidemiological evidences indicate an impact of sleep duration and sleep quality on the development of overweight and obesity. Recent findings among children and adults suggest that improving sleep patterns represent a promising obesity prevention strategy (27, 28).

On Japanese community dwelling adults aged 80 years or older, those with sleep efficiency lower than 85% had a 2.85-fold increased odds of obesity, compared with those with sleep efficiency of 85% or higher (28). Similarly, among university students in Zagreb, those who had poor sleep quality were 1.40 times likely hood of being overweight/obese (27). Which is similar with a seven years prospective study, among 40 to 60 year old employees of the City of Helsinki, Finland, which found trouble falling asleep (OR= 1.65), waking up several times per night (OR= 1.49) and trouble staying asleep (OR =1.41) were associated with major weight gain during the follow-up in women. The summary measure of the four items and occasional sleep problems were also associated with weight gain (41). Contrary to the above findings some researchers did not find association between sleep quality and overweight/obesity (39, 40). The inconsistency may be due to the methodological limitations of the studies that might affect the results of studies.

2.5. Potential mechanisms of association between poor sleep quality and overweight/obesity

Poor sleep quality affect the energy balance equation since it affect both the energy intake and energy expenditure (76, 77), which are the major mechanisms which play a role on association of sleep quality and overweight/obesity.

2.5.1. Poor sleep quality and energy intake

Poor sleep patterns lead to several alterations in metabolism and endocrine function. Food intake is controlled by the neuro endocrine system which is itself controlled by the central nervous

system. Long term regulators of food intake include insulin, leptin and ghrelin. Leptin and ghrelin are thought to act in parallel as opposing metabolic counterparts for body mass homeostasis. Recurrent partial sleep deprivation and chronic short sleep are associated with a significant decrease in levels of leptin and increase levels of ghrelin. Which results in hunger, increase appetite, decreased satiety and increased energy intake (76). Furthermore sleep deprived persons eat more and prefer foods which are high in calorie and capable of triggering weight gain (8).

2.5.2. Poor sleep quality and energy expenditure

Sleep quality is an important contributor to a physically active lifestyle. Individuals who get insufficient sleep are more likely to experience fatigue and excessive daytime sleepiness, which could make them less likely to engage in daytime physical activity and more likely to engage in sedentary behaviors such as television viewing (9, 77).

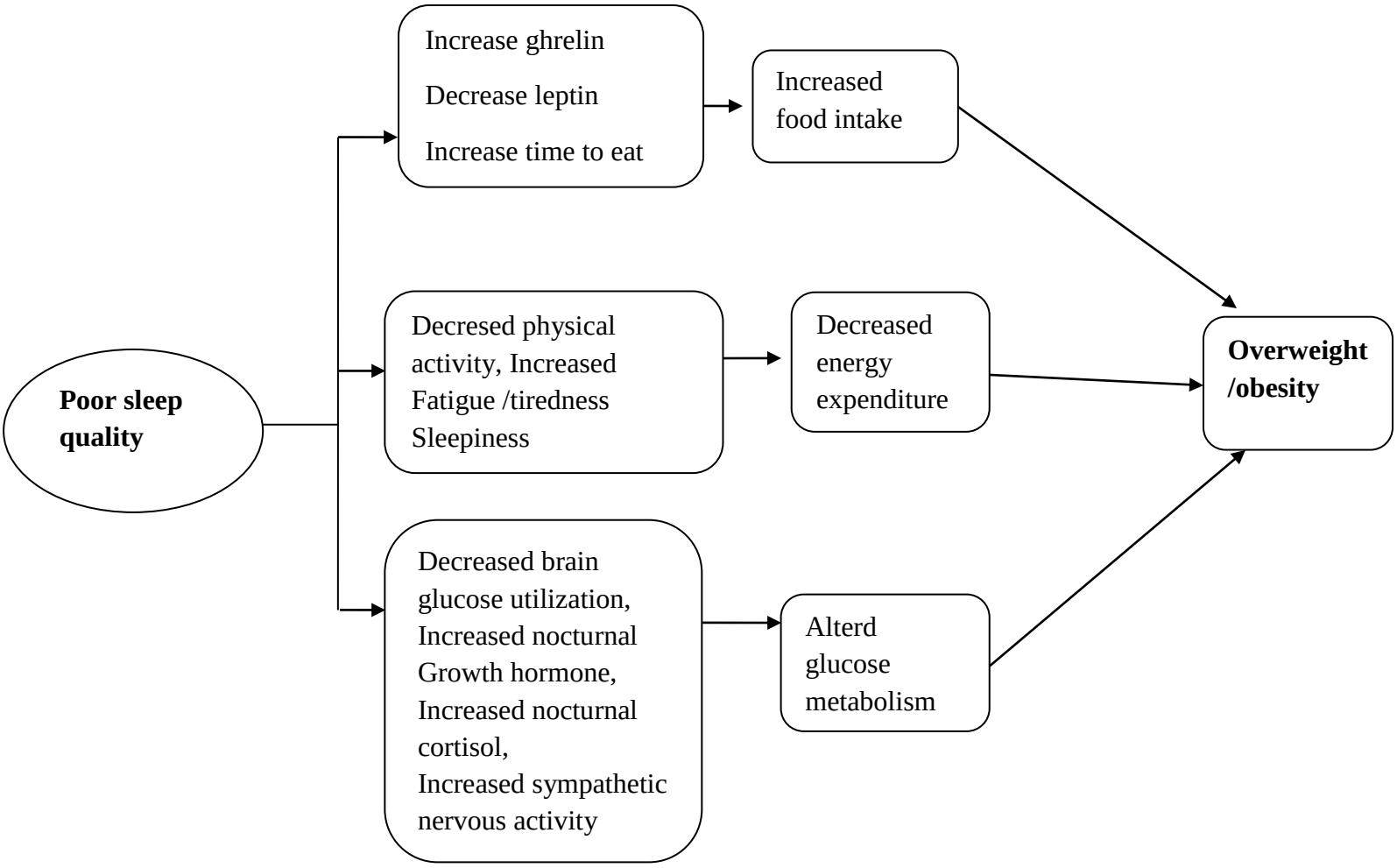

Figure 1: Summary of mechanisms on association of poor sleep quality and overweight/obesity (28, 76-79)

Conceptual frame work

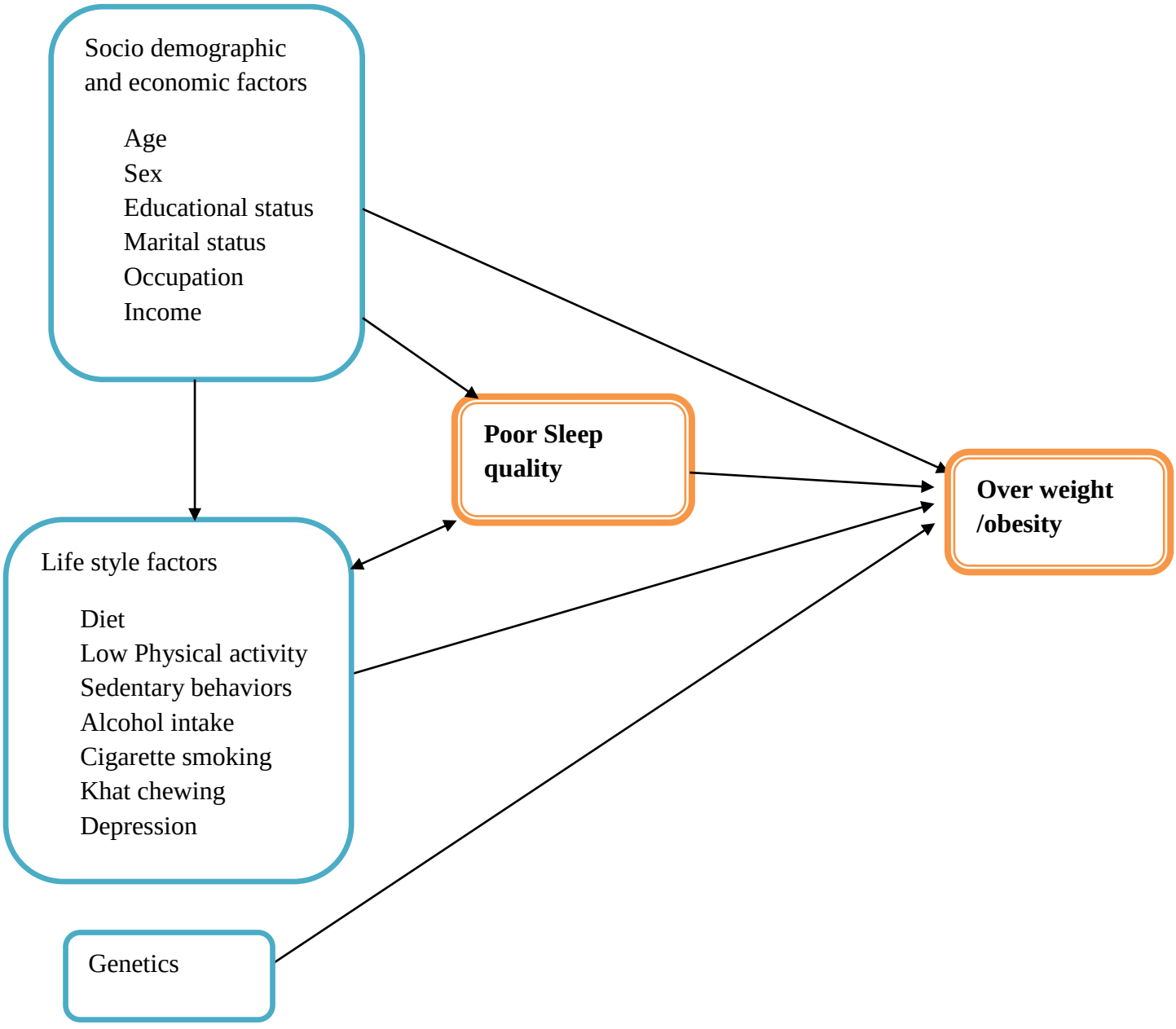

Figure 2: Conceptual frame work for determinants of overweight/obesity (developed from different literature).

3. Objectives

3.1. General objective

The general objective of this study was to assess the association between sleep quality and overweight/obesity among adults in Addis Ababa, Ethiopia, 2019.

3.2. Specific objective

The specific objectives of the study include:-

- To determine the prevalence of overweight/obesity among adults in Addis Ababa, Ethiopia, 2019.
- To assess the magnitude of sleep quality among adults in Addis Ababa, Ethiopia, 2019.
- To assess the association between sleep quality and overweight/obesity among adults in Addis Ababa, Ethiopia, 2019.

4. Methods and materials

4.1. Study area and study period

The study was conducted from March 15 to May 24, 2019 in Addis Ababa, which is the capital city of Ethiopia. It lies $9^0$1'48''N latitude and 38^0 44' 24'' E longitudes with a total area of 540 square kilometers. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), Addis Ababa has a total projected population size of 3,435,028 in 2016 (80). It is sub divided in to ten sub cities namely: Arada, Yeka, Gulele, Addis Ketema, Akaki Kality, Nefassilk Lafto, Lideta, Bole, Kolfe-Keranio, and Kirkos. In terms of area coverage bole is the largest sub city followed by Akak- Kality and Yeka. The sub-cities are also divided in to wereda's and there are 116 werdas in the city administration.

According to EDHS 2016, in Addis Ababa among women age 15-49 years, about 29.4% of them were overweight/obese. Similarly, in males 16.9% of them were overweight/obese (16). The overall prevalence of overweight women living in Addis Ababa increased from 16.1% to 20.6% while obesity increased from 3.0% to 4.3% from 2000 to 2011 (22).

4.2. Study design

We employed a community based cross-sectional study design.

4.3. Population

4.3.1. Source population

The source population for this study was all adult population living in Addis Ababa aged above 19 years old.

4.3.2. Study population

The study population for this study was all adult population living in Addis Ababa aged above 19 years old residing in the selected households.

4.3.3. Inclusion criteria

Adults who were above 19 years old and residents of Addis Ababa were included in the study.

4.3.4. Exclusion criteria

Adults who were Pregnant, history of chronic disease (previously diagnosed) like hypertension and diabetes mellitus were excluded from the study.

4.4. Sample size determination

Objective 1

For the first objective sample size was determined using single population proportion formula using Epi info 7 software. The following assumptions were used: magnitude of overweight/ obesity (p) 11.3% (17), the margin of error (d) 5%, confidence level of 95%, 1.5 design effect and 10% non-response rate (NR).

$n= [z\alpha/2/ d] 2 p [1-p]$

$n= (1.96/0.05)2 \times 0.113 \times 0.887 = 154$

154 × 1.5 (design effect) + (10% non-response rate) = **254**

Objective 2

For the second objective sample size was determined using single population proportion formula using Epi info 7 software. The following assumptions were used: magnitude of poor sleep quality (p) 65.4% (32), the margin of error (d) 5%, confidence level of 95%, 1.5 design effect and 10% non-response rate (NR).

$n= [z\alpha/2/ d] 2 p [1-p]$

$n= (1.96/0.05)2 \times 0.654 \times 0.346 = 348$

348 × **(**1.5 design effect) + (10% non-response rate) = **575**

Objective 3

For the third objective sample size was determined using double population proportion formula using Epi info 7 software. The following assumptions were used: 95% confidence level , 80 % power, ratio of un exposed to exposed = 1, percent outcome (obesity/overweight) in un exposed group (good sleepers) = 22.2 and OR = 2.85 (28).

$$n = \frac{[z\,\alpha/2\,\sqrt{(1+1/r)} + z\beta\sqrt{p1\,(1-p1) + p2\,(1-p2)/r}]}{(p1 - p2)2}$$

Sample size become 152 × 1.5 (design effect) + (10%NR) **= 251** , compared with the sample size of the first and the third objectives, the second objective yielded the largest sample size which was **575** and was taken as the sample size for the study**.**

4.5. Sampling procedure

Figure 3 shows the sampling procedure for this study. A multi-stage stratified sampling technique was applied to select the study subjects. First, the ten administrative sub cities were stratified in to three groups as highest, medium and lowest score based on socio-economic indicators obtained from the Ethiopian household consumption expenditure survey 2016 (81). Second, one sub city was randomly selected from each stratum. Third, two weredas from each sub city were selected randomly. Forth, two ketenas (lowest administrative body of Addis Ababa) were selected randomly from each wereda and the total sample size was distributed to the ketenas proportional to their household size. Finally, the study unit (household) was selected by simple random sampling technique based on the list of households from health extension workers register. A household with more than one eligible person was represented by a randomly selected one participant. When the selected individual had one of the exclusion criteria, he/she was replaced by another eligible person from the same household or the next household. We arranged another visit when the selected person was not available during the first visit.

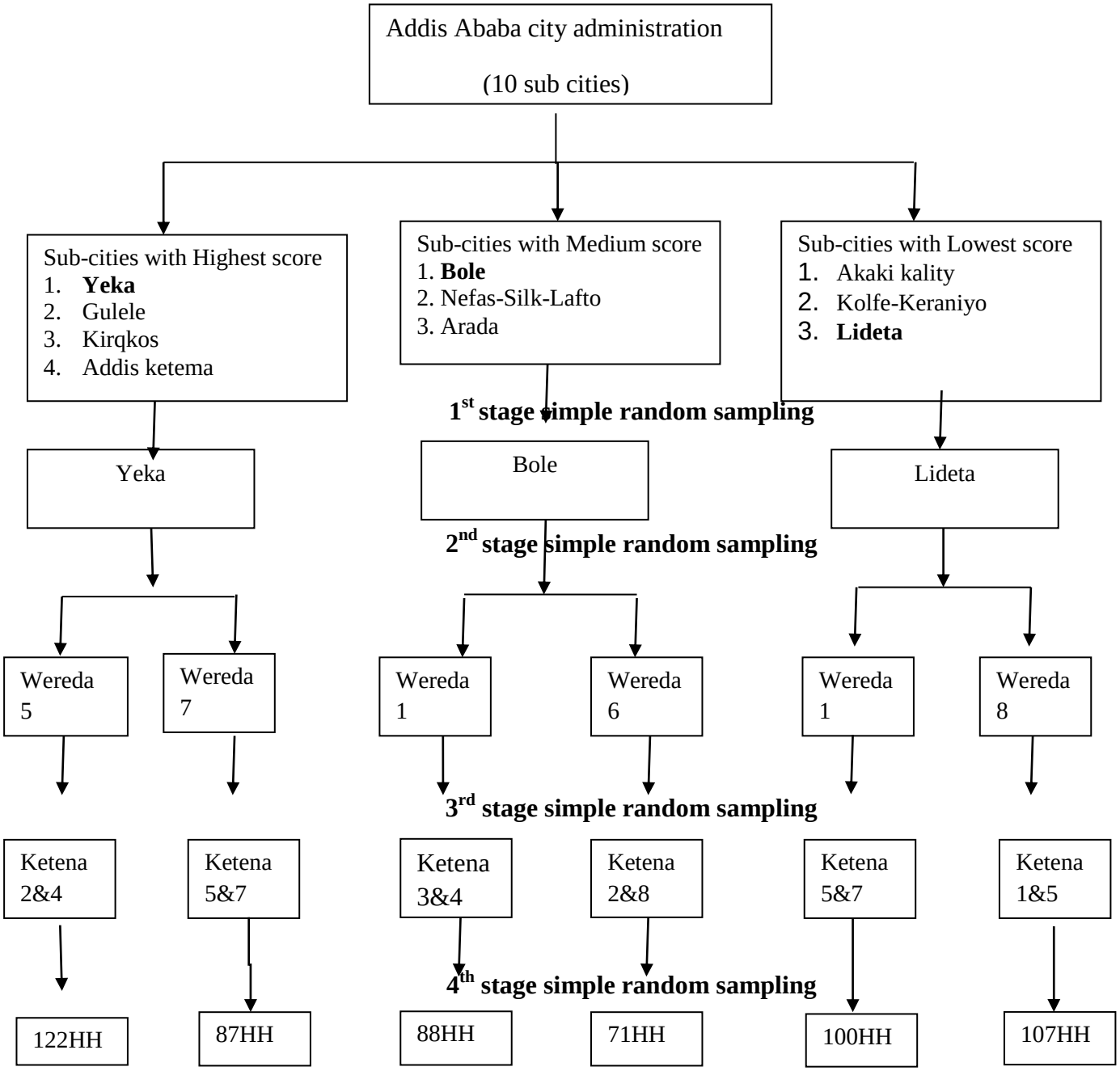

Figure 3: Diagrammatic representation of sampling procedures

4.6. Study variables

4.6.1. Outcome variable

Overweight/obesity

The outcome measure of this study was overweight/obesity which was assessed by Body Mass Index (BMI). BMI was computed as person's weight in kilograms divided by the square of height in meters (Kg/m^2) (1). Weight was measured to the nearest 0.1 kg using an electronic portable scale (seca). To ensure measurement accuracy the scale was checked for 0 reading and calibrated before each data collection. Height was measured in standing position to the nearest 0.1 cm using a portable stadiometer. The study participants were asked to stand with bare foot against the scale, heels together, and head in the upright position. The movable head board was lowered until it touches the upper part of the subjects head firmly (82).

4.6.2. Exposure variable

Sleep quality

We have used Pittsburgh Sleep Quality Index (PSQI) to assess participant's sleep quality. The tool has been widely used to assess sleep quality during the previous month using self-report data. The tool has been validated in Ethiopian and showed internal consistency and sufficient internal homogeneity as indicated by correlation coefficient between component scores and the global PSQI score. The PSQI had good value for screening poor sleep quality with optimal cut-off scores of 6 (sensitivity 82%, specificity 56.2% and the area under the curve, 0.78 ($p < 0.0001$)) (83). The PSQI consists of 7 elements, including perceived sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The items in each element inquire how often respondents have been bothered by poor sleep quality symptoms, with response categories of 0 *'not during the past month'*, 1 *'less than once a week'*, 2 *'Once or twice a week'* and 3 *'Three or more times a week'.*

4.6.3. Covariate variables

Socio-demographic and economic characteristics

Socio-demographic characteristics such as age, sex, occupation, educational status and marital status which were adapted from Ethiopian Demographic Health Survey (EDHS) were included. Occupation was categorized using scales ranging: 1) Government Employee, 2) Merchant, 3) Student, 4) Daily laborer, 5) House wife, 6) Unemployed, and 7) Other. Educational status was categorized using scales ranging: 1) Illiterate (can't read and write), 2) can read and write, 3) Primary, 4) Secondary, 5) Technical/vocational and 6) College graduate or above. Income was assessed by asking average monthly household income (16).

Dietary habit

Participant's dietary habit was assessed using qualitative food frequency questionnaire (FFQ). The FFQ is a check list of foods and beverages with a frequency response section, for subjects to report how often each item was consumed over a specified period of time. The format was adapted from Harvard FFQ, developed by walter willet and the list of food items were taken and modified from the previous study which was done in Addis Ababa on dietary pattern of type 2 diabetes mellitus patients (84). 24 hr. recall was done before data collection on 50 subjects to modify and supplement the food items. The respondents were asked how often they ate the food items with a response category of never, one to three per month, once per week, 2-4 per week, 5-6 per week, once per day, more than once per day. In addition to FFQ, eating habit (meal pattern) was assessed using eating habit questionnaire.

Physical activity and sedentary behaviors

Physical activity level and sedentary behaviors of the study participants were assessed by Global Physical Activity Questionnaire (GPAQ). The GPAQ was developed by World Health Organization (WHO) for physical activity surveillance in countries and it had been tested in large scale population based surveys with the general adult population including Ethiopia. It collects information on physical activity participation in three settings (or domains) as well as sedentary behavior, comprising 16 questions. The domains are activity at work, travel to and from places and recreational activities. Participants were asked activities in the domains with a response

category of ‘yes’ or ‘no’ and those who involved in the activities were asked number of days in a typical week and the amount of time spend on a typical day for the activities (85).

Substance use (Smoking, Alcohol drinking, chat chewing)

Participants’ habit of substance use was assessed using questions adapted from EDHS. Participants were asked whether or not they use the substances with a response category of ‘yes’ or ‘no’ and the frequency (number of days) and amount (for cigarrete) of their consumption (16).

Depression

Depression was measured using the Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a self-report measure used to screen major depressive disorders. The PHQ-9 has been found to be valid tool to measure depression in Ethiopia. Over all, the PHQ-9 items showed good internal and test re-test reliability and validity for diagnosing major depressive disorders (86, 87). It is composed of nine items asked with recall period of two weeks. The items inquire how often respondents have been bothered by depressive symptoms with response categories of 0 *‘not at all’*, 1 *‘several days’*, 2 *‘more than half the days’* and 3*’ nearly every day’.*

4.7. Data collection tools and procedures

Interviewer administered questionnaire including questions on socio-economic and demographic factors, substance use, sleep quality, diet, depression, physical activity and sedentary behaviors was used. The questionnaire was first prepared in English and translated in to Amharic. Anthropometric measurements were also taken.

Six female data collectors who were diploma nurse and midwifery in their profession and two supervisors including the principal investigator participated in the data collection. The supervisors and the principal investigator were responsible for controlling and supervising the data collection process. The data collectors explained the purpose of the study to the participants and written informed consent was taken from each participant. The participants were invited to respond the questionnaire and following that anthropometric measurement was taken.

4.8. Data quality management

Data quality assurance measures were applied during the course of the study. A one week theoretical and practical training was given for the data collectors and supervisors by the principal investigator about the purpose of the study, anthropometrical measurements including standardization protocol, data collection tools and procedures. The questionnaire was prepared in English and translated to Amharic and back to English by different person to ensure consistency of the questions.

We also performed anthropometric standardization exercise to improve the quality of the anthropometric data. Based on the standardization exercise, we calculated Technical error of measurement (TEM). Hence, the Intra observer TEM was between 0.001-0.003 for height and was between 0.02-0.1 for weight measurements. On the other hand the inter observer TEM was 0.005 for height and 0.2 for weight. In all cases the calculated TEM was within the acceptable range (88). We also conducted a Pretest on 50 adults and modification was done accordingly.

During data collection, weight was measured with light cloth and bare foot to the nearest 0.1 kg. Measurement scales were calibrated and checked for 0.00 before each data collection. Height was measured using stadiometer to the nearest 0.1 cm. Measurements were taken two times and the average was taken.

Completeness and consistency of the information of completed questionnaires was checked every day after data collection. Those study participants who were not present at the time of data collection were visited twice and data was collected. The data was collected on all seven days of the week to include all age group adults who may not be available on working days.

After data collection, data were coded using non overlapping codes and entered using EpiData version 4.4.2.1. Data cleaning and completeness was checked using STATA version 15.1.

4.9. Data analysis

Data were coded and entered using EpiData version 4.4.2.1. All statistical analysis was performed using STATA version 15.1.

Overweight/obesity

Body mass index (BMI) was computed using weight and height (Kg/m^2). Participants with a BMI score of < 18.5 kg/m^2 were considered as "Underweight", with a BMI score of 18.5 – 24.9 kg/m^2 as "Normal weight", with a BMI score of 25 – 29.9 kg/m^2 as "Overweight" and with a BMI score of ≥ 30 kg/m^2 as "Obese".

Sleep quality

Sleep quality was categorized based on Pittsburgh sleep quality index (PSQI) score with cutoff point 6. Respondents self-rate each of the seven areas of sleep and scoring was based on a scale ranging from 0 to 3. The total sleep quality score ranged from 0 to 21, with higher scores indicating poorer sleep quality. Participants with PSQI ≤ 6 were classified as "good" sleepers and participants with PSQI > 6 as "poor" sleepers.

The seven component scores of sleep quality were analyzed as follows. Subjective sleep quality was classified as 0 "v*ery good"*, 1 *"fairly good"*, 2 *"fairly bad"*, 3 "*Very bad".* For sleep latency questions about time taken to sleep and can not to sleep within 30 minutes were added. Then the sum was classified as 0 *"0"*, 1 *"1-2"*, 2 *"3-4"*, 3 *"5-6"*. For sleep duration, hour of actual sleep get at night classified as 0 *"> 7 hours"*, 1 *"6-7 hours"*, 2 *"≥ 5-6 hours"*, 3 *"< 5 hours".* Sleep efficiency classified as 0 *"> 85%"* 1 *"75-84%"* 2 *"65-74%"* 3 *"< 65%".* For sleep disturbance the scores of poor sleep quality symptoms in PSQI questionnaire five were added and the result was classified as 0 *"0",* 1 *"1-9"*, 2 *"10-18"*, 3 "19-27". Use of sleep medication was classified as 0 *"not during past month"*, 1 *"less than once a week"*, 2 *"once or twice a week"*, 3 *"three or more times a week".* The last component daytime dysfunction was computed by adding the scores of question 7 and 8 of PSQI questionnaire and the sum was classified as 0 *"0"*, 1 *"1-2"*, 2 *"3-4"*, 3 *"5-6".*

Substance use

Cigarette smoking status was categorized in to daily smoker, less than daily smoker and non-smoker. Those who smoke daily were further categorized in to less than five and greater than five based on the number of cigarettes they smoked daily. Habit of ever chat chewing and alcohol drinking was categorized in to non-chat chewers versus chat chewers and alcohol

drinkers versus non-drinkers respectively. Among participants who ever chewed chat in the last 30 day, number of days they chewed chat was categorized in to 1-5 days and 6+ days. Current status of alcohol consumption was categorized as daily, weekly, less than weekly and never.

Physical activity and sedentary behaviors

Global Physical Activity Questionnaire (GPAQ) analysis guide was used for analysis of physical activity level of study participants. Participant's minutes spend on each domain of physical activity were multiplied by number of days of physical activity to get a week's physical activity in minutes. Finally minutes in each domain were added together to get total physical activity level (TPA) per week. The level of physical activity was classified in to three groups based on the World Health Organization (WHO) physical activity guidelines, which is at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity per week or an equivalent combination of moderate and vigorous-intensity physical activity achieving at least 600 Metabolic Equivalents (MET) minutes. Participants who were not meet the guidelines were classified as *"inactive"*. Participants who were engaged in 150-299 minute/week of moderate or 75-149 minute/week of vigorous activity were classified as *"active"*. Participants who were engaged in ≥ 300 minute/week of moderate or ≥ 150 minute/week of vigorous activity were classified as *"very active"*. Sedentary time spent per day was categorized as < 8 hours and ≥ 8 hours per day based on the mean sedentary time.

Depression

Depression was categorized using the standard Patient Health Questionnaire-9 (PHQ-9) score. The total PHQ was calculated by adding the values of response categories of the nine depressive symptoms. A person scoring between 0-4 was considered as *"having minimal"* or *"no depression"*, 5-9 as *"mild depression",* 10-14 as *"moderate depression"*, 15-19 as *"moderately severe depression",* and 20-27 as *"severe depression".* However, those in severe depression and moderately severe range have been merged with moderate depression due to small observation.

Dietary habit

The food items in FFQ were grouped in to 12 food groups which was adapted and modified from Food and Agriculture Organization (FAO) and other literatures. The food groups were Cereals, Vegetables and tubers, Legumes and nuts, Fruits, Meats, Fish, Dairy product, Egg, Sweets, Nonalcoholic beverages, Fast foods and Oil and fats. Similar food items based on their food group were included in one food category. Food items including Enjera, bread, kinche, atmit, pasta, macaroni, rice, chechebisa, porridge and chiko were grouped under cereals. Potato, beet, carrot, beetroot, cabbage, kale, lettuce, kosta, chopped-tomato, tomato-sauce, fosolia, broccoli, kyar, zkuni, pumpkin and pepper were grouped under vegetables and tubers. Shirostew, corn, barley, chickpea, pea, split pea, lentil stew and peanut butter were grouped under legumes and nuts. Avocado, banana, mango, orange, pineapple, papaya, apple and strawberry were grouped under fruits. Beef, lamb, goat, chicken and organ meat were grouped under meat. Milk, yogurt and cheese were grouped under dairy product. Sugar, honey, marmalade, chocolate, cake and kukis were grouped under sweets. Mirinda, coca-cola, sprite, tea, coffee and makyato were grouped under non-alcoholic beverages. Pizza and burger grouped under fast foods. Oil and butter grouped under oil and fats. The last two food groups were fish and egg. The food groups were grouped in to frequency consumption category of never, one to three per month, once per week, 2-4 per week, 5-6 per week, once per day, more than once per day. Meal pattern was categorized into daily and not daily for each meal.

Data were cleaned for outliers and corrected by transforming in to categorical variable. The normality of continuous variables was assessed by evaluating histograms. Normally distributed data presented as mean (SD) and skewed data presented as median (IQR: 25th to 75th). Categorical variables were expressed as percentage. Missing values were excluded from the analysis.

Chi-squared test was done to see the relationship between dietary pattern, physical activity and sleep quality. The difference of sleep quality component scores among sex assessed by chi-squared and fisher's exact test.

Binary logistic regression was done to investigate the association between explanatory variables and outcome variable. Variables with P-value < 0.2 on the bivariate regression analysis and

important variables for the objective of the study based on literature review were entered to the multivariate model.

Multivariate logistic regression was run and the differences between variables were explored. Multicollinearity of the independent variables was also checked by variance inflation factor (VIF) and no variables had VIF of greater than five. Statistical significant was considered for variables with p-value of less than 0.05.

4.10. Definition of Terms

Moderate physical activity: - Activities that require moderate physical effort and cause small increases in breathing or heart rate.

Vigorous physical activity: - Activities that require hard physical effort and cause large increases in breathing or heart rate.

Typical week: - A week when the participant was engaged in his/her usual activities considered as typical week.

Typical day: - A day when the participant was engaged in his/her usual activities considered as typical day.

Snack: - Any food consumed in between meals

Dietary pattern: - A variety or combination of different foods and beverages in a diet and the frequency with which they are habitually consumed.

4.11. Ethical consideration

Ethical clearance was obtained from research ethics committee of Addis Ababa University, School of Public Health. Additional support letter and ethical clearance was also obtained from Addis Ababa regional health bureau. Support letter was also obtained from administrative bodies of sub cities and the respective weredas. Finally, after explaining the purpose, significance and process of the research to the study subjects, written informed consent was obtained from participants of each household.

The benefit of the study and the fact that it has no invasive physical harm was explained for the participants. Participants who had depressive symptoms were recommended to see a physician.

Respondents were also informed that they can refuse or discontinue participation at any time and they were informed the fact that information was recorded without their name being mentioned. Only codes were used to keep it anonymous and maintain confidentiality and privacy of respondent.

4.12. Dissemination of results

The final report of the study will be submitted to Addis Ababa University College of Health Sciences School of Public Health. It will also be sent to Addis Ababa regional health bureau. Attempts will also be made to publish the information on reputable peer reviewed journals.

5. Result

5.1. Socio-demographic Characteristics

A total of 575 sampled adults were included in this study, out of which 27 adults were not willing to participate resulting a response rate of 95.3%.

The socio-demographic characteristics of the study population are presented in Table 1. In this study, females accounted for 60.4% of the total study participant. The age distribution showed that about 46.2% belong in the age range of 20-29 years and 50% were married. The median value for the reported average monthly household income was 3350 (2000-5000) ETB. The distribution of the respondent by educational status revealed that 89.2% of respondents attended school and from them 59% were secondary and above.

Table 1: Socio-demographic characteristics of study participants in Addis Ababa, Ethiopia, 2019

Variables	Frequency	Percent
Sex		
Male	217	39.6
Female	331	60.4
Age (years)		
20-29	253	46.2
30-39	138	25.2
40-49	60	10.9
50-59	38	6.9
≥60	59	10.8
Educational status		
Illiterate	59	10.8
Read and/or write	21	3.8
Primary (1-8)	145	26.5
Secondary (9-12)	166	30.3
Technical/vocational	37	6.8
College/above	120	21.9

Marital status		
Single/never married	210	38.3
Married	274	50
Divorced/separated	19	3.5
Widowed	45	8.2
Occupation		
Government employee	90	16.4
Merchant	69	12.6
Student	56	10.2
Daily laborer	51	9.3
House wife	97	17.7
Unemployed	72	13.1
Other	113	20.6
Average monthly household income (n= 482)		
<2000 ETB*	97	20.1
2000-2999 ETB*	66	13.7
3000-4499 ETB*	135	28
≥4500 ETB*	184	38.2

* Ethiopian birr

5.2. Substance use

Table 2 shows cigarrete smoking, alcohol drinking and chat chewing history of the respondents. About 12% of the study participants reported having ever chewed chat. Among them, 39.4% chewed chat for at least 6 days in the last 30 days. Among the study participants, currently 6.7% of them smoked cigarettes. From daily smokers, 35.7% were smoking less than 5 cigarettes every day.

About 51.1% of the respondents reported drinking alcohol at some point in their lives. From those participants, currently 53.9% had history of drinking alcohol for less than once a week.

Table 2: Substance use of the study participants in Addis Ababa, Ethiopia, 2019

Variable	Frequency	Percent
Ever chewed chat		
Yes	66	12
No	482	88
Number of days chewed chat in the last 30 day (n=66)		
None	23	34.8
1-5	17	25.8
≥6	26	39.4
Current smoking		
Every day	14	2.5
Someday/less than daily	23	4.2
Not at all	511	93.3
Average number of cigarettes smoked each per day (n=14)		
<5	5	35.7
≥5	9	64.3
Ever drink alcohol		
Yes	280	51.1
No	268	48.9
Current drinking status (n=280)		
Almost every day	30	10.7
At least once a week	55	19.6
Less than once a week	151	53.9
Never	44	15.7

5.3. Nutritional status

The mean BMI of the respondents was 23.4 ± 4.3. The prevalence of overweight and obesity among the study population was 22.5% & 6.9% respectively, resulting a combined overweight/obesity prevalence rate of 29.4%. According to sex, 21.4% of them were females. From the total respondents, 11.5% of them were underweight & 59.1% were normal weight.

Figure 4 shows nutritional status of the study participants by sex. From male respondents 17.5% of them were overweight and 2.8% were obese. Similarly, from female respondents 25.7% of them were overweight and 9.7% were obese.

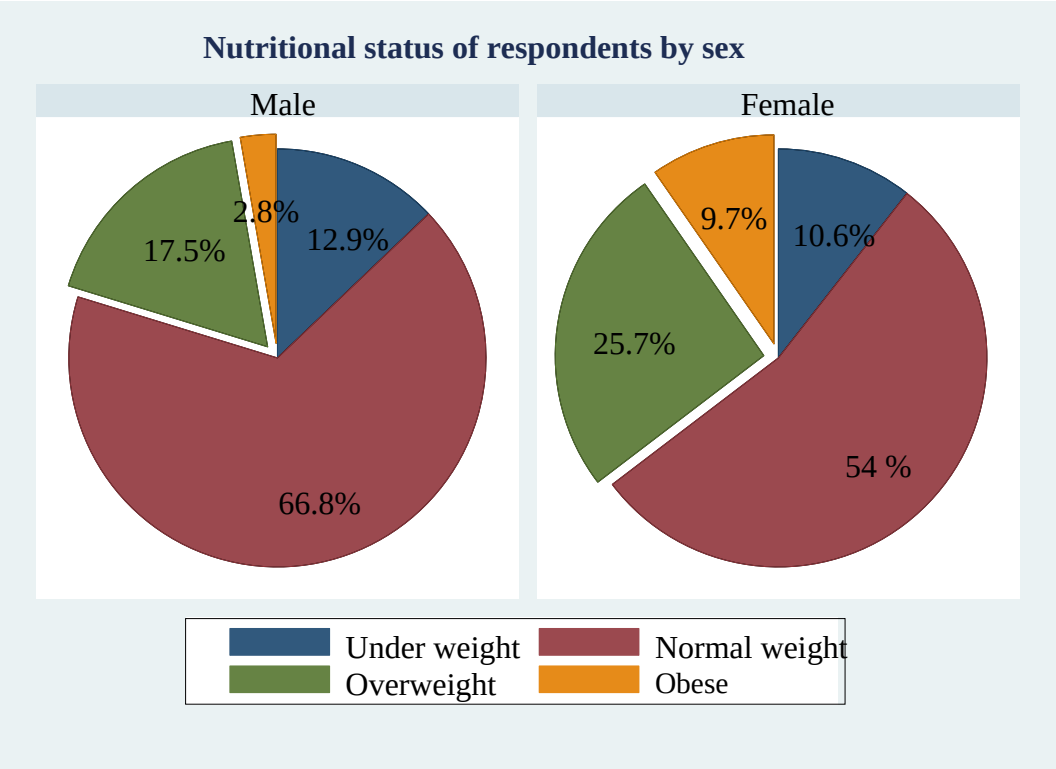

Figure 4: Nutritional status of male and female respondents in Addis Ababa, Ethiopia, 2019

5.4. Sleep quality

Table 3 shows component scores of sleep quality scale among study participants. About 45.6% of study participants get more than 7 hours of sleep at night. About 99.1% of respondents didn't use any type of sleep medication in the last month. Among the respondents about 73.4% of them

had sleep efficiency of ≥ 85%. About 46.1% male and 43.2% female respondents perceive their sleep as very good. From the total respondents about 80% of them had mild to severe sleep disturbance. Females reported mild to severe sleep disturbance at a significantly higher frequency than males (82.1% versus 76.6%). Similarly 24% males and 36.3% females reported mild to severe day time dysfunction.

Table 3: The component scores of the sleep quality scale among adults in Addis Ababa, Ethiopia, 2019

Sleep quality items	**Category**	**Male**	**Female**	**Total**	**P value**
		N (%)	N (%)	N (%)	
Subjective sleep quality	Very good	100 (46.1)	143 (43.2)	243 (44.3)	0.108
	Fairly good	91 (41.9)	122 (36.9)	213 (38.9)	
	Fairly bad	17 (7.8)	42 (12.7)	59 (10.8)	
	Very bad	9 (4.2)	24 (7.3)	33 (6)	
Sleep latency	0	47 (21.7)	68 (20.5)	115 (21)	0.444
	1	63 (29)	78 (23.6)	141 (25.7)	
	2	54 (24.9)	92 (27.8)	146 (26.6)	
	3	53 (24.4)	93 (28.1)	146 (26.6)	
Sleep duration	> 7 hours	99 (45.6)	151(45.6)	250 (45.6)	0.307
	≥6-7 hours	74 (34.1)	93 (28.1)	167 (30.5)	
	≥5-6 hours	35 (16.1)	71 (21.5)	106 (19.3)	
	< 5 hours	9 (4.2)	16 (4.8)	25 (4.6)	
Sleep efficiency	≥ 85%	174 (80.2)	228 (68.9)	402 (73.4)	0.033
	75-84%	20 (9.2)	45 (13.6)	65 (11.9)	
	65-74%	18 (8.3)	47 (14.2)	65 (11.9)	
	< 65%	5 (2.3)	11 (3.3)	16 (2.9)	
Sleep disturbance	0	51 (23.5)	59 (17.8)	110 (20.1)	0.023
	1	144 (66.4)	209 (63.1)	353 (64.4)	
	2	16 (7.4)	51 (15.4)	67 (12.2)	
	3	6 (2.8)	12 (3.6)	18 (3.3)	

Use of sleep medication	Not during past month	216 (99.5)	327 (98.8)	543 (99.1)	0.653
	Less than once a week	1 (0.5)	4 (1.2)	5 (0.9)	
Daytime dysfunction	0	165 (76)	211 (63.8)	376 (68.6)	
	1	36 (16.6)	84 (25.4)	120 (21.9)	0.010
	2	16 (7.4)	36 (10.9)	52 (9.5)	

Figure 5 shows sleep quality of the study participants. The study shows the median global PSQI score of the study population was 5 (3-7). The study found that nearly one in three adults (32.3%) had poor sleep quality. Further, the study found that poor sleep quality is more pronounced in females compared to male adults (23% versus 9.3%).

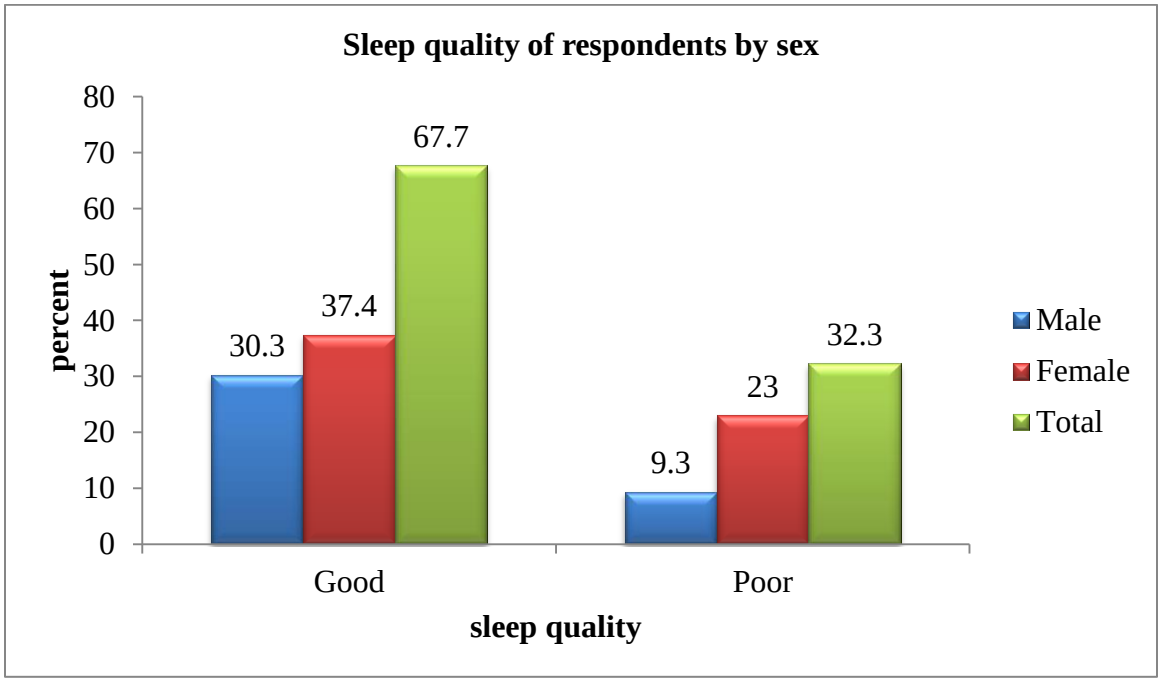

Figure 5: Sleep quality of respondents by sex in Addis Ababa, Ethiopia, 2019

5.5. Physical activity and sedentary behavior

Table 4 shows physical activity and sedentary behavior of the respondents. Based on WHO recommendations 343 (62.6%) of study participants were classified as having high total physical activity level or highly active and 143 (26.1%) as low total physical activity level or in active. Total physical activity of respondents was different among males and females. From males 69.6% had high physical activity in contrast to 58% females who had high physical activity. Regarding sedentary time per day, 78.6% of respondents spent less than 8 hours per day. There was also sex difference on sedentary time. About 17.6 males and 23.9% females had high sedentary time.

Table 4: Physical activity and sedentary behavior of study participants in Addis Ababa, Ethiopia, 2019

Variable	Frequency	Percent
Total physical activity level		
Inactive	143	26.1
Active	62	11.3
Highly active	343	62.6
Sedentary time (n=547)		
<8hr	430	78.6
≥8hr	117	21.4

5.6. Depression

From the total respondents about 403 (73.5%), 120 (21.9%) and 25 (4.6%) of the respondents had no depression, mild depression and moderate depression respectively. Regarding sex, about 19.3% of males and 31.1% of females had mild to moderate depression. Based on sleep quality, 36.7% of poor sleepers and 21.6% of good sleepers had mild to moderate depression.

5.7. Meal pattern

Table 5 shows meal pattern of the study participants. From the total respondents 62.6% had three meals per day. About 184 (33.6%) of adults reported habit of skipping meals and the most commonly skipped meals were snack and breakfast.

Table 5: Meal pattern of study participants in Addis Ababa, Ethiopia, 2019

Variables	Frequency	Percent
Number of meal in a day		
Two	122	22.3
Three	343	62.6
More than three	83	15.1
Meal skip		
Yes	184	33.6
No	364	66.4
Break fast		
Daily	420	76.6
Not daily	128	23.4
Lunch (n=547)		
Daily	526	96.2
Not daily	21	3.8
Dinner		
Daily	490	89.4
Not daily	58	10.6
Snack		
Daily	74	13.5
Not daily	474	86.5

5.8. Dietary pattern

Table 6 shows the dietary pattern of respondents. Cereals and oil & fat were the most frequently consumed food groups. About 97.3% & 100% of the respondents consumed cereals and oils & fats at least once a day respectively. About 51.5% of the respondents consumed vegetables once a day. From the total respondents 24.8% consumed fast foods at least once a month and 82.7% of study participants consumed sweets once a day.

Table 6: Dietary pattern of respondents in Addis Ababa, Ethiopia, 2019

Variables	Frequency	Percent
Cereals		
More than once/day	465	84.9
Once/day	68	12.4
2-4/week	15	2.7
Vegetables		
More than once/day	12	2.2
Once/day	282	51.5
5-6/week	32	5.8
2-4/week	185	33.8
Once/week	25	4.6
1-3/month	12	2.2
Legumes		
More than once/day	186	33.9
Once/day	211	38.5
5-6/week	26	4.7
2-4/week	99	18.1
Once/week	17	3.1
1-3/month	9	1.6
Fruits		
Once/day	161	29.4
5-6/week	38	7

2-4/week	207	37.8
Once/week	59	10.8
1-3/month	39	7.1
Never	43	7.9
Meats		
Once/day	26	4.7
2-4/week	133	24.3
Once/week	84	15.3
1-3/month	177	32.3
Never	128	23.4
Fish		
2-4/week	12	2.2
Once/week	18	3.3
1-3/month	76	13.9
Never	442	80.7
Dairy product		
Once/day	66	12
5-6/week	11	2
2-4/week	129	23.5
Once/week	71	13
1-3/month	101	18.4
Never	170	31
Egg		
Once/day	9	1.6
5-6/ week	6	1.1
2-4/week	194	35.4
Once/week	99	18.1
1-3/month	117	21.4
Never	123	22.5
Sweets		
More than once/day	68	12.4

Once/day	453	82.7
2-4/week	9	1.6
Never	18	3.3
Non-alcoholic beverages		
More than once/day	62	11.3
Once/day	452	82.5
5-6/week	5	0.9
2-4/week	14	2.6
Once/week	9	1.6
Never	6	1.1
Fast foods		
2-4/week	12	2.2
Once/week	29	5.3
1-3/month	95	17.3
Never	412	75.2
Oil and fats		
More than once/day	501	91.4
Once/day	47	8.6

5.9. Relationship between physical activity, diet and sleep quality

Table 7 shows a relationship between dietary pattern, physical activity and sleep quality among adults in the study. About 16.2% of adults who had good sleep quality and 13% of adults who had poor sleep quality had more than three meals per day. About 26.4% of good sleepers and 21.5% of poor sleepers had fast foods at least once a month. Adults who had good sleep quality had significantly higher frequency of high physical activity than adults who had poor sleep quality (64.7% versus 58.2%).

Table 7: Relationship between dietary pattern, physical activity and sleep quality among adults in Addis Ababa, Ethiopia, 2019

Variable	Sleep quality				P value
	Good		Poor		
	Number	Percent	Number	Percent	
Meal frequency per day					
Two times	80	21.6	42	23.7	
Three times	231	62.3	112	63.3	0.585
More than three	60	16.2	23	13	
Fast foods					
2-4 /week	7	1.9	5	2.8	
Once/ week	22	5.9	7	4	
1-3 /month	69	18.6	26	14.7	0.422
Never	273	73.6	139	78.5	
Meats					
Once /day	19	5.1	7	4	
2-4 /week	95	25.6	38	21.5	
Once/week	49	13.2	35	19.8	0.177
1-3 /month	126	34	51	28.8	
Never	82	22.1	46	26	
Vegetables					
Once/day	194	52.3	100	56.5	
5-6/week	24	6.5	8	4.5	
2-4 /week	130	35	55	31.1	0.485
Once/ week	17	4.6	8	4.5	
1-3 /month	6	1.6	6	3.4	
Fruits					
Once/ day	107	28.9	54	30.5	
5-6 /week	31	8.4	7	4	
2-4 / week	137	37	70	39.6	0.133

Once/ week	44	11.9	15	8.5	
1-3 / month	21	5.7	18	10.2	
Never	30	8.1	13	7.3	
Physical activity					
Low	83	22.4	60	33.9	
Moderate	48	12.9	14	7.9	0.008
High	240	64.7	103	58.2	

5.10. Logistic regression result

Table 8 shows the bivariate and multivariate regression analysis when overweight/obesity is regressed on sleep quality and others covariates. After controlling the effect of covariates, the regression analysis showed a statistically significant association between sleep quality and overweight/obesity. Specifically, the odds of being overweight/obese were 3.8 times higher among adults with poor sleep quality than the odds among adults with good sleep quality, [AOR 3.83; 95% CI: 2.33- 6.29].

Moreover, sex, age, physical activity, depression and sedentary time were also found to be associated with overweight/obesity.

The odds of being overweight/obese were 1.7 times higher among females than the odds among males, [AOR 1.7; 95% CI: 1.00- 2.89]. Furthermore the odds of being overweight/obese were 2.9 times higher among adults with in age category of 30-39 years, [AOR 2.94; 95% CI: 1.62-5.33] , 7.6 times higher in age category of 40-49 years, [AOR 7.61; 95% CI: 3.47-16.67] and 2.26 times higher among the age of above 60 years, [AOR 2.26; 95% CI: 1.00-5.07] as compared with the odds among adults with in age category of 20-29 years.

The odds of being overweight/obese among adults who had high physical activity were significantly lower than the odds among adults who had low physical activity level, [AOR 0.44; 95% CI: 0.25-0.75]. Similarly, adults with high sedentary time had 2.1 times higher odds of being overweight/obese than the odds among adults with low sedentary time, [AOR 2.1; 95% CI: 1.21-3.64].

In addition, the odds of being overweight/obese were 3.2 times higher among adults who were moderately depressed than the odds among adults who were not depressed, [AOR 3.21; 95% CI: 1.06-9.74].

Table 8: Bivariate and multivariate analysis showing association between sleep quality and covariate variables with overweight/obesity among adults in Addis Ababa, Ethiopia, 2019

	Overweight /obesity				COR(95%CI)	AOR (95%CI)
	Yes		No			
Variables	N	%	N	%		
Sex						
Male	44	20.3	173	79.7	1	1
Female	117	35.4	214	64.6	2.149 (1.44-3.208)	**1.70 (1.00- 2.89)***
Age						
20-29	36	14.2	217	85.8	1	1
30-39	87	37	51	63	3.53 (2.15- 5.79)	**2.94 (1.62-5.33)****
40-49	34	56.7	26	43.3	7.88 (4.23-14.66)	**7.61 (3.47-16.67)****
50-59	14	36.8	24	63.2	3.51 (1.66-7.42)	1.72 (0.65-4.51)
≥60	26	44.1	33	55.9	4.74 (2.54-8.85)	**2.26 (1.00- 5.07)***
Family income						
<2000	24	24.7	73	75.3	1	1
2000-2999	21	31.8	45	68.2	1.41 (0.709-2.839)	1.09 (0.48- 2.49)
3000-4499	48	35.6	87	64.4	1.67 (0.93-2.99)	1.32 (0.65- 2.70)
≥4500	61	33.2	123	66.8	1.50 (0.86-2.62)	1.45 (0.71-2.98)
Educational status						
Illiterate	22	37.3	37	62.7	1	1
Educated	139	28.4	350	71.6	0.66 (0.38-1.17)	1.09 (0.50- 2.35)
Sleep quality						
Good	70	18.9	301	81.1	1	1
Poor	91	51.4	86	48.6	4.55 (3.07- 6.74)	**3.83 (2.33- 6.29)****

Physical activity						
Low	62	43.4	81	56.6	1	1
Moderate	21	33.9	41	66.1	0.66 (0.35- 1.24)	1.23 (0.53-2.83)
High	78	22.7	265	77.3	0.38 (0.25- 0.58)	**0.44 (0.25- 0.75)****
Depression						
No	106	26.3	297	73.7	1	1
Mild	39	32.5	81	67.5	1.34 (0.86-2.09)	0.87 (0.49-1.57)
Moderate	16	64	9	36	4.98 (2.13-11.61)	**3.21 (1.06- 9.74)***
Sedentary time						
<8hr	104	24.2	326	75.8	1	1
≥8hr	57	48.7	60	51.3	2.97 (1.94 - 4.55)	**2.1 (1.21- 3.64)****
Breakfast consumption						
Daily	118	28.1	302	71.9	1	1
Not daily	43	33.6	85	66.4	1.29 (0.84 - 1.97)	1.43 (0.82- 2.47)
Cereal consumption						
> once/day	131	28.2	334	71.8	1	1
Once/day	26	38.2	42	61.8	1.57 (0.92 -2.67)	1.59 (0.81-3.13)
2-4/ week	4	26.7	11	73.3	0.92 (0.29 - 2.96)	0.89 (0.16- 4.91)
Fruit consumption						
Once/day	51	31.7	110	68.3	0.96 (0.46- 1.97)	0.65 (0.24- 1.73)
5-6/week	10	26.3	28	73.7	0.73 (0.28- 1.93)	0.33 (0.09- 1.13)
2-4/week	66	31.9	141	68.1	0.96 (0.48-1.95)	0.76 (0.30- 1.92)
Once/week	10	17	49	83	0.42 (0.16-1.07)	0.41 (0.12- 1.33)
1-3/month	10	25.6	29	74.4	0.71(0.27- 1.86)	0.30 (0.08- 1.02)
Never	14	32.6	29	67.4	1	1
Meat consumption						
Once/day	9	34.6	17	65.4	1.2 (0.49- 2.94)	1.13 (0.35-3.63)
2-4/week	33	24.8	100	75.2	0.75 (0.43- 1.29)	0.87 (0.40- 1.89)
Once/week	29	34.5	55	65.5	1.2 (0.66- 2.16)	1.64 (0.72- 3.73)
1-3/month	51	28.8	126	71.2	0.92 (0.56-1.51)	1.19 (0.62-2.30)
Never	39	30.5	89	69.5	1	

Fast food consumption						
2-4/week	4	33.3	8	66.7	1.17 (0.34-3.97)	2.37 (0.44-12.50)
Once /week	6	20.7	23	79.3	0.61 (0.24-1.54)	0.53 (0.15- 1.82)
1-3/month	28	29.5	67	70.5	0.98 (0.60- 1.60)	1.27 (0.65-2.47)
Never	123	29.8	289	70.2	1	1

***p-value < 0.05, **p-value < 0.01**

6. Discussion

This study was conducted with the main aim of examining the association between sleep quality and overweight/obesity. This study revealed a considerable magnitude of poor sleep quality. We also found high prevalence of overweight/obesity and poor sleep quality was significantly associated with overweight/obesity.

This study found that almost one third adult population of Addis Ababa suffer from poor sleep quality. The prevalence is much lower than the study conducted in Jimma, Addis Ababa, and the pooled estimate of poor sleep quality among the country (32-34, 89). This might be because, in Jimma town, the high prevalence of poor sleep quality may be due to the substance use habit. Almost more than half of the community chews chat (32), and hence high probability of having poor sleep (31, 32, 38). In addition, the study of Addis Ababa was done in patients that may be different from the community and their health status may affect the sleep pattern. The other possible reason for low prevalence of the problem in this study could be the sleep assessment tool. In this study we used the validated tool for Ethiopian community with the global Pittsburgh sleep quality index (PSQI) cutoff point 6 (83). In contrary, the above studies have used the tool before it was validated in our country with cutoff point 5 to classify subjects as poor and good sleep quality, which could possibly increase its prevalence. The prevalence of poor sleep quality in the study area is comparable to the pooled prevalence of poor sleep in a systematic review and meta-analysis among 45 publications of low and middle-income countries, which was 32.8% in working age adults and 33.4% in older adults (30).

The finding of this study also shows that the prevalence of poor sleep quality was higher among females than males. Specifically from the seven component scores, day time dysfunction, sleep disturbance and poor sleep efficiency were significantly higher among females. The finding is comparable to other studies (31, 36, 90, 91). The reason may be due to the fact that compared to men; women had higher proportions of low education, more chronic diseases, and were more susceptible to depression and anxiety (36, 90-92).

This study found that 29.4% of respondents were overweight/obese. The finding is comparable with the prevalence reported in Dessie, Mekele, Gonder and Hawassa (18-21). Similarities in life style factors shared by urban areas may contribute to similar finding among the studies.

Moreover, similarities in socio-demographic characteristics of study participants among the studies may contribute for consistent prevalence of the problem. The prevalence of overweight/obesity in our study is lower than the studies from developed countries such as USA, China, Australia and Canada (10, 46, 93). This might be because; adults in developed countries may consume energy dense foods more frequently than adults living in developing countries. In addition, socio-economic status, consumption of mainly cereal based monotonous diet and having a relatively low sedentary behavior among adults in the study setting may contribute to the lower prevalence of overweight and obesity in the study area compared to developed countries.

In this study the prevalence of overweight/obesity was higher among females than males, which is in agreement with other studies (21, 94, 95). The observed difference between the two genders can be due to both biological, social and lifestyle factors. In developing countries males are predominantly engage in physically demanding activities and have high physical activity than females. In contrast females have high sedentary behavior and susceptible to depression and anxiety than males. In addition to this, studies suggested that female sex hormones have a great impact on deposition of fat, and hence risk of obesity (74, 92, 94, 95).

This study found a positive association between sleep quality and overweight/obesity. The odds of being overweight/obese were 3.8 times higher among adults with poor sleep quality than the odds among adults with good sleep quality. This implies poor sleep quality is likely to contribute to overweight/obesity. Our study finding is in agreement with other studies done in different countries (43, 44, 96-98). In the cross-sectional study of Akron, United States among 251 adults aged 18 years and above, the odds of being overweight/obese were 2.2 times higher among adults with poor sleep quality than the odds among adults with good sleep quality (43). Similarly, In the study of Korea, adults who had poor sleep quality had higher odds of being overweight/obese (98). In addition in the study of Germany involving 753 participants, significant association was observed between poor sleep quality and general obesity and high body fat (96). A recent meta-analysis involving young subjects also confirms the positive association of sleep quality and overweight/obesity (99).

In contrary, different finding is found in the study conducted among older adults from six middle income countries, in the study of Taiwanese police officers and in the study conducted among adults in United States, in which no association was found between sleep quality and overweight/obesity (39, 40, 100). The discrepancy may be explained by methodological limitation of the studies on assessment of sleep and obesity, diagnostic criteria for poor sleep quality and difference on socio-demographic characteristics. For instance, in the study of Taiwan involves only men with age category of 20-60 years (39). In addition the other study among older adults from six middle income countries measures two nights sleep duration to assess habitual sleep duration and sleep quality was not measured by standard and validated tool. Furthermore the criteria to differentiate poor and good sleep quality is different from our study (40). In addition in the study of Ohio,United States, self-report anthropometry was used for assessment of overweight/obesity (100) which may introduce error and different from the actual measurement.

Good sleep quality is important for the normal functioning of daily metabolic & hormonal process and appetite regulation. The mechanisms underlying the relationship between sleep quality and overweight/obesity are unclear. The proposed central mechanism linking poor sleep and risk of obesity is based on the theory that sleep deprivation leads to altered glucose metabolism, lower energy expenditure, lower circulating levels of leptin (hormone that suppresses appetite) and higher levels of ghrelin (hormone that increases appetite). Furthermore sleep deprived persons eat more and prefer foods which are high in calorie and capable of triggering weight gain (8, 28, 76-79). In this study there was no significant difference on dietary pattern among adults who had good sleep quality and poor sleep quality. However, in this study we found that participants with good sleep quality have higher level of physical activity as compared to those with poor sleep quality. This might partly support the above proposed mechanism i.e., poor sleep quality lowers energy expenditure, and hence by affecting the energy balance equation leads to overweight/obesity. These may also partly explain the relationship between poor sleep quality and overweight/obesity in our study.

7. Strength and Limitation of the Study

7.1. Strength of the Study

As a major strength, this study tried to address a neglected but an important public health issue. Second, we used standardization protocol for anthropometric measurements. This helps to find accurate and precise measurement on each anthropometrical measurement and reduce errors. Third, we used validated tool for assessment of sleep quality, depression and physical activity. So the information obtained in the study is valid i.e., reflects the true situation and the tools measure what it is supposed to measure. Fourth, considering various covariates also helps to see the independent association of sleep quality and obesity. Finally, the community based nature of the study and sampling procedure also contributes to the representativeness and generalizability of the study.

7.2. Limitation of the study

The findings of our study should be interpreted in light of some study limitations. First, the cross-sectional study design precludes the establishment of causal relationship between sleep quality and overweight/obesity. Although poor sleep could predict obesity by altering energy regulatory hormones and lifestyle behaviors, obesity could also contribute to sleep problems via co-occurring conditions such as pain and obstructive sleep apnea. Second, sleep quality was assessed by the use of the self-reported questionnaires instead of objective measurements such as actigraphy or polysomnography. However, the global PSQI scores are validated and can reflect usual overall sleeping condition whereas equipment measurements concentrate only on particular nights which may not reflect the usual pattern of sleep. Third, dietary intake was assessed by using qualitative food frequency questionnaire, which does not account absolute intake of specific nutrients and the nature of self-reported data may be different from actual behavior because it is prone to over reporting and recall & social desirability bias. Finally other factors which can affect excess body weight like genetic factor, health condition (which was not diagnosed and reported by the patient during data collection) and drug use of participants were not addressed in this study.

8. Conclusion and recommendation

8.1. Conclusion

This study shows a considerable magnitude of overweight/obesity. The study also shows one in three adults suffer from poor sleep quality and poor sleep quality is positively associated with overweight/obesity. This implies the prevalence of overweight/obesity and poor sleep quality is becoming health problem in the study area. In addition sleep quality might be important modifiable factor associated with overweight/obesity.

8.2. Recommendation

For programmers

- Heath promotion programs targeting established risk factors for poor sleep quality are needed.
- Creating awareness on possible implication of sleep problems for the prevention of weight gain and obesity.
- Improvements in sleep quality should be considered as part of interventions to prevent and control overweight/obesity.

For health care professionals

- In clinical setting routine screening for poor sleep quality among subjects with overweight/obesity is crucial.

For researchers

- Longitudinal study is needed to verify cause effect relationship of sleep quality and overweight/obesity.
- Predictor factors for poor sleep quality in the study area should be investigated.
- Exploring potential causal mechanisms on association between sleep quality and overweight/obesity should be considered.

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QUESTIONNAIRE

Annex 1: English version of subject information sheet

How are you, I am ————. I am here On behalf of Muna Shemsu, a student in Addis Ababa University, Collage of Health Science, School of Public Health, nutrition unit. She is conducting a research on association between sleep quality and overweight/obesity in adults. This study will have a great contribution in the control and prevention of adults' overweight/obesity. The findings of the study could be used for policy makers and relevant stakeholders to have an insight on association of sleep quality and obesity/overweight. Furthermore it could be used as a base line to understand sleep quality and its association with overweight and obesity in the study area. You are selected by random sampling procedure for the study. Your participation on this study will only be based on your willingness. You have the right not to take part in this study. If you take part in the study, you have the right to stop at any time. You will not be subjected to any ill treatment for your decision.

If you agree to participate in the study your height and weight will be measured using standard measuring instruments. Only light clothes will be wearing with bare foot during the measurement. You will also be interviewed about your personal characteristics, feeding practice, physical activity, sedentary behaviors and sleep quality. Your name will not be written in this form and will never be used in connection with any information you tell me. All information given by you will be kept confidential by using code numbers and locking the data. Your participation is voluntary and you are not obligated to answer any question which you do not wish to answer. If you feel discomfort with the interview, or measurement please feel free to drop it any time you want. Your willingness and active participation is very important for the success of this study.

Annex 2: English version of informed consent

Having the above information, I honourly invite you to participate in the study. Are you willing to participate in the study?

A. Yes
B. No

If yes continue the questionnaire

If no write the reason for refusal and skip to the next participant

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Do you have a medically diagnosed hypertension, diabetes mellitus, cancer, heart, and kidney (kidney failure)?

1. Yes (thank and leave for the next participant)

2. No (continue the interview)

Are you pregnant or delivered on the last six month?

1. Yes (thank and leave for the next participant)

2. No (continue the interview)

Interviewer: Name----------

Questionnaire number----------

Sub city ----------wereda ----------ketene----------mender----------

Date of interview----------Time started----------Time completed----------

Result of interview:

1. Completed

2. Respondent not available

3. Refused

4. Partially completed

Checked by Supervisor: Name _____ Signature_____

For any further information, inconvenience and problem related to questionnaire please contact principal investigator.

Name of principal investigator: Muna Shemsu Tell: +251-09 49- 21 81 17

+251-09 43-10 43 43

Email: shemsumuna100@gmail.com

Annex 3: English version of questionnaire

Part one: - Back ground information

Instructions: - Now I would like to ask you about your socio demographic and economic characteristics.

No	Question	Response	Skip
101	How old are you in completed years (yrs.)?	☐☐ years old	
102	Sex of respondent	Female ……..……..…… 1 Male……..…….2	
103	Have you ever attended school?	Yes ……1 No …….2	If no go to 105
104	What is the highest level of education you have attended?	Can read and write ……...…1 Primary (1-8)…….…..….2 Secondary (9-12)...……3 Technical/vocational……..…...4 College graduate or above …….…..…5	
105	What is your marital status?	Single/never married……...…1 Married ……..…..2 Divorced/separated..……..…...3 Widowed ……...…..……4	
106	What is your occupation? That is, what kind of work do you mainly do? (more than one answer is possible)	Government Employee.....1 Merchant.....2 Student.....3 Daily laborer.....4 House wife ……5 Un employed.....6 Other specify.....	
107	How much is average monthly household income?	_____	

	(**Interviewer :-** household income is any type of income, like salaries, wages, retirement income, rent income, investment income, family monetary support)		
Part 2 Questionnaire on Substance use **Instructions**: - Now I would like to ask you about alcohol drinking , cigarette smoking and chat chewing			
201	Have you ever chewed chat?	Yes ……1 No …….2	If no go to 203
202	During the last 30 days, how many days did you chew chat?	Number of days… ☐☐ None in the last 30 days 00	
203	Do you currently smoke cigarette every day, some day, or not at all? **Interviewer: -** daily means smoking at least one cigarette every day or nearly every day over a period of a month or more. Rare circumstances of smoking or experimental smoking (tried once or twice in life time) should be counted in the NOT AT ALL category	Every day……1 Some day/less than daily…….2 Not at all……..3	If every day go to 204, if less than daily go to 206 , if not at all go to 205
204	On average, how many cigarettes do you currently	Number of Cigarettes…… ☐☐	

	smoke each day? **Interviewer:-** for daily cigarette smokers only		
205	In the past have you smoked cigarette on a daily basis, less than daily, or not at all	Daily ……..1 Less than daily ……...……...2 Not at all ……...…….3	
206	Have you ever taken a drink that contains alcohol (Tella/Tegi/Areke/Beer/Wine , etc...)?	Yes ……...…….1 No……...……2	If no go to 301
207	Currently how often do you have a drink containing alcohol?	Almost every day . . . . 1 At least once a week . . . . 2 Less than once a week. . . . . 3 Never……...……...……4	

Part three: - Questionnaire about Dietary information

Instructions: - On this section of the questionnaire I will ask you few questions about your dietary practices with special reference to eating habits.

No	Question	Response	Skip
301	How many times in a day do you eat?	1 times……..…1 2 times……...…..2 3times ……...…..3 Greater than 3 times…….4	
302	Do you have a habit of skipping meals?	Yes……1 No…….2	If no go to 304
303	Which meal do you usually skip?	Breakfast……1 Lunch……..2	

		Dinner…….3	
304	In a typical week how often do you eat Breakfast? **Interviewer:-** Typical week" means usual week	6-7 days/week……1 4-5 days/week ……..……. 2 2-3 days/week …….…….. 3 0-1 days/week…….4	
305	In a typical week how often do you eat Lunch?	6-7 days/week……1 4-5 days/week ……..……. 2 2-3 days/week …….…….. 3 0-1 days/week…….4	
306	In a typical week how often do you eat dinner?	6-7 days/week……1 4-5 days/week ……..……. 2 2-3 days/week …….…….. 3 0-1 days/week…….4	
307	In a typical week how often do you take snacks?	6-7 days/week……1 4-5 days/week ……..……. 2 2-3 days/week …….…….. 3 0-1 days/week…….4	

Part four: - Food frequency questionnaire

Instructions: - Dear respondent please take few moment to memorize the food and drinks you ate and drink within the last month and I will say the food items if you consume the food type you will tell me how often you ate and drink.

	Food types **For interviewer :-** the respondents must be asked if they ate each food type listed in the last year	Did you eat ------ in the last month 1 yes 2 no (write only the code) **Interviewer:-** if yes ask the frequency (how often) they ate or drank	2-3 * a day	Daily	5-6 * weekly	3-4 * a week	2* weekly	Once a week	2-3 * a month	Once a month
Cereals										
1	Teff key									

	enjera									
2	Teff nech enjera									
3	Enjera firfir									
4	Gebis dabo									
5	Nech sinde dabo									
6	Kinche									
7	Yeaja atmit									
8	Pasta									
9	Macaronni									
10	Rice									
11	Chechebisa									
12	genifo									
13	Chiko									
Roots										
14	fried Potato (dinich tibs)									
15	(boiled potato) Dinich kikil									
16	Potato wot Dinich wot									

17	Beet									
18	Carrot									
19	Beet root									
20	Kocho									
Vegetables										
21	Cabbage Tikil gomen kikil									
22	Kale boiled (tikur gomen)									
23	Lettuce (selata)									
24	Kosta									
25	Tomato raw kurit									
26	Tomato sause									
27	Fosoliya									
28	Pumkin									
29	Pepper									
30	Broccoli									
31	Kyar									
32	Zkuni									
Legumes										

33	Shiro wet									
34	corn									
35	Barely									
36	Chickpea									
37	Pea									
38	Ater kik wet									
39	Misir kik wot									
40	Peanut butter									
Fruits										
41	Avocado									
42	Banana									
43	Mango									
44	Orange									
45	Pineapple									
46	Papaya									
47	Lemon									
48	Apple									
49	Straw berry									
Meats										
50	Beef									
51	Lamb									
52	Goat									

53	Fish									
54	Chicken									
55	Organ meat									
Dairy fats and egg										
56	Cow Milk									
57	Yoghurt									
58	Cheese (Ayib)									
59	Egg whole boiled									
60	Egg fried									
Sweets										
61	Honey									
62	Sugar									
63	Jams,marmarta									
64	Cke kukis									
Beverage and Fast foods										
65	Mirinda									
66	Coca cola									
67	Sprite									
68	Tea									
69	Coffee									
70	Macchiato									

71	Beer									
72	Tella									
73	Tej									
74	Wine									
75	Pizza									
76	Burger									
Fat and oils										
77	Oil									
78	Butter									

Part five: - Assessment of sleep quality

Instructions: - Now I am going to ask you about your sleep. The questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month.

During the past month,

501. When have you usually gone to bed? ☐☐ Hr.

502. How long (in minutes) has it taken you to fall asleep each night? ☐☐☐ min

503. What time have you usually gotten up in the morning? ☐☐ Hr.

504. A. How many hours of actual sleep did you get at night? ☐☐ Hr

B. How many hours were you in bed? ☐☐ Hr

505		During the past month, how often have you had trouble sleeping because you/due to	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
	A	Cannot get to sleep within 30 minutes? **Interviewer :-** only write the codes				
	B	Wake up in the middle of the night or early morning				
	C	Have to get up to use the bathroom				
	D	Cannot breathe comfortably				
	E	Cough or snore loudly				
	F	Feel too cold				
	G	Feel too hot				

	H	Have bad dreams				
	I	Have pain				
	J	Other reason (s), please describe, including how often you have had trouble sleeping because of this reason (s):				
506		During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
507		During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
508		During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
509		During the past month, how would you rate your sleep quality overall?	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)

Part six: - Assessment of physical activity and sedentary behaviors

Instructions: - Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, seeking employment. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or

heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

No	Question	Response	Skip
Work ***Vigorous intensity physical activities***			
601	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate such as [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously	Yes……. 1 No ……..…2	If No, go to 604
602	In a typical week, on how many days do you do vigorous intensity activities as part of your work? **For Interviewer:-** Typical week" means a week when the participant is engaged in his/her usual activities	Number of days ☐	
603	How much time do you spend doing vigorous-intensity activities at work on a typical day? **For interviewer:-** Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in vigorous-intensity activities at work. The participant should only consider those activities undertaken continuously for 10 minutes or more. Probe very high responses (over 4 hrs.) to verify Typical day" means a day when the participant is engaged in his/her usual activities	Hours : minutes ☐☐ : ☐☐	

Moderate-intensity activity			
604	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?	Yes …….. 1 No……. 2	If No, go to 607
605	In a typical week, on how many days do you do moderate intensity activities as part of your work? **For interviewer:-** "Typical week" means a week when the participant is engaged in his/her usual activities	Number of days ☐	
606	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes : ☐☐ ☐☐	
Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship…..			
607	Do you walk or use a bicycle for at least 10 minutes continuously to get to and from places?	Yes ……....1 No …….. .. 2	If No, go to 610
608	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days	
609	How much time do you spend walking or bicycling for travel on a typical day? **For interviewer :-** Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in transport-related activities. The participant should	Hours : minutes ☐☐: ☐☐	

	only consider those activities undertaken continuously for 10 minutes or more. Probe very high responses (over 4 hrs.) to verify.		
Recreational activities			
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure),			
vigorous-intensity physical activities			
610	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?	Yes…… 1 No ……. 2	If No, go to 613
611	In a typical week, on how many days do you do vigorous intensity sports, fitness or recreational (leisure) activities?	Number of days ☐	
612	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ☐☐ : ☐☐	
moderate-intensity physical activity			
613	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously?	Yes……..…….1 No …….……..2	If No, go to 16
614	In a typical week, on how many days do you do moderate intensity sports, fitness or recreational (leisure) activities?	Number of days ☐	
615	How much time do you spend doing moderate-intensity sports, fitness or	Hours : minutes ☐☐ : ☐☐	

	recreational (leisure) activities on a typical day?		
Sedentary behavior			
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, using computer but do not include time spent sleeping			
616	How much time do you usually spend sitting or reclining on a typical day? .	Hours : minutes ☐☐ : ☐☐	

Part seven: - Assessment of depression

Instructions: - Now I would like to ask you about symptoms of depression and how often you have bothered.

1. Over the last two weeks, how often have you been bothered by any of the following problems? Please tick (√) in the response section

No		Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
701	Little interest or pleasure in doing things?				
702	Feeling down depressed or hopeless?				
703	Trouble falling or staying asleep, or sleeping too much?				
704	Feeling tired or having little energy?				
705	Poor appetite or over				

	eating?				
706	Feeling bad about yourself or that you are a failure or have let yourself or your family down?				
707	Trouble concentrating on things, such as reading the newspaper or watching television?				
708	Moving or speaking so slowly that other people could have noticed? Or the opposite being so fidgety or restless that you have been moving a lot more than usual?				
709	Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?				

2. If any of the above were scored more than "not at all " How difficult have these problems made it for you to do your work, take care of things at home , or get along with other people ?

Not at all (0) _____

Somewhat difficult (1) _____

Very difficult (2) _____

Extremely difficult (3) _____

For interviewer:-

- If there are at least 4 √ in the shaded section (including Questions #1 and #2),
- If there are 2-4 √ in the shaded section (one of which corresponds to Question #1 or #2) consider a depressive disorder so advice to see a physician.

Part eight: - Anthropometric measurements

Instructions: - Now I will take your height and weight measurement

For interviewer: - Please check the respondent wears light cloths and bare foot and record the measurement to the nearest one decimal.

No	Measurements		Reading
801	Height in centimeters	1st	☐☐☐.☐ cm
		2nd	.☐☐☐☐ cm
802	Weight in kilograms (Kg)	1st	.☐☐☐☐ kg
		2nd	☐☐☐.☐ kg

Thank You!!

Annex 4: Amharic version of subject information sheet

አዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ኮሌጅ የህብረተሰብ ጤና አጠባበቅ ትምህርት ክፍል

የተሳታፊው መለያ ቁጥር _____

እንደምንአደሩ / ዋሉ፡፡ስሜ ----------ይባላል:: የመጣሁት በአዲስ አባባ ዩኒቨርሲቲ የህብረተሰብ ጤና አጠባበቅ የስና-ምግብ ትምህርት ክፍል ተማሪ የሆነችውን ሙና ሸምሱን ወክዬ ነው፡፡በአዋቂዎች በእንቅልፍ ጥራት እና በውፍራት መካከል ያለውን ግንኙነት ለማወቅ ጥናት እያከሄደችነው፡፡ ይህ ጥናት ውፍራትን ለመካለከል እና ለመቆጣጣር የሚደራግ ስራ ላይ ትልቅ አስተዋፅዖ ያደርጋል፡፡ የዚህ ጥናት ውጤት ፖሊሲ ለሚቀርጹ እና ለአጋር ድርጅቶች በእንቅልፍ ችግር እና በውፍረት መካከል ያለውን ቁርኝት ግንዛቤ እንዲወስዱ ያደርጋል፡፡ በተጫማሪም በጥናቱ ቦታ ላይ ያለውን የእንቅልፍ ችግር እና ከውፍራት ጋር የለውን ቁርኝት ለማወቅ እንደ መነሻ መረጃ ይሆናል፡፡ እርሶዎ በዚህ ጥናት እንዲሳተፉ የተመረጡት በተደጋጋሚ በተወሰደ የአጋጣሚ የናሙና አወሳሰድ ስልት መሰረት ለዚህ ጥናት አላማ ከተመረጡ ግለ-ሰቦች መካከል አንዱኖት፡፡ በጥናቱ ላይ ያለ መሳተፍ ሙሉ መብት አሎዎት፡፡ የእርሶ ተሳትፎ ሙሉ በሙሉ በእርሶዎ ሙሉ ፍቃደኝነት ላይ የተመሰረተ ነው፡፡ ለመሳተፍ ፍቃደኛ ከሆኑ በኃላም በፈለጉት ጊዜ ማቆም ወይም ማቛረጥ ይችላሉ፡፡ በጥናቱ ባለመሳታፎ የሚደርስቦዎት ምንም አይነት ችግር አይኖርም፡፡ በጥናቱ ለመሳተፍ ከተስማሙ ክብደቶን እና ቁመቶን ደረጀዉን በጠበቁ መሳሪያዎች እንለካዎታለን፡፡ ክብደት በሚለካበትጊዜ ቀለል ያሉ ልብሶች እንዲሁም በባዶ እግር ይሆናል፡ ፡በተጫማሪም ስለግሎት መረጃዎች፤ አመጋጋብሁኔታ፤ የአካልብቃት እንቅስቃሴ ስለ እንቅልፍ ጥራት እና ስለ ድብርት እንጠይቆታለን፡፡ ስሞዎት እንደ ማይጠቀስ እና ለማንም አካል ተላልፎ እንደማይሰጥ ልናረጋግጥሎዎት እንወዳለን፡፡ በተጫማሪም ከእርሶ የምንሰበስበዉ መረጃ ከስሞ ጋር አይያያዝም፡፡ ሚስጥራዊነቱን ለመጠበቅ በሚስጥር ኮድ ቁልፎች እንቆልፋለን፡፡ ተሳትፎዎ በፍቃደኝነት ሲሆን መመለስ ያልፈለጉትን ጥያቄ ያለመመለስ መብት አሎዎት፡፡ መልካም ፍቃዶ እና ትብብሮ ለጥናቱ ውጤታማነት ትልቅ አስተወፅኦ አለው፡፡ቃለመጠይቁ 30 ደቂቃ የሚፈጅ ይሆናል፡፡

አመሰግናለሁ፡፡

Annex 5: Amharic version of subject informed consent form

የመስማማት መጠየቂያ / ማረጋገጫ ቅፅ

በተሰጦት መረጃ መሰረት ጥናቱ ላይ እንዲሳተፉ እጋብዞታለው.፡፡ ለመሳተፍ ፍቃደኛ ነዎት?

1. አዎ
2. አይደለሁም

ፍቃደኛ ካልሆኑ ምክንያቱን ጽፋው ወደሚቀጥለው ተሳታፊ እለፍ

_____

_____

ፍቃደኛ ከሆኑ ጥያቄውን ቀጥል

በሀኪም የተረጋገጠ የደም ግፉት ፣ የስካር ፣ የካንሰር ፣ የልብ ፣ የኩላሊት (ኩላሊት ስራውን ማቆም) በሽታ አለቦት?

1 አዎ (አመስግነህ/ሽ ወደ ሚቀጥለው ተሳታፊ እለፉ)

2 አይ (ቃለ መጠይቁ ይቀጥል)

ነፍሰጡር ኖት (ለሴት ተሳታፊዎች)

1 አዎ (አመስግነህ/ሽ ወደሚቀጥለው ተሳታፊ እለፉ)

2 አይ (ቃለ መጠይቁ ይቀጥል)

ቃለመጠይቅ አድራጊው ስም ----------

የቃለመጠይቁ ቁጥር ----------

ክፍለከተማ ---------- ወረዳ ---------- ቀጠና ---------- መንደር ----------

ቃለመጠይቅ የተካሄደበት ቀን ---------- የተጀመረበት ሰዓት---------- ያለቀበት ሰዓት-------

የተሰበሰበው መረጃ ውጤት

A. ሙሉ በሙሉ የተሞላ
B. በከፊሉ የተሞላ
C. ምንም ያልተሞላ

D. ተሳታፉው አልተገኘም

በተቆጣጣሪዎች ተረጋግጦዋል፡ ስም---------- ፊርማ----------

ለተጫማሪ ማብራሪያ የዋና አጥኝውን አድራሻ ይጠቀሙ፡፡

ስም ሙና ሸምሱ

ኢሜይል:shemsumuna100@gmail.com

ስልክ : +251-9 49- 21 81 17

+251-9 43-10 43 43

ማሳሰቢያ ተሣታፊዎች የሚሠጡትን መልስ ከተሠጡት አማራጮች ውስጥ ለይተው ያክብቡ፡፡

Annex 6: Amharic version of questionnaire

ክፍል አንድ: መስረታዊ መረጃዎችን የተመለከቱ ጥያቄዎች

መመሪያ፡- በቀጣይነት ስለ እርሶ መስረታዊ መረጃዎችን የተመለከቱ አንዳንድ ጥያቄዎች እጠይቆታለሁ።

ተ.ቁ	ጥያቄ	መልስ	ወደ ሚቀጥለው ጥያቄ ይሂዱ
101	እድሜዎ ስንት ነዉ (በሙሉአመት?)	----------አመት	
102	ጾታ?	ወንድ..……...……1 ሴት……...……2	
103	ት/ት ቤት ገብተው ያቃሉ ?	አዎ……...……..1 አላቅም…….....2	አላቅም ከሆነ ወደ ጥያቄ ቁጥር 105 ይሂዱ
104	ከፍተኛ የትምህርት ደረጃዎ ስንት ነው / እስከ ስንት ተምረዋል?	ያልተማረ(ማንበብእናመጻፍየማይችል)……..1 ማንበብእናመጻፍየሚችል……..2 የመጀመሪያደረጀ (1-8 ክፍል)……3 ሁለተኛደረጀ (9-12 ክፍል)……...4 የሙያትምህርት……...……..5 ኮሌጅያጠናቀቀወይምከዛበላይ……6	
105	የጋብቻ ሁኔታ ?	ያላገባ/ች……...……1 ያገባ/ች…….....…2 የፈታ/ች/ የተለያየ/ቸ……...…3 የሞተበ/ባት……...……...…4	
106	የስራ ሁኔታ (በዋናነት የሚሰሩት ስራ) (ከአንድ በላይ መልስ መስጠት ይቻላል)	የመንግስትሰራተኛ……...……1 ነጋዴ……...……2 ተማሪ……...……...3 የቀንሰራተኛ……...……4 የቤትእመቤት……...……5 ስራየለኝም……...……6 ሌላ ካለ ይገለጽ……...…..	
107	አማካይ ወርሃዊ የቤተሰቡ ገቢ	_____ብር	

	ምን ያክል ነው (ለመረጃስብሳቢ- የትኛውንም አይነት ገቢ ያካትታል፡- ደሞዝ፡ጡረታ፡የኪራይገቢ፡ የንግድገቢ፡ከቤተሰብ የሚላክ ገንዘብ)		
ክፍል 2፡- እጽኞን የተመለከቱ ጥያቄዎች ***መመሪያ፡-*** አሁን ስለ አልኮል መጠጥ ፣ ሲጋራ እና ጫትን የተመለከቱ ጥያቄዎችን እጠይቆታለው፡፡			
201	ጫት ቅመው ያቃሉ ?	አዎ……...……1 አላቅም……...……2	አላቅም ከሆነ ወደ ጥያቄ ቁጥር 203 ይሂዱ
202	ባለፉት 30 ቀናት ዉስጥ ለስንት ቀናት ቅመዋል	ቀናት ……...… ባለፉት 30 ቀናትዉስጥአልቃምኩም	
203	በአሁኑ ሰአት ሲጋረ ታጨሳለህ/ሽ (በየቀኑ፣የተወሰነቀን /አንዳንዴ፣ምንም አላጨስም) ❖ **(ለመረጃ ሰብሳቢው፡-** በየቀኑ ማለት በቀን ውስጥ ቢያንስ ፣ ሲጋራ ማጨስ ለአንድ ወር ወይም ከዛ በላይ. ❖ በህይወት ዘመን ውስጥ አንዴ /ሁለቴ ማጨስ **ምንም አላጨስም** በሚለውይካተት	በየቀኑ……...……1 የተወሰነቀን/አንዳንዴ……..…..2 ምንምአላጨስም……...…3	መልሱ በየቀኑ ከሆነ ወደ ጥያቄ ቁጥር 204 ይሂዱ ፣ መልሱ የተወሰነ ቀን / አንዳንዴ ከሆነ ወደ ጥያቄ ቁጥር 206 ይሂዱ ፣ መልሱ አላጨስም ከሆነ ወደ ጥያቄ ቁጥር 205 ይሂዱ
204	በአማካይ በቀን ውስጥ ምን ያህል ሲጋረ ያጨሳሉ **(ለመረጃ ሰብሳቢው** በየቀኑ ለሚያጨሱ	በቁጥር----------	
205	ከአሁን በፊት ሲጋር አጭሰህ ታቃለህ? በየቀኑ ፣ የተወሰነ ቀን/ አንዳንዴ፣ ምንም	በየቀኑ……...……1 የተወሰነቀን/አንዳንዴ……...…2 ምንም አላጨስም……...……3	

206	አልኮል ያለበት መጠጥ ጠጥተው ያቃሉ? (ጠላ፣ጠጅ፣አረቄ፣ቢራ...)	አዎ.....1 አላቅም.....2	መልሱ አላቅም ከሆነ ወደ ጥያቄ ቁጥር 301 ይሂዱ
207	በአሁኑ ሰአት በምን ያህል ግዜ አልኮል ያለበት መጠጥ ይጠጣሉ?	በየቀኑ.....1 በሳምንት አንድግዜ.....2 በሳምንት ከአንድግዜበታች.....3 ምንም.....4	

ክፍል 3፦ የአመጋገብ ልምድ የተመለከቱ ጥያቄዎች

መመሪያ፡ ከዚህ በመቀጠል የአመጋገብ ሁኔታን/ልምድ በተመለከተ ጥያቄ እጠይቆታለዉ ።። ምላሽዎትን ከማነብሎት ምርጫ ዉስጥ የትኛዉ እንደሆነ ይነግሩኛል።

ተ. ቁ	ጥያቄ	መልስ	ወደ ሚቀጥለው ጥያቄ ይሂዱ
301	በቀን ምን ያህል ጊዜ ይመገባሉ?	አንድጊዜ.....1 ሁለትጊዜ.....2 ሶስትጊዜ.....3 ከሶስትጊዜ በላይ.....4	
302	የምትዘለው ምግብ አለ? ብዙ ጊዜ የሚሆነዉ የትኛው ነው?	አዎ.....1 የለም.....2	
303	የምትዘለው ምግብ ካለ ብዙ ጊዜ የሚሆነዉ የትኛው ነው?	ቁርስ.....1 ምሳ.....2 እራት.....3	
303	በአብዛኛው (ተለምዶአዊ) ሳምንት ውስጥ በምን ያህል ጊዜ ቁርስ ትመገባለህ?	6-7 ቀን/ በሳምንት.....1 4-5ቀን/በሳምንት.....2 2-3ቀን/በሳምንት.....3 0-1 ቀን/ በሳምንት.....4	
304	በአብዛኛው (ተለምዶአዊ) ሳምንት ውስጥ በምን ያህል ጊዜ ምሳ ትመገባለህ?	6-7 ቀን/ በሳምንት.....1 4-5ቀን/ በሳምንት.....2 2-3ቀን/በሳምንት.....3 0-1 ቀን/ በሳምንት.....4	

305	በአብዛኛው (ተለምዶአዊ) ሳምንት ውስጥ በምን ያህል ጊዜ እራት ትመገባለህ?	6-7ቀን/ በሳምንት……..……..1 4-5ቀን/በሳምንት……..……2 2-3ቀን/በሳምንት……..……3 0-1 ቀን/ በሳምንት……..……4	
306	በአብዛኛው (ተለምዶአዊ) ሳምንት ውስጥ ከመደበኛ የምግብ ፕሮግራምህ ውጪ በምን ያህል ጊዜ መክሰስህን ትመገባለህ?	6-7ቀን/በሳምንት……..……..1 4-5ቀን/በሳምንት……..……..2 2-3ቀን/በሳምንት……..……3 0-1 ቀን/ በሳምንት……..……4	

ክፍል 4፡- የዘወትር አመጋገብ ሁኔታ የሚያሳይ መጠይቅ

መመሪያ፡-ከዚህ በመቀጠል በሚገኘዉ የምግብ ዝርዝር ከያዘዉ ሰንጠረዥ ዉስጥ በወር ውስጥ የተመገቡትን የምግብ ዐይነት ለትንሽ ደቂቃ አስበዉ የወሰዱት የምግብ አይነት ካለ በምን ያህል ግዜ (ድግግሞሽ) እንደወሰዱ ይገልጹልኛል።

	የምግብ አይነት (ከዚህ በታች የተዘረዘሩት ምግቦች በአንድ አመት ውስጥ መመገባቸዉን ይጠይቁ)	በባለፈው በወር ውስጥ --------ተመግበዋል 1. አዎ 2. አልተመገብኩም ቁጥር ብቻ ጻፉ መልሱ አዎ ከሆነ በምን ያህል ግዜ እንደ ወሰዱ ጠይቁ	በቀንከ 2-3 ጊዜ (ቁጥሩንይጻፉ)	በቀን አንዴ	በሳምንት 5-6 ጊዜ (ቁጥሩን ይጻፉ)	በሳምንት 3-4ቀን (ቁጥሩን ይጻፉ)	በሳምንት 2 ጊዜ	በሳምንትነ ጊዜ	በወር 2-3 ጊዜ	በወር አንዴ
የእህል ዘር										
ነ	ቀይ ጤፍ እንጀራ									
2	ነጭ ጤፍ እንጀራ									
3	እንጀራ ፍርፍር									
4	የገብስ ዳቦ									
5	ነጭ ስንዴ ዳቦ									
6	ቂንጬ									
7	የአጃ አጥሚት									

8	ፓስታ									
9	ማካሮኒ									
10	ሩዝ									
11	ጨጨብሳ									
12	ነጭ ገብስ ገንፎ									
13	ቄኮ									
ስር ምግቦች										
14	የተጠበሰ ድንች									
15	ድንች ቅቅል									
16	ድንች ወጥ									
17	ስካር ድንች									
18	ካሮት									
19	ቀይስር									
20	ቆርጫ									
አታክልት										
21	ጥቅልል ጎመን ቅቅል									
22	ጥቁር ጎመን ቅቅል									
23	ሰለጣ									
24	ቆስጣ									
25	ቲማትም ቁርጥ									
26	ቲማቲም ስልስ									
27	ፎሶሊያ									

28	ዱባ									
29	ቃሪያ									
30	አበባ ጎመን									
3ነ	ኪያር									
32	ዝኩኒ									
ጥራጥሬዎች										
33	ሽሮ ወጥ									
34	በቆሎ									
35	ባቄላ									
36	ሽንብራ									
37	አተር									
38	አተር ክክ ወጥ									
39	ምስር ክክ ወጥ									
40	የለዉዝ ቅቤ									
ፍራፍሬ										
4ነ	አቮካዶ									
42	ሙዝ									
43	ማንጎ									
44	ብርቱካን									

45	አናናስ									
46	ፓፓያ									
47	ሎሚ									
48	ሮም									
49	ኢንጆሪ									
ስጋ										
50	በሬ ስጋ									
5ነ	የበግ ስጋ									
52	የፍያል ስጋ									
53	አሳ									
54	የዶሮ ስጋ									
55	ኩላሊት ፣ ጉበት ፣ ልብ									
እንቁላል እና የወተት ተዋጽዎች										
56	የላምወተት									
57	እርጎ									
58	አይብ									
59	እንቁላል ቅቅል									
60	የእንቁላል ጥብስ									
ጣፋጮች										
6ነ	ማር									

62	ስሸር									
63	ማርማራታ									
64	ኬክ፣ኩኪስ									
መጠጦች እና ፈጣን ምግቦች										
65	ሚሪንዳ									
66	ኮካኮላ									
67	ስፕራይት									
68	ሻይ									
69	ቡና									
70	ማኪያቶ									
7ነ	ቢራ									
72	ጠላ									
73	ጠጅ									
74	ወይን									
75	ፒዛ									
76	በርገር									
የቅባት ዉጤቶች										
77	ዘይት									
78	ቂቤ									

ክፍል5፡-የእንቅልፍ ጥራት

መመሪያ፡- አሁን ደግሞ እንቅልፍን የተመለከቱ ጥያቄዎችን እጠይቆታለው፡፡ ጥያቄዎቹ ያለፈውን አንድ ወር የእንቅልፍ ተለምዶ/ሁኔታ ይመለከታል፡፡ ምላሾዎ ያለፈውን ወር የአብዛኛውን ቀን እና ሌሊት የተመለከተ የእንቅልፍ ልማዶ መሆን አለበት፡፡

ባለፈው ወር ውስጥ፡-

501. በአብዛኛው ስንት ሰዐት ወደ አልጋህ/ሽ ትሄዳለ/ሽ? ☐☐ ሰአት

502. በእየንደንዱ ለሊት እንቅልፍ ለመውሰድ ምን ያህል ደቂቃ ይፈጅብሀል/ሻል? ☐☐☐

503. በአብዛኛው ጠዋትጠዋት ስንት ሰዐት ትነሳለህ/ሽ? ☐☐

504. A. በለሊት ውስጥ ምን ያህል ሰዐት እንቅልፍ አግኝተሀል/ሻል? ☐☐

B. ለስንት ሰዐት አልጋህ/ሽ ላይ ነበርክ/ሽ? ☐☐

505		ባለፈው ወር ውስጥ ምን ያህል ጊዜ እንቅልፍ ለመተኛት በእነዚ ምክንያቶች ተቸግረሀል/ሻል? ለመረጃ ሰብሳቢው፡- በቅንፍ ውስጥ ያሉትን ኮዶች ያስቀምጡ	ባለፈው ወር ውስጥ ምንም የለም (0)	በሳምንት ውስጥ ከአንድጊዜ በታች (1)	በሳምንት ውስጥ አንዴ ወይም ሁለቴ (2)	በሳምንት ውስጥ ሶስቴ እና ከዛ በላይ (3)
	A.	በ30 ደቂቃ ውስጥ እንቅልፍ አለመውሰድ				
	B.	በለሊት መሀል ወይም ሳይነጋ መነሳት				
	C.	ለሽንት መነሳት				
	D	ያለምቾት መተንፈስ				
	E.	ጮክ ብሎ ማሳል ወይም ማንኮራፋት				
	F.	በቅዝቃዜ/በብርድስሜት/ በጣም መብረድ				
	G.	በሙቀት ስሜት/ በጣም መሞቅ				
	H.	መጥፎ ህልም በማየት				
	I	በህመም ምክንያት/ ህመም መኖር				
	J	ሌላ ምክንያት ከለ..... በዚህ ምክንያት ለምን ያህል ጊዜ እንቅልፍ ለመተኛት አስቸግሮሀል/ሻል				
506		ባለፈው ወር ውስጥ ምን ያህል ጊዜ እንቅልፍ ለመተኛት የሚረዳ መድሃኒት ወስደሀል/ሻል (የታዘዘ ወይም ያልታዘ)				

507		ባለፈው ወር ውስጥ ምን ያህል ጊዜ መኪና ስትነዳ ፡ ምግብ ስትበላ ወይም ደግሞ በማህበራዊ እንቅስቃሴ ውስጥ ንቁ ሆኖ ለመፈጸም ተቸግረሀል/ሻል?				
508		ባለፈው ወር ውስጥ ነገሮችን በትጋት/በጉጉት ለማድረግ ምን ያህል ተቸግረሀል/ሻል?				
509		ባለፈው ወር ውስጥ ባጠቃላይ የእንቅልፍ ጥራትህን/ሽን እንዴት ትመዝነዋለህ/ሽ?	በጣምጥሩ (0)	መካከለኛ/በመጠኑ ጥሩ (1)	በመጠኑ መጥፎ (2)	በጣም መጥፎ (3)

ክፍል 6:- የአካለዊ እንቅስቃሴ እና እንቅስቃሴ ውጭ መጠይቅ

መመሪያ፡- በመቀጠል በአብዛኛው (ተለምዶ) በሳምንት ውስጥ የተለያዩ እንቅስቃሴዎችን በማድረግ የምታሳልፉትን የጊዜ መጠን እጠይቆታለሁ፡፡

እባኮዎን ራሶዎን አካላዊ እንቅስቃሴ የሚያደርግ ሰው አድርገው ባይቆጥሩም ሁሉንም ተግባራት በመመልከት ጥያቄዎችን ይመልሱ፡፡ እነዚህም በቤት ውስጥ ስራዎች ወይም ከቦታ ወደ ቦታ ለመሄድ የሚያደርጃቸውን መደበኛ እንቅስቃሴዎችን, በስራቦታ, በት/ት ቦታ እና በዕርፍት ግዜዎ ለመዝናኛ ወይም ለእስፖርት እንቅስቃሴ የሚያደርጃቻውን እንቅስቃሴዎች ያጠቃልላል፡፡

ጥያቄዎችን በሚመልሱበት ወቅት ጠንካራ የአካላዊ እንቅስቀሴ ማለት ከባድ አካላዊ ጥረት የሚጠይቁ በትንፋሾ እና በልብ ምትዎ ላይ ከፍተኛ ጭማሪ የሚያመጡ ማለትም ቶሎ ቶሎ መተንፋስ ወይም ፈጣን የልብ ምት ሊያስከትሉ የሚያስችሉ እንቅስቃሴዎች ናቸው፡፡ መካከለኛ የአካላዊ እንቅስቃሴዎች ደግሞ መካከለኛ አካላዊ ጥረት የሚጠይቁ፣ ትንፋሽ እና የልብ ምት ላይ መጠነኛ ጭማሪ ሊያመጡ የሚችሉ አካላዊ እንቅስቃሴዎች ናቸው፡፡

ተ.ቁ	**ጥያቄ**	**መልስ**	**ወደ ሚቀጥለው ጥያቄ ይሂዱ**
	1. ስራ **ጠንካራ የአካላዊ እንቅስቀሴ**		
601	ስራህ/ሽ ላይ ከፍተኛ የትንፋሽ ወይም የልብ ምት መጨመር የሚያመጡ ጠንካራ አካላዊ ተግባራትን ያካታተ ነበር ለምሳሌ ከባድ እቃ ማንሳት/መሸከም፣ ቁፋሮ፣ የግንባታ ስራ ቢያንስ ለተከታታይ 10 ደቂቃ?	1. አዎ 2. አይደለም	መልሱ አይደለም ከሆና ወደ ጥያቄ ቁጥር 604 ይሂዱ

602	በሳምንት (ተለምዶአዊ /በአብዛኛው) ውስጥ እናዚህን ጠንካራ አካላዊ እንቅስቃሴዎች ለምን ያህል ቀናት ይሰራሉ ?	ቀናት ☐	
603	ከእነዛ ቀናት (በአብዛኛው) በአንዱ ቀን ጠንካራ አካላዊ እንቅስቃሴዎችን በመስራት ምን ያህል ግዜ በጠቅላላው ያጠፋሉ ?	ሰዐት ____ ደቂቃ _____	
መካከለኛ አካላዊ እንቅስቃሴዎች			
604	ስራህ/ሽ ላይ መጠነኛ የትንፋሽ እና የልብ ምት መጨመር ያሚየስከትሉ መካከለኛ አካላዊ ተግባራትን ይጨምራል ለምሳሌ ፈጠን ያለ እርምጃ ወይም ቀለል ያሉ እቃዎችን መሸከም ቢያንስ ለተከታታይ 10 ደቂቃ?	1. አዎ 2. አይደለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 607 ይሂዱ
605	በሳምንት ውስጥ (በአብዛኛው) እነዚህን መካከለኛ አካላዊ እንቅስቃሴዎች ለምን ያህል ቀናት ይሰራሉ ?	ቀናት ☐	
606	ከእነዛ ቀናት (አብዛኛው) በአንዱ በእነዚህ መካከለኛ አካላዊ እንቅስቃሴዎች ላይ በጠቅላላው ምን ያህል ጊዜ ያጠፋሉ ?	ሰዐት_____ ደቂቃ_____	
2. ከቦታ ቦታ መጓጓዝ			
ቀጥሎ ያሉት ጥያቄዎች ከላይ የጠቀሳችህቸውን በስራ ያደረጉትን አካላዊ እንቅስቃሴዎች አያካትትም:: አሁን ደግሞ በተለምዶ (አብዛኛውንግዜ) ከቦታ ቦታ የሚጓጓዙባቸው መንገዶችን እጠይቆታለሁ::ለምሳሌ ከቤት ወደ ስራ, ወደ አምልኮ ቦታ, ገበያ ቦታ ወ.ዘ.ተ.			
607	ከቦታ ወደ ቦታ ለመጓጓዝ በእግር ወይም በሳይክል ቢያንስ ለተከታታይ 10 ደቂቃ ይጠቀማሉ?	1. አዎ 2. አይደለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 10 ይሂዱ
608	በሳምንት ውስጥ (አብዛኛውንግዜ) ከቦታ ወደ ቦታ ለመጓጓዝ ስንት ቀን በእግር ወይም በሳይክል ለተከታታይ 10 ደቂቃ ይጓዝሉ?	ቀናት ☐	
609	ከእነዚ ቀናት በአንዱ (አብዛኛውንግዜ) በእግር ወይም በሳይክል በመጓጓዝ ምን ያህል ሰዐት ያጠፋሉ ?	ሰዐት _____ ደቂቃ _____	
3. የመዝናኛእንቅስቃሴዎች			
ቀጥሎ ያሉት ጥያቄዎች ከላይ የጠቀሳችህቸውን በስራ ያደረጉትን እንቅስቃሴዎች እና የመጓጓጉ ሁኔታ አያከትትም::አሁን ደግሞ የመዝናኛ ተግባራትን ለምሳሌ በትርፍ ጊዜ ወይም በቤት ውስጥ ስለሚያደርጓቸው የመዝናኛ እንቅስቃሴዎች ለምሳሌ ስፖረት፣ የአካልብቃት፣ የመዝናኛ እንቅስቃሴዎች (የትርፍግዜ) እጠይቆታለሁ::			
ጠንካራ አካላዊ እንቅስቃሴዎች			
610	እንደመዝናኛ/ የትርፍ ጊዜ እንቅስቃሴዎች ከፍተኛ የትንፋሽ ወይም የልብ ምት መጨመር የሚያመጡ ጠንካራ አካላዊ ተግባራትን ቢያንስ ለተከታታይ 10 ደቂቃ ያደርጋሉ ለምሳሌ	1. አዎ 2. አይደለም	መልሶዎ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 13 ይሂዱ

	የእግር ሸስ ጫዋታ ወይም ሩጫ?		
611	አብዛኛውን ግዜ በሳምንት ለምን ያህል ቀናት ጠንካራ አካላዊ እንቅስቃሴዎች ያላችዎን ስፖረት፣ የአካልብቃት፣ የመዝናኛ /የትርፍ ጊዜ እንቅስቃሴዎችን ያደርጋሉ?	ቀናት ☐	
612	አብዛኛውን ግዜ ከእነዚ ቀናት በአንዱ ጠንካራ አካላዊ እንቅስቃሴዎችን ወይም ስፖረት፣ የአካልብቃት፣ የመዝናኛ /የትርፍ ጊዜ እንቅስቃሴዎችን ለምን ያህል ሰዐት ያደርጋሉ?	ሰዐት _____ ደቂቃ _____	
መካከለኛ አካላዊ እንቅስቃሴዎች			
613	እንደመዝናኛ/ የትርፍ ጊዜ እንቅስቃሴዎች መጠነኛ የትንፋሽ ወይም የልብ ምት መጨመር የሚያመጡ መካከለኛ አካላዊ ተግባራትን ቢያንስ ለተከታታይ 10 ደቂቃ ያደርጋሉ ለምሳሌ ፈጠን ያለ እርምጀ, ዋና, የእጅ ሸስ ጫዋታ?	1. አዎ 2. አላደርግም	መልሱአላደርግምከሆነወደጥያቄቁጥር 16 ይሂዱ
614	አብዛኛውን ግዜ በሳምንቱ ለምን ያህል ቀናት መካከለኛ አካላዊ እንቅስቃሴዎችን ስፖረት፣ የአካልብቃት፣ የመዝናኛ /የትርፍ ጊዜ እንቅስቃሴዎችን ያደርጋሉ?	ቀናት ☐	
615	አብዛኛውን ግዜ ከእነዚ ቀናት በአንዱ መካከለኛ አካላዊ እንቅስቃሴዎችን (የመዝናኛ /የትርፍጊዜ እንቅስቃሴዎችን፣ ስፖረት፣ የአካልብቃት) ለምን ያህል ሰዐት ያደርጋሉ?	ሰዐት _____ ደቂቃ _____	
ከእንቅስቃሴ ውጭ የሚያሳልፉት ጊዜ			
የሚቀጥለው ጥያቄ በቤት፣ በስራ፣ ከቦታ ቦታ በመንቀሳቀስ ወይመ በትርፍ ጊዜዎ በመቀመጥ ወይም ጋደም ብለዉ ያሳለፉትን ጊዜ ይመለከታል። (በዴስክ ላይ ፡ በመኪና ውስጥ፡ ከጓደኞችዎ ጋር ወይም ቴሌቪዥን ለመመልከት ተቀምጠው ወይም ጋደም ብለው፣ በማንበብ፣ ካርታ በመጫወት ያሳለፉትን ጊዜ ይጫምራል። ነገር ግን በእንቅልፍ ያሳለፉትን ጊዜ አያካትትም።			
616	አብዛኛውን ግዜ በቀን ውስጥ በጠቅላላው ምን ያህል ጊዜ ተቀምጠው ወይም ጋደም ብለው ያሳልፋሉ?	ሰአት _____ ደቂቃ _____	

ክፍል 7፦የመደበት/የድብርት ስሜትን መለኪያ መጠይቅ

መመሪያ፡-አሁን ስለ ድብርት /የመደበትን ስሜት በተመለከተ የተወሰኑ ጥያቄዎችን እጠይቆታለው::

በባለፉት ሁለት ሳምንት ጊዜ ውስጥ የሚከተሉት ችግሮች በየስንት ጊዜ አጋጥመውህ/ሽ ያውቃል?

ተ.ቁ	ጥያቄ	አጋጥሞኝ አያቅም (0)	ብዙ ጊዜ (አብዛኛውን ግዜ ያጋጥመኛል (1)	ከግማሽ ቀን በላይ (2)	በየቀኑ (3)
701	ነገሮችን ለማድረግ ፍላጎት ያለማሳያት/ ጥቂት ፍላጎት				
702.	መደበት፣ ጭንቀት እና ተስፋማጣት				
703.	እንቅልፍ ማጣት (እንቅልፍ ቶሎ አለመውሰድ, ቶሎ መነሳት ወይም ለረዥም ሰአት መተኛት				
704.	የድካም ስሜት ወይም አነስተኛ አቅም መኖር				
705.	የምግብ ፍላጎት መቀነስ ወይም በብዛ ትመመገብ/ መብላት				
706	ስለራስህ/ሽ የሚሰማህ/ሽ መጥፎ ስሜት ወይም የውድቀት ስሜት ራስን ወይም ቤተሰብን ለውድቀት የመደረግ ስሜት				
707	ነገሮችን በተመስጦ ያለ ማድረግ ስሜት ለምሳሌ በንባብ ወቅት/ ቴሌቪዥን በምትመለከትበት/ች ወቅት				
708	ሰዎች እስከሚያወቁብህ/ሽ ድረስ ንግግር ወይም እንቅስቃሴ በሚየደርጉበት ወቅት ዝግ ማድረግ ወይም ድምጽን ከፍ አድርጎ መናገር እርፍት ማጣት እና መንቀዥቀዥ/መቁነጥነጥ				
709	በህይወት መኖሬ ትርጉም የለውም/ ብሞት ይሻላል ብሎ የማሰብ ወይም ራስን የመጉዳት ስሜት/ሀሳብ				

ከላይ ከተጠቀሱት ውስጥ ምንም አስቸጋሪ አላደረገብኝም ከሚለው ውጪ ከተጠቀሰ፡- በዚህ መጠየቅ ውስጥ ያጋጠምዎት ችግር ምን ያህል በስራዎት ላይ፤ በቤት ውስጥ በሚየከናውነቸው ተግባራት ላይ እና ከሰዎች ጋር በሎዎት መግባባት ምን ያህል አስቸጋሪ አድርጎብዎታል?

ምንም አስቸጋሪ አላደረገብኝም ☐

በጥቂቱ/በትንሹ አስቸጋሪ አድርጎብኛል ☐

በጣም አስቸጋሪ አድርጎብኛል ☐

እጅግ በጣም አስቸጋሪ አድርጎብኛል ☐

ለመረጃ ሰብሳቢው፡-

በተቀለመው ውስጥ ቢያንስ 4√ካለ (ጥያቄ ቁጥር ፣ እና 2 ጨምሮ) ወይም

በተቀለመው ውስጥ 2-4 √ (አንዱ ጥያቄ ቁጥር ፣ ወይም 2) ካለ፡- የመደበት/የድብርት ስሜት ሊሆን ስለሚችል በባለሙያ መታየት እንዳለባቸው ይንገራቸው

ክፍል 8፡ አንትሮፖሜትሪክ ልኬት

መመሪያ፡- አሁን ደግሞ ክብደቶንና ቁመቶን እንለካዎታለን

ለመረጃ ሰብሳቢው፡- እባክዎ ተሳታፊው ቀለል ያሉ ልብሶችን መልበሱን እና በባዶ እግር መሆኑን ያረጋግጡ፡፡ የልኬቱን ውጤት ሲጽፉ ከነጥብ በኋላ ያለውን ቁጥር ወደ አንድ ቁጥር ያጠጋጉት

ቁጥር	**ልኬት**		**ንባብ**
801	ቁመት (በሴንቲሜትር)	1ኛ	☐☐☐.☐
		2ኛ	☐☐☐☐
802	ክብደት (በኪሎግራም)	1ኛ	☐☐☐.☐
		2ኛ	☐☐☐☐

ስለ ትብብርዎት በጣም እናመሰግናለን።

Annex 7: Anthropometric measurement guidline

Measuring height

Position the board on a firm surface against a wall

Step 1-Ask the participant to remove their:

• Foot wear (shoes, slippers, sandals, etc)

• Head gear (hat, cap, hair bows, comb, ribbons, etc).

• Any fancy or high hairdos may have to be pressed.

Step 2-Ask the participant to stand on the board facing you.

Step 3-Ask the participant to stand with:

Back of head, shoulder blade, buttock, and heels against the back board

• Feet together

• Place arms on the side

Step 4-Ask the participant to look straight ahead and not tilt their head up.

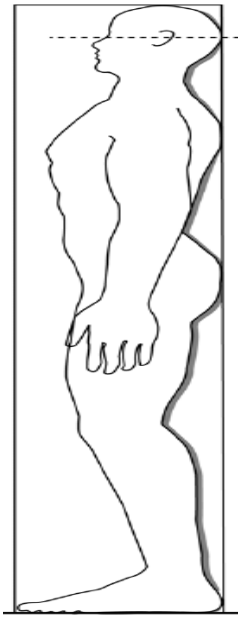
Step 5- Make sure eyes are the same level as the ears.

Step 6- Move the measure arm gently down onto the head of the participant and ask the Participant to breathe in and stand tall.

Step 7- Read the height in centimetres at the exact point to the nearest 0.1 cm.

Step 8- Ask the participant to step away from the measuring board.

Step 9- Record the height measurement in centimetres



Weight measurement

Make sure the scales are placed on a firm, flat surface.

Turn on the scale and wait until the display shows 0.0.

Step 1-Ask the participant to remove their footwear (shoes, slippers, sandals, etc) and socks. They should also take off any heavy belts and empty out their pockets of mobiles, wallets and coins.

Step 2- Ask the participant to step onto scale with one foot on each side of the scale.

Step 3- Ask the participant to:

- Stand still
- Face forward
- Place arms on the side
- Wait until asked step off

Step 4- Record the weight in kilograms to the nearest 0.1 kg

Annex 8. Food groups and their respective food items

Food groups	**Food items**
Cereals	Enjera,firfir,bread,kinche,atmit,pasta,macaroni,rice,chechebisa,genfo,chiko
Vegetables	Boiledpotato,chips,potatowot,beet,carrot,beetroot,kocho, Cabbage, kale, lettuce, kosta,tomatokurt,tomatosauce,fosolia,pumpkin,pepper, Broccoli,kyar,zkuni
Legumes	Shirowot,corn,barley,chickpea,pea,aterkik,miserkik,peanutbutter
Fruits	Avocado,banana,mango,orange,pineapple,papaya,apple,strawberry
Meats	Beef ,lamb,goat , chicken,organ meat
Fish	Fish
Dairy product	Milk,yogurt,cheese
Egg	Egg
Sweets	Shugar ,honey,maramalade,chocolate,cake,kukis
Nonalcoholic beverages	Mirinda ,cocacola,sprite,tea,coffe,macyato
Fast foods	Pizza,burger
Oil and fats	Oil,butter

Annex 9: Technical error of measurement (TEM)

Measurement of data collectors	**Subjects**									
	1	2	3	4	5	6	7	8	9	10
Genet height measurement										
First	151.1	163	164.5	155	165	159	161	169.7	150	158.3
Second	151,1	163.0	164.3	155.5	165	159	161.3	170	150.3	158
Genet weight measurement										
First	47.5	50.2	50.1	50.6	52.9	54.7	62.1	73.4	59	65
Second	47.5	50.2	50.1	50.6	52.9	54.7	62	73.4	59	65
Hana height measurement										
First	150	163	164	155	165	159.5	159	169.2	150	157
Second	150.5	163.5	164	155	165.5	159.3	160.2	169.4	150	157.5
Hana weight measurement										
First	47	50.1	50	51	53	54.7	62	73.4	59.2	65
Second	47.5	50.1	50	51	53	54.7	62	73.4	59.2	65
Semira height measurement										
First	150.9	162	164	155.5	165.2	160	160.7	169	151	157.5
Second	151	162.9	164.5	155.5	165.2	160	161	169.5	151	158
Semira weight measurement										
First	47.5	50.2	50.3	50.6	53	54.7	62	73	59.6	65.3
Second	47.5	50.2	50.3	50.6	53	54.7	62	73	59.6	65.3
Alem height measurement										
First	151	163	164	156	165	160	159.9	170.1	151	158
Second	151	163	164.4	156	165	160	160	170.1	151	158
Alem weight measurement										

First	47	50.2	50	51	52.8	55	62	73.4	59.5	65
Second	47.3	50.2	50	51	53	55	62	73.5	59.5	65
Tesfu height measurement										
First	151.2	162.2	164	155.7	165	159	162	169.8	151	158.5
Second	151.5	162.5	164	155.7	165.1	159.4	161.9	170	151	158.5
Tesfu weight measurement										
First	47.5	50.4	50	50.3	52.8	54.5	62	73.4	59	65
Second	47.5	50.4	50	50.3	52.8	55	62	73.5	59	65
Meliha height measurement										
First	152	163	164.5	155	165	160	161.5	170	150.1	158
Second	151.5	162.9	164.5	155	165	160	161.5	170	150	157.6
Meliha weight measurement										
First	47.6	50	50.5	50.6	52.9	54.6	62.5	73.4	59	65.3
Second	47.4	50	50.5	50.6	53	54.6	62.4	73.4	59	65

TEM results

- For height measurement intra TEM of observers was between 0.001 and 0.003
- For weight measurement intra TEM of observers was between 0.02 and 0.1
- For height measurement inter TEM of observers was 0.005
- For weight measurement inter TEM of observers was 0.2

CURRICULUM VITAE-MUNA SHEMSU

1. Personal information

Full Name	Muna Shemsu
Sex	Female
Date of birth	August 23, 1993 G.C.
Place of birth	Addis Ababa
Marital status	Married
Nationality	Ethiopian
Address	Mob. +251-0949218117
	(Addis Ababa, Ethiopia)

Email: shemsumuna100@gmail.com

2. Language Proficiency

	Read	Write	Speak
➢ Amharic	Excellent	Excellent	Excellent
➢ English	Excellent	Excellent	Excellent
➢ Arabic	Excellent	Good	Good

3. Educational Background

- **B.Sc. Degree in Public Health**, Arba Minch University, College of Medicine and Health Sciences, Arba Minch, Ethiopia (September 2011-August 2014).
- **Certificate** of Ethiopian School leaving Certificate, higher 23 Addis Ababa (September -June 2010)

4. Professional Work Experience

Duration: October 2014 – September 2015

Organization: Arba Minch University (Ethiopia), College of Medicine and Health Sciences

Position:

- ✓ Lecturing (graduate assistant II) at department of Public Health

Duties and responsibilities:

- Advising/supervising students' research projects
- Supervising students on community based education and clinical attachment

Duration: October 2015 – June 2016

Organization: Yirgalem hospital medical college

Position: lecture (Assistant lecturer)

Duties and responsibilities:

- Advising/supervising students' research projects
- Supervising students on community based education and clinical attachment

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5. Consultancy (short term) Services

Duration: November 2015 – December 2015

Organization: Japigo

Position: data collector

Duties and responsibilities:

- **C**ollection of data in different areas of southern regions in Ethiopia

6. Work Shops and In-service Trainings attended and certified

- Higher diploma program (HDP)
- Basic computer skills,
- Basic training on research methodology

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7. Other Experiences and Skills

- A good experience and skill of proposal development and report writing, Excellent skill and knowledge of computer applications (Word, Excel, Power point, Access, Epi info, stata)
- Active member of Public Health officers association (PHOA)

8. RESEARCH EXPERIENCE

1. A B.Sc. project work, "Assessment of prevalence and associated factors of exclusive breast feeding in shelle district, Arbaminch , Southern Ethiopia".

9. References

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