Addis Ababa University College of Health Science School of Public Health

Assessment of Sleep duration and Overweight/Obesity among High School Adolescents in Addis Ababa, Ethiopia

A Thesis Submitted To School of Graduate Studies of Addis Ababa University, College of Health Sciences, School of Public Health in Partial fulfillment of the requirements for the degree of master in Public Heath

By Dessalegn Dereje

Advisor: Robel Yirgu

June, 2016

Addis Ababa, Ethiopia

Table of Contents

Contents **Pages**

List of tables

List of figures

Acronyms

AAU……. Addis Ababa University

AOR…….. Adjusted Odds Ratio

BMI…… Body Mass Index

CDC……... Center for Disease Control and Prevention

Cm…….. Cent-meter

COR…… Crude Odds Ratio

CI…… Confidence Interval

DALY……. Disability Adjusted Life Year

EDHS…….. Ethiopian Demographic Health Survey

Kcal…… Kilo-calorie

Kg……... Kilo-gram

NSF……. National Sleep Foundation

OR…….. Odds Ratio

REC…… Research Ethics Committee

SPSS……..... Statistical Package for the Social Sciences

TV…….. Television

USA…… United State of America

WHO……..... World Health Organization

Acknowledgments

I really would like to express my deep gratitude and appreciation to my advisor, Mr. Robel Yirgu (MPH) for his unreserved and invaluable advice and comment from the development of proposal to the end of the research. Also, I would like to thank directors of the selected schools for giving permission and the necessary information. My thanks also goes to the study participants for their willingness and participation in the study. Last, but not least my appreciation goes to the following personnel: Minilik Tsega (MSc), Ephrem Mamo (PhD fellow), Raji Feyisa (PhD fellow), Busha Gemechu (MSc) and Desalegn Geneti for their precious support.

Abstract

Background: Worldwide, at least 2.8 million people 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. Many studies in Ethiopia showed that overweight and obesity is caused due to increased intake of energy-dense food, physical inactivity, changing modes of transportation and increasing urbanization. However, there is no published article showing that short sleep duration is an independent risk factor to cause overweight and obesity for adolescents in the country.

Objective of the study: To measure the magnitude of overweight/obesity and its association with short sleep duration among high school adolescents' in Addis Ababa, Ethiopia.

Methods: School based cross-sectional study was conducted with a sample size of **405**. Data was collected by self-administered questionnaire, entered and cleaned using EPI INFO version 7, and was exported to SPSS version 20 for analysis. Body mass index (BMI) was computed using weight and height (Kg/m^2). Descriptive statistics using frequencies, proportion and table were used to present the study results. Binary logistic regression analysis was employed to see association between short sleep duration and overweight/obesity. To evaluate the association between short sleep duration and overweight/obesity, both crude odds ratio and adjusted odds ratio with 95% confidence interval were computed.

Results: The combined prevalence of adolescents' overweight and obesity was 18.2%, the specific prevalence for overweight and obesity were 14.4% and 3.8%, respectively. Adolescents with short sleep duration (<8 hours/day) were significantly at risk for being overweight/obese as compared to adolescents with normal sleep duration (8-10 hours/day) [AOR = 3.7 (95% CI: 1.9-7.0)].

Conclusions and recommendations: The findings of this study showed that higher prevalence rates of overweight and obesity were observed among adolescents in the study area. Short sleep duration was strongly associated with overweight/obesity during adolescence. Hence, results of this study suggest that adolescents should receive educational intervention on adequate duration of sleep at night to reduce the risk of being overweight or obese.

1. Background

1.1. Introduction

In the past, overweight and obesity were problems of high-income countries; however, now days it is dramatically on the rise in low- and middle-income countries, particularly in urban setting [1, 2]. Adolescence, particularly teenagers age (13 – 19) is a critical period for the development of overweight and obesity that transit into adulthood [3, 4, 5]. Overweight is defined as Body Mass Index (BMI) for ages greater than or equal to 85th percentile and less than 95th percentile, and Obesity is defined as BMI for ages greater than or equal to 95th percentile [4].

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]. In Africa, despite a high prevalence of under nutrition, the prevalence of overweight and obesity is increasing at an alarming rate. It is estimated that 4% to 7% of urban children are overweight [4]. Currently there is a growing pattern of adolescents overweight and obesity in Ethiopia especially in urban areas. WHO estimated in 2008 in Ethiopia, the prevalence death due to overweight and obesity was 7.4% and 1.1%, respectively [5].

The main cause of overweight and obesity is an energy imbalance between calories used and calories expended [4, 9].Several factors contribute toward the occurrence of overweight and obesity in adolescents. Globally there has been an increased intake of energy-dense food that are high in fat, sugar, salt and an increase in physical inactivity due to increasing sedentary nature of many forms of activities, changing modes of transportation and increasing urbanization [4, 6]. However, in recent years, short sleep duration has received greater attention as independent risk factor for overweight and obesity in adolescents [7, 8].

Many cross-sectional and longitudinal studies in developed countries have shown short sleep duration could increase energy intake by increasing hunger, giving people more time to eat and promoting people to choose less health diets; and could decrease energy expenditure by decreasing physical activity and lowering body temperature [10, 11, 12]. Recently there is convincing evidence that getting a less than ideal amount of sleep is independent and strong risk factor for overweight and obesity in infants and children as well as in adults [10].

1.2. Statement of the problem

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, hypertension, stroke and cancer [14]. Since adolescents are still vulnerable to develop overweight and obesity, early control is necessary at this stage of life, in order to avoid an unfavorable long-term prognosis, as in adulthood. Future complications of this condition in adulthood can be serious if early intervention measures are not established [13].

In recent decades, children's prevalence of overweight and obesity increased worldwide from 4.2% in 1990 to 6.7% in 2010, and this trend is expected to reach 9.1% in 2020. These findings are particularly alarming since children's obesity is strongly associated with a wide range of serious health complications and increased risk of premature illness and death later in life [15].

Short Sleep duration has emerged as risk factor for childhood obesity with weight gain, higher body mass index (BMI) and increased odds of being overweight/ obese. The association between sleep duration and overweight or obesity has been mostly studied in developed countries. Several findings suggested that these observations may not fully extrapolate a wider diversity of ethnic group and socio-demographic variables [16].

In Ethiopia, different studies showed that overweight and obesity are caused due to increased intake of energy-dense food, physical inactivity, changing modes of transportation and increasing urbanization. However, there is no published article showing that short sleep duration is an independent risk factor to cause overweight and obesity for adolescents in the country. Ethiopian Demographic Health Survey (EDHS) 2011 reported the burden of adulthood overweight and obesity, but still there is scarce research report on adolescents' overweight and obesity. In Addis Ababa, though it is common to see overweight people in all age groups, including school adolescents, there is no research report done to assess the association between sleep duration and overweight/obesity of adolescents in Addis Ababa.

The data from this study will be used for decision makers, educators and stakeholders in planning appropriate intervention programs targeting high school adolescents. Hence, this study addresses the gap by assessing the magnitude of overweight and obesity among high school students and their association with short sleep duration.

2. Literature review

2.1. Magnitude of overweight and obesity

The prevalence of childhood overweight and obesity has risen in the last two decades. In the year 2010, approximately 80% of adolescents with overweight/obesity were in developing countries [16]. The study in Vietnam showed 6.7% and 2% prevalence of overweight and obesity, respectively, among children aged eleven to fourteen years old [17].Similarly, the prevalence of overweight for adolescents aged 10 to 20, was 12.2% in the year 2015 in Ghana [9]. The study in Addis Ababa, Ethiopia, reported the prevalence of overweight and obesity were 9.7% and 4.2%, respectively [5]. The study on High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia, and on high school adolescents in Gondar Town, Northern Ethiopia, showed that the prevalence of overweight/obesity were 12.9%/2.7% and 5.4%/0.5%, respectively [2, 14]. Another study on high school adolescents in Arada Sub-city, Addis Ababa showed the overall prevalence of overweight and obesity was 9.4% [4].

2.2. Causes and consequences of overweight/obesity

Overweight/obesity results when there is an energy imbalance between calories used and calories expended [4]. Overweight/obesity reach typically focuses on dietary intake and physical exercise as the cause of overweight/obesity. However, short sleep duration can influence energy intake and expenditure and cause obesity in children independently. Short sleep duration has received considerably less attention in relation to overweight/obesity, especially when research funding is the metric [18].

Being overweight or obese is a risk factor for a wide array of health problems, which include cardiovascular disease, diabetes, cancer, hypertension, stroke, respiratory problems, and sleep apnea [19]. Moderately obese adolescents have an average life expectancy of two to five years less than those who are not overweight or obese. Severely obese adolescents have a life expectancy up to 20 years less than those not overweight or obese [20].

2.3. Sleep duration in adolescents

Sleep is an important modulator for growth, maturation and health of children and adolescents [21]. The transition from childhood to adolescence is when significant changes occur, both for physical development and sleep. In modern society, adolescence becomes a

period of sleep deprivation (short sleep duration occurs) because waking later on weekdays is prevented by early school times. The increased amount of sleep deprivation is sometimes recovered during the weekend with adolescents commonly staying in bed until the late morning or early afternoon [22].

The National Sleep Foundation (NSF) 2015, along with a multi-disciplinary expert panel, issued its new recommendations for appropriate sleep durations. The report recommends wider appropriate sleep ranges for most age groups. The summary of the new recommendation is jotted below in Tabe1 [26].

Table1. National sleep foundation's sleep duration recommendations (2015)

Age	**Recommended**	**May be appropriate**	**Not recommended**
Newborns *0-3 months*	14 to 17 hours	11 to 13 hours 18 to 19 hours	Less than 11 hours More than 19 hours
Infants *4-11 months*	12 to 15 hours	10 to 11 hours 16 to 18 hours	Less than 10 hours More than 18 hours
Toddlers *1-2 years*	11 to 14 hours	9 to 10 hours 15 to 16 hours	Less than 9 hours More than 16 hours
Preschoolers *3-5 years*	10 to 13 hours	8 to 9 hours 14 hours	Less than 8 hours More than 14 hours
School-aged Children *6-13 years*	9 to 11 hours	7 to 8 hours 12 hours	Less than 7 hours More than 12 hours
Teenagers *14-17 years*	8 to 10 hours	7 hours 11 hours	Less than 7 hours More than 11 hours
Young Adults *18-25 years*	7 to 9 hours	6 hours 10 to 11 hours	Less than 6 hours More than 11 hours
Adults *26-64 years*	7 to 9 hours	6 hours 10 hours	Less than 6 hours More than 10 hours
Older Adults *≥ 65 years*	7 to 8 hours	5 to 6 hours 9 hours	Less than 5 hours More than 9 hours

Short sleep duration in adolescence was identified in the National Sleep Foundation 2006 *Sleep in America* poll, which reported that only one in five American adolescents obtained pre-defined "optimal" amounts of sleep. The majority reported feeling tired or sleepy during the day and

45% slept less than 8 hours on a weekday [23]. Study in china showed 51% of adolescents slept less than 7.5 hours per weekday [24]. Similarly, systematic review done in Portugal and England reported 45% adolescents slept less than 7 hours per weekday [25].

Sleep loss is becoming increasingly prevalent in today's society due to factors such as technology use, environment, diet, medications, health conditions, smoking, shift work, and caffeine and alcohol consumption [18]. Also demographic factors like increased age, non-married status and living with infants have all been associated with short sleep duration [11].

2.4. Association of sleep duration and overweight/obesity

A good night's sleep is one of the keys to good health—and may also be a key to maintaining a healthy weight. There is convincing evidence that people who get too little sleep have a higher risk of weight gain and obesity than people who get seven to eight hours of sleep a night [10].

A British study, followed more than 8,000 children from birth found that those who slept fewer than 10 and a half hours a night at age 3 had a 45%higher risk of becoming obese by age 7, compared to children who slept more than 12 hours a night [27]. Similarly, U.S. prospective cohort study of 915 children, found that infants who averaged fewer than 12 hours of sleep a day had twice the odds of being obese at age 3, compared with those who slept for 12 hours or more [28].Another study in New Zealand, researchers followed 1,037 children from birth until age 32, collecting information from parents on the average number of hours their children slept at ages 5, 7, 9, and 11; each one hour reduction in sleep during childhood was associated with a 50% higher risk of obesity at age 32 [29].

A study of 4,511 Portugal children ages 7–9 found that sleep duration of8 hours and 9–10 hours had odds ratio (ORs) for obesity of 2.56 and 2.27 respectively, when compared with 11 hours or more. Similar study of 422 Canadian children ages 5–10 found that compared to sleep duration of 12 hours or more, the ORs for obesity were 1.42 and 3.45 for sleep durations of 10.5–11.5 hours and 10 or fewer hours, respectively [18].

A study on Peruvian, 6–13 years school-aged children, there was a trend for the association between short sleep duration and obesity; those who slept less than 10 hours have a 15% greater prevalence of obesity when compared to children who sleep between 10 to 11 hours a night [16].

A study of 383 USA's school children aged 11 to 16 reported the odds ratio for obesity increased fivefold for every 1 hour reduction in total sleep time. Similarly, study of nearly 4,500 American teenagers found each hour reduction in sleep duration was associated with a 0.08% increase in

BMI and increase risk of overweight in boys. Another study in 40 Senegalese girls showed sleep duration was reduced by 6.85 minutes for every 1kg/m^2 increase in BMI [30].

2.5. Potential mechanism of sleep duration and overweight/obesity

Several studies attempted to assess possible mechanism that link short sleep duration and overweight/obesity. As shown in Fig1, short sleep duration may lead to increase calorie intake due to increased hunger/appetite and increased opportunity to eat. It also possible that short sleep duration could decrease energy expenditure through altered thermoregulation and increased fatigue/physical inactivity [31].

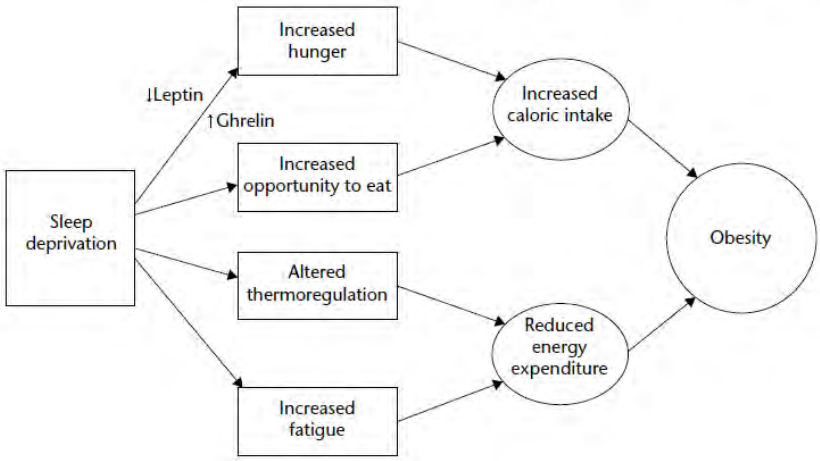


Fig1. Potential mechanisms by which short sleep duration may predispose overweight/obesity (Frank Hu, 2008).

2.5.1. Short sleep duration and calorie intake

2.5.1.1. Short sleep duration and increased hunger/appetite

Sleep deprivation is associated with low levels of leptin and high levels of ghrelin. In humans, leptin and ghrelin are peripheral signals that contribute in hunger and appetite regulation. Short sleep duration decreases leptin, a hormone secreted from adipocytes (fat cells). A decrease in leptin level thus lead to increase in hunger and appetite, especially for foods rich in fat and carbohydrates. The increase in hunger is also partly due to an increase in plasma ghrelin, a hormone that is secreted by the stomach [12].

Experimental study of 12 healthy, normal weight men in USA, participated in the experiment of 2 days of sleep deprivation (4 hours in bed) and 2 days of sleep extension (10 hours in bed) under controlled conditions of calorie intake and physical activity. Sleep deprivation was associated with 18% decrease in mean leptin levels and 28% increase in mean ghrelin levels when compared to sleep extension days. In addition, there was an increase in hunger and appetite sensation, especially for calorie-dense foods with high carbohydrate content [32]. Similar experiment with 9 healthy men, a single night of total sleep deprivation was associated with 10% increase in ghrelin levels with markedly stronger feelings of hunger compared to 7 hours of sleep [11]. In another population-based cross-sectional study in Canada, of 323 men and 417 women, ages 21 to 64 years, short sleep duration (5-6 hours) was associated with reduced circulating level of leptin [33].

2.5.1.2. Short Sleep duration and opportunity to eat more

Short sleep duration can lead to overweight/obesity by promoting individual's behavior that causes weight gain. Increased wakefulness may give more opportunity for eating in an obesogenic environment where food is readily available [30].

In a study of 240 adolescents in America, less than 8 hours of sleep was associated with 2times increased odds of daily consumption of 475 or more Kcal from snacks, when compared to 10 hours sleepers. Similar study on college students showed that the habitual short sleepers (6 hours/night) ate more than three meals with frequent nibbling than did the long sleepers [11].

2.5.2. Short sleep duration and energy expenditure

Energy expenditure is another possible underlying mechanism mediating the interaction between sleep and obesity. Short sleep duration could decrease energy expenditure through altered thermoregulation and increased fatigue [18].

2.5.2.1. Short sleep duration and decrease in physical activity

People who don't get enough sleep are more tired during the day, and as a result may curb their physical activity. Some studies have found that sleep-deprived people tend to spend more time watching TV, less time playing organized sports, and less time being physically active than people who get enough sleep [10].

In a large population-based study, assessed the association between sleep duration and morning tiredness of 1,139 females Spanish adolescents (ages ranged from 13 to 18.5 years). Finding showed that female participants who slept 8 hours or longer were less likely to report morning tiredness (OR 0.49, 95% CI 0.34 – 0.71), but females who slept less than 8 hours was associated with lower probability of engaging in any physical activities (OR 0.64, 95% CI 0.45–0.93) and higher probability of excessive hours of watching TV (≥3 hours per day) (OR 2.15, 95% CI 1.42–3.27) [34]. Results of a similar study in Spain, in a sample of 383 adolescents (aged 11 to 16 years) showed that each hour reduction in total sleep time was associated with 80% increased risk for obesity (95% CI 0.11–0.34) and associated with decreased physical activity levels among these individuals [23].

2.5.2.2. Short sleep duration and altered thermoregulation

Altered thermoregulation refers to a drop in body temperature seen with short sleep duration [18]. Sleep has an important role in thermoregulation. Body temperature reduces during sleep suggesting energy dissipation. Sleep deprivation may affect this reduction in body temperature, thus avoiding energy dissipation. This could contribute to weight gain [23].

Studies of acute sleep deprivation in humans have consistently found a drop in core body temperature in response to sleep loss. Increased complaints of cold and earlier onset of shivering with sleep deprivation suggest that this is not due to a change in the temperature set point. Although some studies suggest this is due to increased heat loss, exercise data suggest sleep deprivation leads to an increase in heat conservation. These studies suggest that alterations in sleep may affect energy expenditure through changes in thermoregulation [30].

3. Objective of the study

3.1. General objective

- To measure the magnitude of overweight/obesity and its association with short sleep duration among high school adolescents' in Addis Ababa, Ethiopia

3.2. Specific objective

- To determine the magnitude of overweight and obesity
- To identify the association between short sleep duration and overweight/obesity

4. Methods and Materials

4.1. Study area and period

The study was conducted in Addis Ababa from February to June, 2016. Addis Ababa is the capital city of Ethiopia with a great diversity, and homes of almost all ethnicities are found in the country. In 2014, a study done among high school adolescents in Addis Ababa reported that the overall prevalence of overweight and obesity was 13.9% [5]. The city contains 10 administrative sub cities namely: Arada, Yeka, Gulele, Addis Ketema, Akaki Kality, Nefassilk Lafto, Lideta, Bole, Kolfe Keranio, and Kirkos. The study included all sub-cities. According to the 2015/2016 report of Addis Ababa City Government Educational Bureau, there are 171 high schools. In all these schools, there are a total of 127056 students. From the total number of schools, 62.57% are private and 37.43% are public. The study was conducted in 6 selected schools, of which 4 were private and 2 were public.

4.2. Study design

School-based cross-sectional study was conducted.

4.3. Source population

All high school students attending in Addis Ababa

4.3.1. Study population

Students of adolescent age between 13 and 19 in Addis Ababa enrolled from grade 9 to 12 for the 2015/2016 academic years.

4.3.1.1. Inclusion criteria

Adolescents with ages ranging between 13 and 19 and who were attending their regular classes were included.

4.3.1.2. Exclusion criteria

Adolescents whose age was between 13 and 19 and who were pregnant, and who had diseases during data collection were excluded from the study.

4.4. Sample size determination

Sample size (n) was calculated by using single population proportion formula. The magnitude of 13.9% was taken from the study done among high school adolescents in Addis Ababa in 2014,

the margin of error (d) 5% and taking confidence interval ($Z_{\alpha/2}$) of 95% [5].

$$n = \left[\frac{z\alpha/2}{d}\right]^2 p\,[1-p]$$

$$n = \left[\frac{1.96}{0.05}\right]^2 0.139\,[1-0.139] = 184$$

Sampling procedure for the study is two-stage probability sampling, to adjust the variability taking design effect of 2 and non-response rate of 10%. Therefore the total sample size for this study was: N= 184×2+ (10%) = **405**

For the second objective, the following assumptions were made: prevalence of short sleep duration among obese adolescents of Saud Arabia was 38.9%, prevalence of short sleep duration among non-obese adolescents of Saud Arabia was 18.5% [35].

$$n_1 = \frac{\left[Z_{\frac{\alpha}{2}}\sqrt{\left(1+\frac{1}{r}\right)P(1-P)} + Z_{\beta}\sqrt{P_1(1-P_1)+\frac{P_2(1-P_2)}{r}}\right]^2}{(P_1-P_2)^2}$$

Where $P = \dfrac{(P_1 + r\,P_2)}{1+r}$

n= required minimum sample size for the two groups (n_1+n_2)

Where n_1 = number of obese adolescents

n_2 = number of non-obese adolescents

p_1= proportion of short sleep duration among obese

p_2=proportion of short sleep duration among non-obese

r = 1, Proportion of group 1 to group 2 (obese to non-obese) was taken as equal 1:1

$\frac{z\alpha}{2}$ =critical value at 95% level of significance

$z1-\beta$ = standard normal distribution value corresponding to 80% power to detect the assumed difference =0.84.

$$n_1 = \frac{1.96\sqrt{2 \times 0.29 \times 0.71} + 0.84\sqrt{0.389 \times 0.611 + 0.185 \times 0.815}\,¿^2}{¿}$$

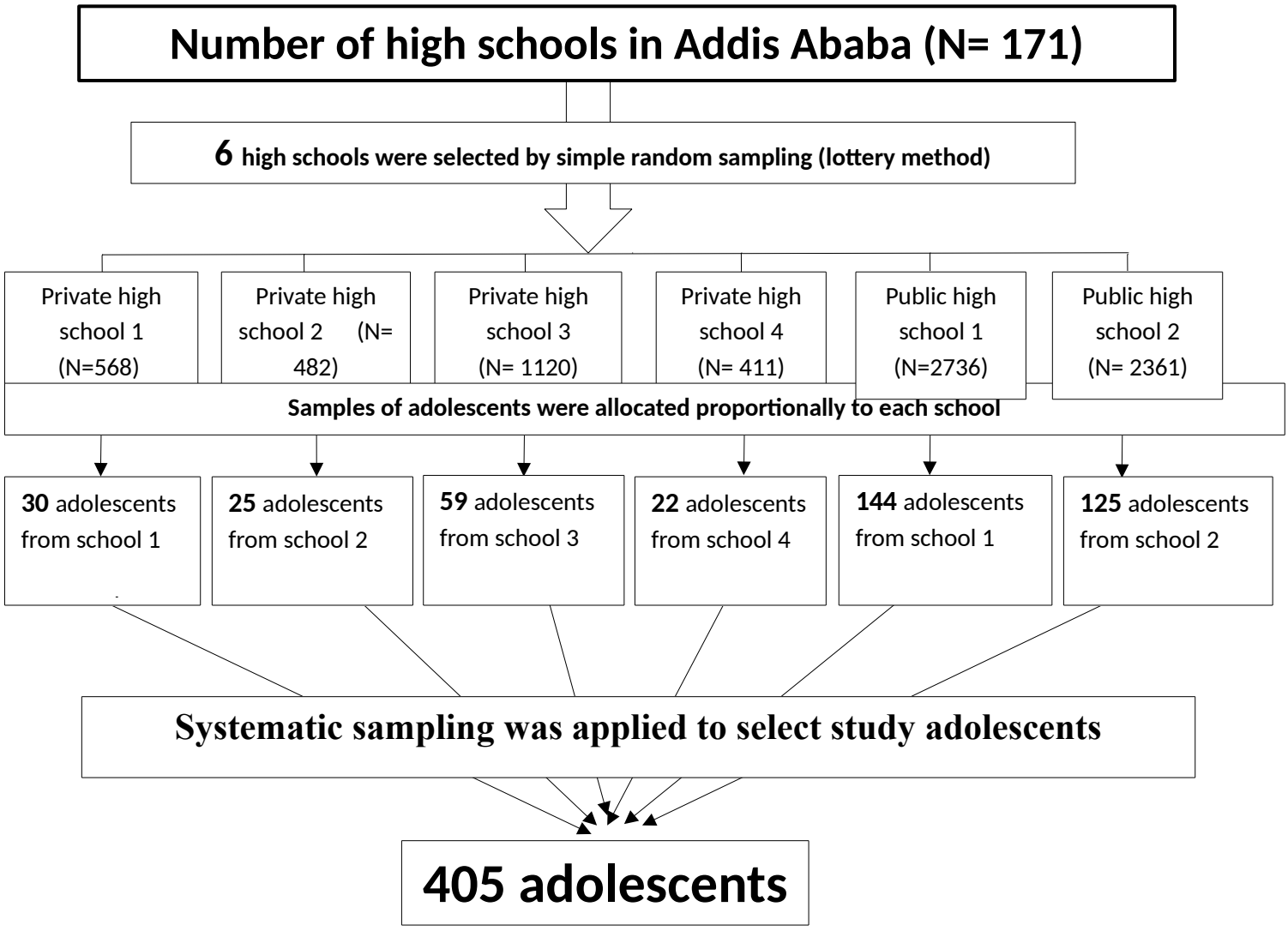
$$(0.389 - 0.185)^2$$

$n_1 = 78$

Since n_1=n_2, total sample size (**n**) with 10% non-response rate and design effect of 2 was **343**. Therefore, compared with the sample size of first objective, 405 was larger and it was taken as sample size for this study.

4.5. Sampling procedure

A two-stage probability sampling procedure was applied to select the study subjects. In Addis Ababa there are 171 high schools (107 private and 64 public), from which 6 study high schools were randomly selected by lottery method. Out of these 6 schools, 4 private and 2 public schools were proportionally allocated. Then, the number of study adolescents from each school was allocated proportionally. Finally, study adolescents were selected by systematic sampling method from a student list of each section. The sampling procedure is indicated in Fig 2.



4.6. Data collection procedures

Data was collected between February and March 2016 through self-administered and interviewer-guided structured questionnaire. A one-day training was given for seven health professionals to collect data and to take anthropometric measurements. For the purpose of this study, structured questionnaire was developed based on conceptual frame work after a thorough review of different literatures. The questionnaire was pre-tested for suitability before 10 days of data collection in other school that had no chance of being included in this study.

After the participants finished filling the questionnaires, trained health professionals took anthropometric measurements. Anthropometric measurement of weight was taken to the nearest 0.1 kg using calibrated digital balance in standing position, and heights were measured to the nearest 0.5 cm using height measuring board in standing position after students removed their heavy clothing and shoes.

4.7. Study variables

4.7.1. Dependent variables

- Obesity/ Overweight

4.7.2. Independent variables

- Sex

- Age
- Educational status of the family
- School type
- House-hold income
- Eating habit
- Physical activity
- Short sleep duration
- Sedentary activity (TV, Video game or Internet)

4.8. Operational definitions

- Overweight: BMI for age greater than or equal to 85th percentile but less than 95th percentile.
- Obesity: BMI for age greater than or equal to 95th.
- Sleep duration: night sleep of weekday (wakeup time – bedtime) ×5 + weekend (wakeup time – bedtime) ×2 ÷ 7.
- Short sleep duration: less than 8 hours of average sleep at night according to National Sleep Foundation (NSF) for adolescents.
- Weekday sleep: a night sleep from Monday to Friday.
- Weekend sleep: a night sleep from Saturday to Sunday.
- Physical activity – measures an average of hours per day or week spend on doing physical exercise.
- Vigorous exercise: Running or jogging, high-intensity aerobic classes, competitive full-field sports (soccer) or basketball.
- Moderate exercise: Low-impact aerobic exercise classes, brisk walking or hiking, recreational team sports (volleyball, soccer, etc.).
- Household income – describes the monthly income of household head, house-wife and income from aid.
- Eating habit – measures daily consumption of diet during the past one year.
- Adolescent: A person of age between 13 and 19 years for this study, because the average minimum age for a 9^{th} grade student is 13.

4.9. Data quality management

The questionnaire was prepared in English and translated to Amharic and back to English to keep the consistency of the questions. Training of data collectors and supervisors and pre testing of questionnaire was made to ensure the quality of data. Principal investigator and supervisors were present on the spot to check and review all the completed questionnaires; and to ensure completeness and consistency of the information had collected.

4.10. Data analysis procedures

Data were coded, cleaned and entered to EPI-INFO version7 and were exported to SPSS version 20 for analysis. Body mass index (BMI) was computed using weight and height (Kg/m^2). Descriptive statistics using frequencies, proportion and table were used to present the study results. Binary logistic regression analysis was employed to see association between short sleep

duration and overweight/obesity. To evaluate the association between short sleep duration and overweight/obesity, both crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% confidence interval were computed. All statistical tests were considered significant at alpha less than 0.05.

4.11. Ethical consideration

Ethical clearance was obtained from REC of Addis Ababa University, School of Public Health. Permission was obtained from Education Departments of Sub-cities and Directors of Schools to be studied. Informed verbal consent was obtained from each study subjects and their parents after the data collectors clearly explained the aims of the study.

4.12. Dissemination of results

The finding of the study will be disseminated to Addis Ababa University, School of Public Health, Ministry of Health, the Addis Ababa City Health Bureau, and the Addis Ababa Administration Education Bureau. Finally, the paper will be published in peer reviewed journals.

5. Result

5.1. Socio demographic characteristics

A total of 405 adolescents from 6 high schools (4 private and 2 public schools) were selected to participate in the study, of which 390 were involved with a response rate of 96.3%.

Of the 390 participants 168 (43.08%) were males and 222 (56.92%) were females and 165 (42.30%) were between the age of 13-16 and 225 (57.70%) in the age group 17-19. About 254 (65.13%) participants were from public schools and 136 (34.87%) were from private schools.

Regarding educational status of parents, around half of fathers 185 (47.44%) completed higher education; whereas 60 (15.38%) of fathers had no formal education. On the other hand, mothers who attended high school were 136 (34.87%); while 74 (18.97%) of the mothers had no formal education. As to major occupation of fathers and mothers, 161 (41.28%) were private employees and 154 (39.49%) were housewives, respectively. Of all, 46 (11.8%) of the respondents' family earned 1864 ETB or less, and 27 (6.9%) of the families earned more than 22727 birr per month (Table 2).

Table2: socio demographic characteristics among high school adolescents in Addis Ababa, 2016 (n=390)

Variables	Level	Frequency	Percent (%)
Type of school	Public	254	65.13
	Private	136	34.87
Sex	Male	168	43.08
	Female	222	56.92
Age (in years)	13-16	165	42.3
	17-19	225	57.7
Grade level	9	108	27.7
	10	101	25.9
	11	88	22.6
	12	93	23.8
Father's educational status	Illiterate	14	3.59
	Read and write	46	11.79
	Elementary	42	10.77
	High school	103	26.41
	Higher education	185	47.44
	Illiterate	25	6.41
Mother's educational status	Read and write	49	12.56
	Elementary	61	15.64
	High school	136	34.87
	Higher education	119	30.52

Variables	Level	Frequency	Percent (%)
Father's occupation	Daily laborer	18	4.62
	Private organization employee	161	41.28
	Business person	71	18.21
	Government employee	91	23.33
	Unemployed	1	0.26
Mother's occupation	Daily laborer	4	1.03
	Private organization employee	87	22.31
	Business women	51	13.08
	Government employee	71	18.21
	House wife	154	39.49
Household monthly income (in ETB)	<= 1864	46	11.8
	1865-7368	190	48.7
	7369-22727	127	32.6
	> 22727	27	6.9

5.2. Dietary habits and meal pattern

Dietary habit of the participants showed that 17 (4.36%) of the respondents did not consume fruit, while 50 (12.82%) ate once per day. Minority 15 (3.85%) of adolescents never consumed vegetables, while 182 (46.67%) ate two to four times per week and 31 (7.95%) ate once per day. On the other hand, 23 (5.9%) of the participants responded that they did not consume meat and egg, 114 (29.23%) consume meat and egg two to four times per week and 34 (8.72%) consume once per day. About sixteen (4.10%) of participants did not eat sweet food, whereas 95 (24.36%) ate once per day (Table 3).

Table 3: Dietary habits among high school adolescents in Addis Ababa, 2016 (n=390)

Variable	Level	Frequency	Percent (%)
Fruits intake	Never	17	4.36
	Less than once a week	80	20.51
	Once a week	99	25.38

Variable	Level	Frequency	Percent (%)
	Two to four times per week	132	33.85
	Once per day	50	12.82
	More than twice per day	12	3.08
Vegetables intake	Never	15	3.85
	Less than once a week	54	13.85
	Once a week	97	24.87
	Two to four times per week	182	46.67
	Once per day	31	7.95
	More than twice per day	11	2.82
Bread and cereals intake	Never	3	0.77
	Less than once a week	14	3.59
	Once a week	18	4.62
	Two to four times per week	104	26.67
	Once per day	115	29.49
	More than twice per day	136	34.87
Meat and eggs intake	Never	23	5.9
	Less than once a week	100	25.64
	Once a week	99	25.38
	Two to four times per week	114	29.23
	Once per day	34	8.72
	More than twice per day	20	5.13
Milk, cheese and yogurt intake	Never	67	17.18
	Less than once a week	107	27.44
	Once a week	94	24.1
	Two to four times per week	60	15.38
	Once per day	49	12.56
	More than twice per day	13	3.33
Sugar and sweets intake	Never	16	4.1
	Less than once a week	38	9.74
	Once a week	55	14.1
	Two to four times per week	90	23.08
	Once per day	95	24.36
	More than twice per day	96	24.62

Frequency of meal pattern attended by participants shows that 181 (46.41%) ate meal three times per day, while 42 (10.77%) ate less than three times in a day. From the total sampled respondents, 279 (71.54%) took breakfast daily, 98 (25.13%) took breakfast sometimes and 13 (3.33%) never took breakfast at all. The majority, 309 (79.23%) took lunch daily and 70

(17.95%) took lunch sometimes, while 11 (2.82%) never took lunch. Two hundred seventy eight (71.28%) took dinner regularly, 102 (26.15%) took dinner sometimes and 10 (2.56%) never took dinner. Fast food and visible fat in meat was taken frequently by 277 (71.03%) and 207 (53.08%) of the participants (Table 4).

Table 4: Meal pattern of the adolescent students

Variable	Level	Frequency	Percent (%)
Number of meals per day	<1 meal a day	1	0.26
	1 meal a day	9	2.31
	2 meals a day	33	8.46
	3 meals a day	181	46.41
	>3 meals a day	166	42.56
Breakfast	Daily	279	71.54
	Sometimes	98	25.13
	Never	13	3.33
Lunch	Daily	309	79.23
	Sometimes	70	17.95
	Never	11	2.82
Dinner	Daily	278	71.28
	Sometimes	102	26.15
	Never	10	2.56
Fast food	Daily	75	19.23
	Sometimes	277	71.03
	Never	38	9.74
Visible fat in meat	Daily	8	2.05
	Sometimes	207	53.08
	Never	175	44.87

5.3. Physical activity and sedentary lifestyle

The participants physical activity status related to sport and recreation revealed that 338 (86.7%) did not participate in vigorous physical exercise, causing a major increase in heart beat rate and respiration, while 52 (13.3%) of the respondents did vigorous physical exercise. The majority 341 (87.4%) did not engage in moderate physical exercise that cause minor increase in heart beat rate and respiration, whereas 49 (12.6%) did moderate physical exercise.

Sedentary behavior of the respondents showed that 246 (63.1%) of the adolescents go to and come from school on foot and 144 (36.9%) travelled by car. About 274 (70.3%) of the respondents spent with watching TV programs, playing video games or browsing the Internet less than 120 minutes a day, while 116 (29.7%) spent 120 minutes and more a day (Table 5).

Table 5: physical activity and sedentary lifestyle characteristics among high school adolescents in Addis Ababa, 2016 (n=390)

Variables	Level	Frequency	Percent (%)
Vigorous exercise	Yes	52	13.3
	No	338	86.7
Moderate exercise	Yes	49	12.6
	No	341	87.4
Mode of transportation to/from school	Walking	246	63.1
	Car	144	36.9
Time spent watching TV programs and playing video games or browsing the Internet	<120minutes a day	274	70.3
	>=120minutes a day	116	29.7

5.4. Sleep duration

The sleep duration reported by the participants is presented in Table 6. The overall prevalence of short, normal and long sleep duration was 165 (42.3%), 170 (43.6%) and 55 (14.1%), respectively.

Table 6: prevalence of sleep duration among high school adolescents in Addis Ababa (2016)

Sleep duration	Frequency	Percent (%)
Short (<8 hours)	165	42.31
Normal (8-10 hours)	170	43.59
Long (>10 hours)	55	14.10

5.5. Prevalence of overweight and obesity

The prevalence of overweight and obesity in the study participants were 14.4% and 3.8%, respectively. The combined prevalence of overweight and obesity was 18.2% (Table 7).

Table 7: prevalence of underweight, normal, overweight and obesity among high school adolescents in Addis Ababa (2016)

Body Mass Index	Frequency	Percent (%)
Underweight	45	11.5
Normal	274	70.3
Overweight	56	14.4
Obesity	15	3.8

5.6. Determinants of Overweight/Obesity

Potential confounders, such as age, sex, household monthly income, dietary habit, physical activity and sedentary lifestyle in relation to sleep duration and overweight/obesity were analyzed using binary logistic regression.

In the binary logistic regression analysis, overweight/obesity was significantly associated with household monthly income of more than 22727 ETB [COR= 7.6(95% CI; 2.3, 25.2)], did not engaging in vigorous or moderate exercise [COR= 2.4(95% CI; 1.1, 5.6], did not eating lunch daily [COR= 0.4(95% CI; 0.2, 0.9)] and short sleep duration [COR=3.4(95% CI; 1.9, 6.0)].

However, no statistically significant association was observed between overweight/obesity and variables such as sex, age, time spent on (TV, video games or internet), meal pattern, frequency for breakfast, and dinner, and daily frequency of consumption for fruits, vegetables, cereals, fats, sugars, fast foods, milk and milk products and meat. The possible reason that diet did not

significantly associated with overweight/obesity might be due to non-variation of eating habit among the respondents.

Finally, using multiple binary regression model, analysis was done to control for potentially confounding variables. As indicated in Table 8, only household monthly income, physical activity and sleep duration were the independent determinants for overweight/obesity.

From the household monthly income group, adolescents whose family's income more than 22727 ETB per month were 4.1 times more likely to be overweight/obese, AOR= 4.1(95% CI; 1.1, 15.8) compared with those family's income less or equal to 1864 ETB per month. Adolescents whose family's earn 1865-7368 and 7369-22727 ETB per month, respectively, were statistically not significant when compared to those families earning less or equal to 1864 ETB per month. Doing physical exercise was found to protect overweight/obesity. Those adolescents who did not do vigorous or moderate exercise were 2.7 times at risk than those who did [AOR= 2.7(95% CI; 1.0, 6.9)].

When insignificant variables were adjusted, the result with sleep duration was slightly increased. Adolescents sleeping short sleep duration (<8 hours/day) were 3.7 times more likely to develop overweight/obesity, AOR= 3.7(95% CI; 1.9, 7.0) than those who sleep normal (8-10 hours/day). Long sleep duration did not show statistically significant association with overweight/obesity (Table 8).

Table 8: binary logistic regression analysis of determinants of overweight/obesity among high school adolescents in Addis Ababa (2016)

Variables		Overweight/obesity		COR (95% CI)	AOR (95% CI)
		Yes	No		
		n(%)	n(%)		
Sex					
	Male	32 (8.2)	136(34.9)	1	1
	Female	39(10.0)	183(46.9)	0.91 (0.54-1.52)	0.64 (0.34-1.20)
Age					
	13-16	30(7.7)	135(34.6)	1	1
	17-19	41(10.5)	184(47.2)	1.00 (0.59-1.69)	0.97 (0.52-1.82)
Monthly income (in ETB)					
	<= 1864	5(1.3)	41(10.5)	1	1
	1865-7368	22(5.6)	168(43.1)	1.07 (0.38-3.01)	0.63 (0.21-1.91)
	7369-22727	31(7.9)	96(24.6)	2.65 (0.96-7.29)	1.59 (0.52-4.88)
	> 22727	13(3.3)	14(3.6)	7.61 (2.3-25.19)	4.11 (1.08-15.76)*
Fruits intake					
	<once a day	59(15.1)	269(69.0)	1	1
	>=once a day	12(3.1)	50(12.8)	1.09 (0.55-2.18)	0.86 (0.37-2.00)
Vegetables intake					
	<once a day	63(16.1)	285(73.0)	1	1
	>=once a day	8(2.1)	34(8.7)	1.06 (0.47-2.41)	1.13 (0.44-2.95)
Cereals intake					
	<once a day	26(6.7)	113(29.0)	1	1
	>=once a day	45(11.5)	206(52.8)	0.95 (0.56-1.62)	1.23 (0.65-2.35)
Meat & eggs intake					
	<once a day	56(14.3)	280(71.8)	1	1
	>=once a day	15(3.8)	39(10.0)	1.92 (0.99-3.72)	1.31 (0.56-3.09)
Milk, cheeses & yogurt					
	<once a day	58(14.8)	270(69.3)	1	1
	>=once a day	13(3.3)	49(12.6)	1.24 (0.63-2.42)	1.10 (0.48-2.50)
Sweet & sugars intake					
	<once a day	34(8.7)	165(42.3)	1	1
	>=once a day	37(9.5)	154(39.5)	1.17 (0.69-1.95)	1.15 (0.63-2.10)
Meals per day					
	<3 meals/day	5(1.3)	38(9.7)	1	1
	3 meals/day	40(10.3)	141(36.2)	2.16 (0.79-5.84)	1.89 (0.61-5.92)
	>3 meals/day	26(6.7)	140(35.9)	1.41 (0.51-3.92)	1.07 (0.31-3.75)
Frequency of breakfast					
	Daily	45(11.5)	234(60.0)	1	1
	Not daily	26(6.7)	85(21.8)	1.59 (0.92-2.74)	1.57 (0.80-3.07)

Variables	Overweight/obesity		COR (95% CI)	AOR (95% CI)
	Yes n(%)	No n(%)		
Frequency of lunch				
Daily	63(16.2)	246(63.1)	1	1
Not daily	8(2.1)	73(18.7)	0.43(0.19-0.93)*	0.42 (0.17-1.02)
Frequency of dinner				
Daily	44(11.3)	234(60.0)	1	1
Not daily	27(6.9)	85(21.8)	1.69 (0.99-2.89)	1.62 (0.83-3.16)
Consumption of fast food				
Daily	13(3.3)	62(15.9)	1	1
Not daily	58(14.9)	257(65.9)	1.08 (0.56-2.09)	1.23 (0.55-2.77)
Consumption of fat				
Daily	2(0.5)	6(1.5)	1	1
Not daily	69(17.7)	313(80.3)	0.66 (0.13-3.35)	0.54 (0.07-3.92)
Physical activity pattern				
Vigorous or moderate exercise				
Yes	7(1.8)	67(17.2)	1	1
No	64(16.4)	252(64.6)	2.43 (1.07-5.55)	2.66 (1.03-6.90)*
Time spent on TV, video games or internet				
<120 minutes/day	45(11.5)	229(58.7)	1	1
>=120minutes/day	26(6.7)	90(23.1)	1.47 (0.86-2.53)	1.49 (0.79-2.81)
Sleep duration				
Normal	19(4.9)	151(38.7)	1	1
Short	49(12.6)	116(29.7)	3.36 (1.88-6.01)	3.69 (1.94-7.04)*
Long	3(0.8)	52(13.3)	0.46 (0.13-1.61)	0.51 (0.14-1.89)

6. Discussion

Prevalence of overweight and obesity

The overall magnitude of overweight and obesity among adolescents in Addis Ababa was 18.2%, of which 14.4% accounted for overweight and 3.8% accounted for obesity. This prevalence was comparable to reports of studies in urban communities of Hawassa and Bahir Dar, which was 15.6% [14] and 16.7% [44], respectively. However, it was higher than the finding of study done in Ghana [9] and Addis Ababa [5], which was 13.0% and 13.9%, respectively. This could be explained by change in the lifestyle factors of the society through time.

Determinants of overweight/obesity

Using the World Bank income classification of 2015, household monthly income was statistically significant association with overweight and obesity. Adolescents from families income more than 22727 ETB per month were 4.1 times more likely to be overweight/obese as compared with adolescent whose family income was less or equal to 1864 ETB per month [AOR= 4.1(95% CI; 1.1, 15.8)]. This finding was consistent with the result from Egypt where the prevalence of overweight and obesity significantly higher among the adolescents of high income compared with those of low income [36]. Similarly, study conducted in Hawassa showed that adolescents from higher income were 7.19 times more likely to develop overweight/obesity when compared with adolescent whose family was from low income, AOR= 7.19(95% CI; 2.6, 19.89) [14].

In addition, a finding of a study conducted in Bahir Dar showed significant association between household income and overweight/obesity, where from higher family income were more likely to be overweight/obese than from low-income family [44]. This might be related to the patterns of high energy expenditure from low income, where engaging in any work besides learning contributes to reducing the prevalence of overweight and obesity. In Ethiopian context, weight gain in childhood and adolescence is considered a sign of healthiness and high social class.

Physical activity was another independent predictor that is statistically associated with overweight/obesity. Adolescents who did not do any vigorous or moderate exercise for at least ten minutes were 2.7 times at risk of being overweight/obese than those who did vigorous or moderate exercise [AOR= 2.7(95% CI; 1.0, 6.9)]. This result is comparable to findings of studies conducted in Gondar and Addis Ababa which also showed that lack of physical activity had positive association with overweight and obesity [2, 5]. A similar report from Pakistan revealed that lack of physical activity was found to be significantly associated with overweight in adolescents [37]. Another study in China also indicated that regular physical activity was an important factor in reducing the prevalence of overweight and obesity [38]. The possible reason for this result might be due to lower energy expenditure caused by decreased vigorous/moderate physical exercise.

In both crude and adjusted binary logistic regression, sleep duration was strongly associated with overweight/obesity. The present study showed that there was the involvement of adolescents with insufficient sleep according to the minimum recommendation (8 hours/day) [26]. Such behaviors are due to increase in social, hormonal changes and use of caffeine or stimulants [18], and can lead to a serious damage to health and quality of life as well as the emergence and worsening of diseases, overweight/obesity being the focus of the present study. This finding showed that students having short duration of sleep (<8 hours/day) were 3.7 times more likely to develop overweight/obesity [AOR=3.7(95% CI; 1.9- 7.0, p=0.000)] than those who sleep normal (8-10 hours/day). This finding was consistent with result from South Korea, where reduced sleep duration among adolescents was strongly associated with a greater risk for overweight/obesity, P<0.0001 [40]. Supporting result from Saudi Arabia revealed that sleeping short duration significantly increased the risk of being obese among adolescents [39]. Similar report from Italy showed that short sleep duration was significantly associated with obesity for school children [41].

Another study conducted in Japan also indicated that students with short sleep were 2.87 times more likely to be obese than normal sleepers [42]. In addition, a consistent finding from Taiwan showed short sleep duration had positive association with overweight and obesity [43]. One possible explanation for higher prevalence of overweight/obesity among short sleep duration of adolescents might be due to staying long at night with academic reading.

7. Strength and limitation

Strength of the study: This study has used self-administered and interviewer-guided structured questionnaire to collect data. The study has also used the National Sleep Foundation Recommendation (2015) as a criterion for classification which is mostly accepted and recommended to screen short, normal and long sleep durations for adolescent ages.

Limitation of the study: Since the study was cross-sectional in design, it may not be strong enough to demonstrate direct cause-and-effect relationships between risk factors and outcomes. During interview there might be recall and social desirability bias by participants.

8. Conclusion and recommendation

Findings of the study revealed that higher prevalence rates of overweight and obesity were seen among high school adolescents of Addis Ababa. Having short sleep duration was strongly associated with overweight/obesity in adolescents. Physical inactivity and coming from high-income families were also important determinants impacting the risk of overweight/obesity in adolescents.

Based on the observed findings, it is suggested that there should be collaboration among health sectors and education sectors of Addis Ababa to reduce problems of adolescent overweight/obesity. Increasing awareness on adolescent adequate duration of sleep at night through mass-media should also be considered as important preventive program. Training should be given at school for parents to encourage their children to involve themselves in more physical exercises, sports and outdoor activities. Schools should also facilitate the environment for sport grounds. Furthermore, researchers should conduct longitudinal studies to investigate the relationship between diet and overweight/obesity.

9. References

1. WHO report of obesity and overweight fact sheet 2015: www.who.int/mediacentre/factsheets/fc311/en/.
2. Gebremedhin B, Melkie E, Taresa K. Overweight and Obesity, and Associated Factors among High School Students in Gondar Town, North West Ethiopia. *J. Obese Wt Loss Ther* 2013, 3:2. http://dx.doi.org/10.4172/2165-7904.1000165.
3. Abdulrahman O, Mariam A, Reema T, Osama A, Essa Y, Faiza K, Mofida M, Sabri S, Ismail H, Zahra Dj, Manel Ch. Prevalence of Overweight and Obesity among Adolescents in Seven Arab Countries: A Cross-Cultural Study. *Journal of Obesity*; Volume 2012, Article ID 981390, 5 pagesdoi:10.1155/2012/981390.
4. Emana A, Azeb A, Mezgebu Y, Kedir Y. Prevalence of Overweight and/or Obesity and Associated Factors among High School Adolescents in Arada Sub city, Addis Ababa, Ethiopia. *Journal of nutrition & food science* 2014, 4:2. http://dx.doi.org/10.4172/2155-9600.1000261.
5. Mulugeta Sh, Mekitie W, Alemayehu A, Shikur M, Zewdu Sh, Mukerem A, Gebresilasea G. Magnitude and Determinants of Overweight and Obesity among High School Adolescents in Addis Ababa, Ethiopia. *Journal of Food and Nutrition Sciences* 2015; 3(5): 166-173.
6. WHO. InfoBase data on overweight and obesity, mean BMI, healthy diets and physical inactivity. Geneva; 2012.
7. Joana A, Milton S, Elisabeth R. *Sleep Duration and Adiposity during Adolescence*. Portugal 2012. www.pediatrics.org/cgi/doi/10.1542/peds.2011-1116.
8. Jianghong L, Angelina Z, Linda L. Sleep duration and overweight/obesity in children: implication for pediatric nursing. *J Spec Pediatric Nurse* 2012; 17(3): 193–204. doi:10.1111/j.1744-6155.2012.00332.x.
9. D. B. Kumah, K. O. Akuffo, J. E. Abaka-Cann, D. E. Affram, E. A. Osae. Prevalence of Overweight and Obesity among Students in the Kumasi Metropolis. *Journal of Nutrition and Metabolism.* Volume 2015, Article ID 613207, 4 pages. http://dx.doi.org/10.1155/2015/613207.
10. HARVARD TH.CHAN. Sleep/obesity prevention source report 2015. www.hsp.harvard.edu.
11. HERPREET K. *Sleep duration and Obesity: Longitudinal study of Adolescents.* PhD thesis. University of Alabama Birmingham; 2012.

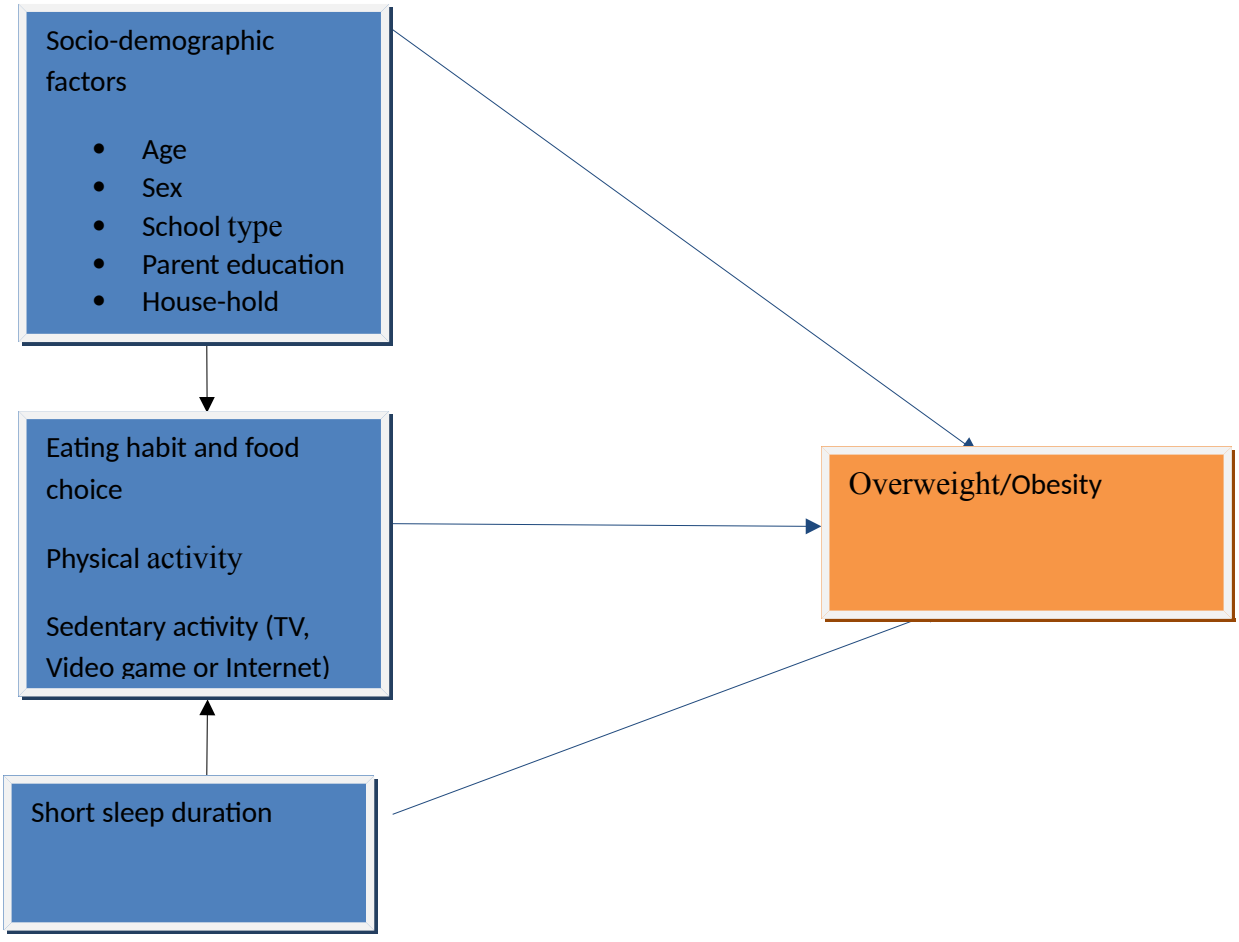
12. Taheri S. The link between short sleep duration and obesity: we should recommend more sleep to prevent obesity. *Arch Dis Child* 2006; 91:881–884. doi: 10.1136/adc.2005.093013.
13. Janaina R, Ana Inês G, Robson R, Poliana P, Patrícia H. Prevalence of Overweight and Obesity in Children and Adolescents from the Age Range of 2 to 19 Years Old in Brazil. *International Journal of Pediatrics*. Volume 2014, Article ID 583207, 7 pages http://dx.doi.org/10.1155/2014/583207.
14. Tesfalem T, Pragya S, Debebe M. Prevalence and Associated Factors of Overweight andObesity among High School Adolescents in Urban Communities of Hawassa, Southern Ethiopia. *Journal of nutrition and food science 2013*.Vol. **1**(1), 23-36.
15. Claudia P, Francesca L, Aida B, Carmelo G, Maria P. Relationship between Chronic Short Sleep Duration and Childhood Body Mass Index: A School-Based Cross-Sectional Study. *PLoS ONE* 2013; 8(6): e66680. doi:10.1371/journal.pone.0066680.
16. Rodrigo M, Antonio B, J. Jaime M. Short Sleep Duration and Childhood Obesity: Cross-Sectional Analysis in Peru and Patterns in Four Developing Countries. *PLoS ONE* 2014; 9(11): e112433. doi:10.1371/journal.pone.0112433.
17. Le HT, Vu NTT, Huyen DTT, Toan NV. Overweight, obesity and associated factors among secondary school students in a northern city of Vietnam in 2011. Health 5: 24–29.
18. Shiny P. *Examining the relationship between sleep and obesity using subjective and objective Methods*. MSC thesis. Iowa State University Ames, Iowa; 2011.
19. Center for Disease Control and Prevention. *Health Consequences*2011. http://www.cdc.gov/obesity/causes/health.html.
20. National Institutes of Health (NIH). *Obesity Threatens to Cut U.S. Life Expectancy, New Analysis Suggests* 2005. http://www.nih.gov/news/pr/mar2005/nia-16.htm.
21. Muqing C, Yanna Z, Baoting H, Wenhan Y, Yajun Ch, Jun M, Jin J. Association between sleep duration and obesity is age and gender-dependent in Chinese urban children aged 6–18 years: a cross-sectional study. *BMC Public Health* (2015) 15:1029DOI 10.1186/s12889-015-2359-0.
22. Teresa A. *sleep and its association with metabolic function across the lifespan*. PhD thesis. University of Birmingham; 2011.
23. Marzieh H. *The Association between Sleep and Obesity and Its Impact on Health and Wellbeing*. PhD thesis. University of Birmingham; 2013.
24. Ting Ch, Zengqiang W, Zhifei Sh, Jun Zh, Xiaoming Sh, Shenghui L. Sleep duration in Chinese adolescents: biological, environmental, and behavioral predictors. *Sleep Medicine 15* (2014) 1345–1353. www.elsevier.com/locate/sleep.

25. Maritza L, Raphael J, Penelopy D, Clara M, Monteiro D. Sleep during, overweight and obesity in adolescence: *a systematic review*. http://dx.doi.org/10.17784/mtprehabjournal.2014.12.195.
26. National Sleep Foundation Recommends New Sleep Times2015. www.sleepfoundation.org .
27. Reilly J, Armstrong J, Dorosty A. Early life risk factors for obesity in childhood: cohort study. *BMJ*. 2005; 330:1357.
28. Taveras E, Rifas-Shiman S, Oken E, Gunderson E, Gillman M. Short sleep duration in infancy and risk of childhood overweight. *Arch Pediatric Adolescent Med*. 2008; 162:305-11.
29. Landhuis C, Poulton R, Welch D, Hancox RJ. Childhood sleep time and long-term risk for obesity: a 32-year prospective birth cohort study. *Pediatrics*. 2008; 122:955-60.
30. Frank Hu. *Obesity epidemiology*. New York: Oxford University Press, Inc; 2008.
31. Patel SR, Hu FB. Short Sleep Duration and Weight Gain: A Systematic Review of Obesity. *Epub* 2008; 16(3):643-53.
32. Spiegel K, Tasali E, Penev P Van Cauter E. Brief communication: Sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite. *Annals of Internal Medicine* 2004*, 141*(11), 846-850.
33. Chaput J, Despres J, Bouchard C, Tremblay A. Short sleep duration is associated with reduced leptin levels and increased adiposity: Results from the Quebec family study. *Obesity (Silver Spring)* 2007*, 15*(1), 253-261. doi:10.1038/oby.2007.512.
34. Ortega F, Chillon P, Ruiz J. Sleep patterns in Spanish adolescents: associations with TV watching and leisure-time physical activity. *Eur J Appl Physiology* 2010; **110**(3): 563-73.
35. Al-Hazzaa H, Musaiger A, Abahussain N, Al-Sobayel H, Qahwaji D. Prevalence of short sleep duration and its association with obesity among adolescents 15- to 19-year olds: A cross-sectional study from three major cities in Saudi Arabia. *Ann Thorac Med.* 2012; 7(3):133-9. doi: 10.4103/1817-1737.98845.
36. Nora El-Said B, Abeer B, Seham Sh, Haitham F. Prevalence of overweight and obesity in primary school children in Port Said city. *Egyptian Pediatrics Association Gazette* 2013; 61: 31-36.
37. Muhammad M, Sibogha G, Komal M. Dietary, physical activities and sedentary lifestyle associated with overweight and obesity among Pakistani primary school children. *I.J.Beh. Nut. and Phy.Acti* 2011,8:130,5–20.
38. Y. Li, F. Zhai. Determinants of childhood overweight and obesity in China, *British Journal of Nutrition* 2007: 97, 210–215.

39. Bawazeer N, Al-Daghri N, Valsamakis G, AL-Rubeaan K, Sabico S, Huang T. Sleep Duration and Quality Associated With Obesity Among Arab Children. *Journal of Obesity* 2009; 17:2251-2253.
40. Park S. Association between short sleep duration and obesity among South Korean adolescents. *West J Nurs Res* 2011; 33:207-23.
41. Claudia P, Francesca L, Aida B, Carmelo N, Maria P. Relationship between Chronic Short Sleep Duration and Childhood Body Mass Index: A School-Based Cross-Sectional Study. *PLOS ONE* 2013; 8(6). Doi: 10.1371.
42. Sekine M, Yamagami T, Handa K. A dose response relationship between short sleeping hours and childhood obesity: Cross-sectional based Study. *Child Care Health Dev* 2002; 28:163–70.
43. Jianghong L, Angelina Z, and Linda L. Sleep duration and overweight/obesity in children: implication for pediatric nursing. *J. Spec Pediatr Nurs* 2012; 17(3): 193–204. Doi: 10.1111.
44. Zalalem A, Molla G, Kidist N, Meseret Ts, Dagmawi A. Risk Factors of Overweight and Obesity among High School Students in Bahir Dar City, North West Ethiopia: School Based Cross-Sectional Study. *J. Advance in preventive medicine* 2015; http://dx.doi.org/10.1155/2015/294902
45. Aounallah H, Traissac P, Ati J, Eymard S, Landais E, Achour N, Delpeuch F, Romdhane B. Nutrition transition among adolescents of a South-Mediterranean country: dietary patterns, association with socio-economic factors, overweight and blood pressure. Across-sectional study in Tunisia. *Nutrition Journal* 2011; **10**: 38.
46. Tsedeke W, Tefera B. Prevalence and Determinant Factors of Overweight and Obesity among Preschool Children Living in Hawassa City, South Ethiopia. *Food Science and Quality Management*; 2014.

ANNEX I

Conceptual frame work of short sleep duration and overweight/obesity, adopted from different literatures (fig.3).



ANNEX II: English Questionnaire

Addis Ababa University, School of Public Health

1. Information sheet

Greeting

How are you, I am ————. I came from Addis Ababa University, Collage of Health Science, School of Public Health to conduct a research. The aim of the study is to identify the association between short sleep duration and overweight/obesity in adolescents. Therefore, this study will have a great contribution in the control and prevention of adolescents' overweight/obesity and related chronic diseases in Addis Ababa. Besides, I believe that this study will help in attracting governmental, non-governmental organizations and stakeholders to contribute their part on these problems.

During the study period height and weight will be measured using standardized instruments. Only light clothes will be wearing during measurement of body weight and Height will be measured using measuring board with bare foot. You also be interviewed about your personal characteristics, feeding practice, physical activity and night sleep duration. 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 strictly confidential. 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, please feel free to drop it any time you want. This interview will take about 30 minutes.

2. Informed consent

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

I the under signed, will like to confirm that, as I give consent to participate in the study, it is with clear understanding and recognition of:

1. The objective of the study
2. My right to resign from the study during any stage of the study

I confirmed my agreement with my signature after the detailed objective of the study has been explained to me in the language I understand well.

Signature (participant's) _____ Signature (collector) _____

Date _____ *Date* _____

Remark: for any inconvenience and problem related to questionnaire please contact principal investigator.

Name of principal investigator: Dessalegn Dereje
Tell: +251-912- 73 25 98
Email: dessdrj@gmail.com

1. Information sheet for child parents

Greeting

How are you, I am ————, work with Addis Ababa University. We are conducting a research on assessment of sleep duration and overweight/obesity among high school adolescents in Addis Ababa. I would like to ask about your willingness for the participation of your child in our study. We will take measurement of your child height and weight. We will also ask your child eating habit, physical activity and sleeping duration. This will help us to improve the prevention and control method of adolescent's overweight and obesity in Addis Ababa based on your child information. Your child name will not be written in this form. All information given by your child will be kept strictly confidential. Your child participation is voluntary and not obliged to take part in the study. If you feel discomfort to your child participation, please feel free to disagree. This interview will take about 30 minutes.

2. Informed consent

Having the above information, we honourly ask your willingness for your child participation in the study. Are you willing to let your child participate in the study?

1. If yes, you will put your signature below
2. If no, you can give your suggestion of refusal

I confirmed my agreement with my signature for my child participation in the study after the detailed objective of the study has been explained to me in the language I understand well.

Signature (parent) _____ signature (collector) _____

Date _____ Date _____

Part I: socio-demographic characteristics

Questionnaire ID No.————— school name ————— grade level ———— section ____

Name of data collector_____

No	Questions	Response
1. 1	Age of the respondent	————
1. 2	Sex of the respondent	1. Male Female
1. 3	Type of school	1. Public Private
1. 4	What is your father's educational status?	1. Illiterate 2. Read and write 3. 1-4 grade 4. 5-8 grade 5. 9-10 grade 6. 11-12 grade 7. College/TVT completed 8. University and above completed
1. 5	What is your mother's educational status?	1. Illiterate 2. Read and write 3. 1-4 grade 4. 5-8 grade 5. 9-10 grade 6. 11-12 grade 7. College/TVT completed 8. University and above completed
1. 6	What is your father's occupation?	1. Daily laborer 2. Work in private organization 3. Business man 4. Civil servant 5. He doesn't work 6. He is not alive 7. I don't know 8. Other (specify)
1. 7	What is your mother's occupation?	1. Daily laborer 2. Work in private organization

		3. Business women 4. Civil servant 5. House wife 6. She is not alive 7. I don't know 8. Other (specify)
1. 8	How do you perceive your family monthly income?	_____ birr

Part II: Dietary information

The next questions ask about diet that you usually eat. As you answer these questions please think of a typical week in the last year.

No	Questions	Response
2.1	How often did you eat Fruits?	1. Never 2. Less than once a week 3. Once a week 4. Two to four times per week 5. Once per day More than twice per day
2.2	How often did you eat greens and vegetables?	1. Never 2. Less than once a week 3. Once a week 4. Two to four times per week 5. Once per day 6. More than twice per day
2.3	How often did you eat Bread and Cereals?	1. Never 2. Less than once a week 3. Once a week 4. Two to four times per week 5. Once per day More than twice per day
2.4	How often did you eat Meat and eggs?	1. Never 2. Less than once a week 3. Once a week 4. Two to four times per week 5. Once per day More than twice per day
2.5	How often did you eat Milk, cheeses, yogurt?	1. Never 2. Less than once a week 3. Once a week 4. Two to four times per week 5. Once per day

		More than twice per day
2.6	How often did you eat Sugar and sweets?	1. Never 2. Less than once a week 3. Once a week 4. Two to times per week 5. Once per day More than twice per day

Part III: Eating habit

The next questions ask about your dieting habit for the last one year.

No	Questions	Response
3.1	How many times you usually eat per day?	1. <1 meal a day 2. 1 meal a day 3. 2 meals a day 4. 3 meals a day 5. >3 meals a day
3.2	How often do you eat Breakfast?	1. Daily 2. Sometimes 3. Never
3.3	How often do you eat Lunch?	1. Daily 2. Sometimes 3. Never
3.4	How often do you eat during Tea time?	1. Daily 2. Sometimes 3. Never
3.5	How often do you eat Dinner?	1. Daily 2. Sometimes 3. Never
3.6	How often do you eat during Bed time?	1. Daily 2. Sometimes 3. Never
3.7	How often do you eat fast foods?	1. Daily 2. Sometimes 3. Never
3.8	How often do you eat deep fries?	1. Daily 2. Sometimes 3. Never
3.9	How often do you eat visible fat in meat?	1. Daily 2. Sometimes 3. Never

Part IV: Physical activity questionnaire

Below are questions about individual's physical activity levels. Please read the descriptions and answer the questions even if you do not consider yourself to be an active person. Consider all activities, those you do at school, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

	Hard physical activity: Think about all the **vigorous activities** which take hard physical effort that you did in the **last 7 days**. Vigorous activities make your breath harder than normal and may include heavy lifting, aerobic, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.		
No	**Questions**	**Response**	**Code**
4.1	Do you engaged in work besides your education?	**1.** Yes **2.** No	
4.2	During the ***last 7 days***, on how many days did you do vigorous physical activities?	1. _____days/week 2. _____don't know/not sure	
4.3	How much ***total time*** did you usually spend doing ***vigorous physical activities*** on one of those days?	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
4.4	If your pattern of activity varies from day to day, how much ***total time*** did you spend over the last 7 days doing ***vigorous physical activity***?	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
	Moderate physical activity: Think about the activities which take **moderate physical effort** that you did in the **last 7 days**. Moderate physical activities make your breath somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. Do not include walking.		

	Again, think about only those physical activities that you did for at least 10 minutes.		
No	**Questions**	**Response**	**Code**
4.5	During the ***last 7 days***, on how many days did you do ***moderate physical activities?***	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
4.6	How much ***total time*** did you usually spend doing ***moderate physical activities*** on one of those days?	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
4.7	If your pattern of activity varies from day to day or includes multiple tasks, how much ***total time*** did you spend over the last 7 days doing ***moderate physical activity?***	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
	Walking: Now think about the time you spend ***walking*** in the ***last 7 days***. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise or leisure.		
4.8	During the ***last 7 days***, on how many days did you ***walk*** for at least 10 minutes at a time?	1. _____days/week 2. _____don't know/not sure	
4.9	How much ***total time*** did you usually spend ***walking*** on one of those days?	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
4.10	If your pattern of activity varies from day to day or includes multiple tasks, how much ***total time*** did you spend ***walking*** over the last 7 days?	1. _____hours/day 2. _____minutes/day 3. _____don't know/not sure	
	Sitting: Finally, think about the time you spent ***sitting*** on weekdays during the ***last 7 days***. Include time		

	spent at class, at home, while doing course work, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, and sitting or lying down to watch television.		
4.11	During the ***last 7 days*** how much ***total time*** did you usually spend sitting on a week day?	1. _____hours/weekday 2. _____minutes/weekday 3. _____don't know	

Part V Sedentary activity questionnaire

The following question ask about your traveling in car, bus or train, on foot and time spent with using internet, playing game or watching television.

No	Questions	Response	Code
5.1	Which one do you usually use to go from home to school	1. Walking 2. Cycle 3. Driven	
5.2	Hours spent with TV programs, video games or internet	1. <30min a day 2. 30-60min a day 3. 60-90min a day 4. >=120minutes a day 5. Never	

Part VI: Sleep duration information

Below questions ask about your night sleep duration. As you respond these questions please think of a typical weekdays (school days) and weekends sleep in the last week.

No	Questions	Response	Code
6. 1	What time did you usually go to bed on school days?	——— hours/weekday	
6. 2	What time did you usually wakeup on school days?	——— hours/weekday	
6.3	What time did you usually go to bed on weekends?	——— hours/weekend	
6.4	What time did you usually wakeup on weekends?	——— hours/weekend	

Part VII: Anthropometric measurements

No	Measurements	Reading	Code
7.1	Height	In centimeters ————	
7.2	Weight	In kilograms (Kg) ————	

Thank You!!

ANNEX III: Amharic Version Questionnaire

አዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ኮሌጅ የህበረተሰብ ጤና አጠባበቅ ትምህርት ክፍል

የተሳታፊው መለያ ቁጥር _____

1. <u>የመረጃ ቅጽ</u>

ጤና ይስጥልን !

———————————— እባላለሁ። የመጣውት ከአዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ኮሌጅ የህበረተሰብ ጤና አጠባበቅ ትምህርት ክፍል ሲሆን የመጣሁበት ምክንያት ጥናት ለማድረግ ነው። የጥናቱ ዓላማ የእንቅልፍ መጠን ማነስ እና ከመጠን በላይ ክብደት በጉርምስና ወቅት ያላቸው ግንኙነት በጥናት ለማወቅ ነው::

በመሆኑም ይህ ጥናት እነዚህ ችግሮች በተለይም ደግሞ ከመጠን በላይ ክብደትና ተያያዝ ችግሮች በመቆጣጠርና በመከላከል ረገድ ትልቅ ሚና ይኖረዋል:: በተጨማሪም ይህ ጥናት የተለያዩ መንግስታዊ፣ መንግስታዊ ያልሆኑ ድርጅቶች እና አጋር ድርጅቶች በነዚህ ችግሮች ዙርያ እንዲሰሩና የተቻላቸውን እንዲያበረክቱ ያደርጋል የሚል ጽኑ እምነት አለኝ::

በጥናቱ ጊዜ የእንተን/ቺን ክብደትና ቁመት ደረጃቸው በጠበቁ መሳሪያዎች እንለካለን። ክብደት በሚለካበት ጊዜ ቀለል ያሉ ልብሶች እንዲሁም ቁመት በሚለካበት ጊዜ ደግሞ በባዶ እግር ይሆናል:: ለማጠናው ጥናት የተወሰኑ ጥያቄዎችን እጠይቅሀለሁ/ሻለሁ። በዚህ መጠይቅ የአመጋገብ ልምድ፣ ስለአካላዊ እንቅስቃሴ፣ በሌሊት የምትተኛውን/ኚውን የእንቅልፍ መጠን በተመለከተ እጠይቅሀለሁ/ሻለሁ። ከአንተ/ቺ የምንሰበስበው መረጃ በሚስጥር እንጠብቃለን። ከአንተ/ቺ የምንሰበስበው መረጃ ከስምህ/ሽ ጋር አይያያዝም። በዚህ ጥናት ውስጥ ለመሳተፍ በቅድሚያ የተሳታፊውን ፍቃደኝነት እንጠይቃለን። መልስ ለመስጠት በማትፈልግበት ወይም በማትፈልጊበት ጥያቄ ካለ አትገደድም/ጅም። መጠይቁ 30 ደቂቃ ያህል ይፈጃል።

2. <u>የስምምነት ማረጋገጫ ቅጽ</u>

ይህንን ግንዛቤ ውስጥ በማስገባት በጥናቱ ላይ እንድትሳተፍ/ፊ በአክብሮት እጠይቃለሁ።

እኔ ከዚህ በታች ፊርማዬ የተቀመጠው በጥናቱ በፍቃደኝነት እሳተፋለሁ ስል የሚከተሉትን ግንዛቤ ውስጥ በማስገባት ነው::

1. የጥናቱ ዓላማ

2. በጥናቱ የሚካተቱ ጥያቄዎችንና የጥናቱ አስፈላጊነት

በሚገባኝ ቋንቋ ስለተገለጸልኝና ስለተብራራልኝ በጥናቱ ለመሳተፍ በፊርማዬ አረጋግጣለሁ::

ፊርማ(የተሳታፊ)_____ ፊርማ(የመረጃ ሰብሳቢ)_____

ቀን_____

ቀን_____

ማሳሰቢያ፡ ያልገባዎት ወይም ጥያቄ የሆነበዎት ሁኔታ ካለ የጥናቱ ዋና ተሳታፊን መጠየቅ ይችላሉ።

የጥናቱ ዋና ተሳታፊ ስም፡ ደሳለኝ ደረጀ

ስልክ ቁጥር፡ +251-912-73 25 98

ኢሜይል፡ dessdrj@gmail.com

1. የመረጃ ቅጽ ለተማሪ ወላጅ

ጤናይስጥልን !

—————————— እባላለሁ። የመጣውት ከአዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ኮሌጅ የህበረተሰብ ጤና አጠባበቅ ትምህርት ክፍል ሲሆን የመጣሁበት ምክንያት የእንቅልፍ መጠን እና ከመጠን በላይ ክብደት በጉርምስና ወቅት ያላቸው ግንኙነት በጥናት ለማወቅ ነው:: የእርሶዎ ልጅ በእኛ ጥናት ውስጥ እንዲካተት/እንዲትካተት የእርሶዎን ፊቃደኝነት እንጠይቃለን። የልጆዎን ክብደት እና ቁመት መጠን እንለካለን። በዚህ መጠይቅ የልጆዎን የአመጋገብ ልምድ፣ ስለአካላዊ እንቅስቃሴ፣ በሌሊት የምተኛውን/ኚውን

የእንቅልፍ መጠን በተመለከተ እንጠይቃለን። ከልጅዎ የምናገኘው መረጃ በጉርምስና ወቅት ከክብደት መጨመር ጋር ተያይዘው የሚመጡ የጤና ችግሮች ለመከላከል እቅድ ለማውጣት ይረዳናል። ከልጅዎ የሚናገኘውን መረጃ በሚስጥር እንጠብቃለን። ልጅዎ የሚሰጠን/የሚትሰጠን መረጃ ከስሙ/ሚ ጋር አይያያዝም። በዚህ ጥናት ውስጥ ለመሳተፍ የእርሶዎ እና የልጅዎ ፈቃደኝነት የተጠበቀ ነው። መጠይቁ 30 ደቂቃ ያህል ይፈጃል።

2. የስምምነት ማረጋገጫ ቅጽ

ይህንን ግንዛቤ ውስጥ በማስገባት ልጅዎ በጥናቱ እንዲካተት/እንዲትካተት የእርሶዎን ፈቃደኝነት በአክብሮት እንጠይቃለን። ልጅዎ በጥናቱ እንዲካተት/እንዲትካተት እርሶዎ ፈቃደኛ ነዎት?

1. አዎ ከሆነ ከዚህ በታች በተቀመጠው የፊርማ ቦታ ላይ የተከበረ ፊርማዎትን ያኑሩ
2. አይ ከሆነ ፈቃደኛ ያልሆኑበት ምክንያት ሀሳቦዎትን መግለጽ ይችላሉ

እኔ ከዚህ በታች ፊርማዬ የተቀመጠው የጥናቱ ዓላማ በሚገባኝ ቋንቋ ስለተገለጸልኝና ስለተብራራልኝ ልጄ በጥናቱ እንዲካተት/እንዲትካተት በፊርማዬ አረጋግጣለሁ::

ፊርማ (የቤተሰብ) _____ ፊርማ (የመረጃ ሰብሳቢ) _____

ቀን _____ ቀን _____

ክፍል አንድ: መስረታዊ መረጃዎችን የተመለከቱ ጥያቄዎች

የሚከተሉትን ጥያቄዎች በጥንቃቄ ካነበቡ በኋላ ለእያንዳንዱ በተሰጠው የመልስ መስጫ ቦታ መልሱን ይሙሉ።

የመጠይቅ መለያ ቁጥር ———— የትምህርት ቤት ስም ———————————— የክፍል ደረጃ ———— ክፍል ---------- መረጃ ሰብሳቢ ስም ----------

ተ.ቁ	ጥያቄ	መልስ
1.1	ዕድሜ	_____
1.2	ፆታ	1. ወንድ 2. ሴት
1.3	የትምህርት ቤት ዓይነት	1. የመንግስት 2. የግል
1.4	የአባትህ/ሽ የትህምርት ሁኔታ?	1. ያልተማረ 2. ማንበብ እና መጻፍ 3. 1-4 ክፍል 4. 5-8 ክፍል 5. 9-10 ክፍል 6. 11-12 ክፍል 7. ኮሌጅ/ቴክኒክና ሙያ ያጠናቀቀ 8. ዩኒቨርሲቲ እና ከዛ በላይ ያጠናቀቀ
1.5	የእናትህ/ሽ የትህምርት ሁኔታ?	1. ያልተማረች 2. ማንበብ እና መጻፍ 3. 1-4 ክፍል 4. 5-8 ክፍል 5. 9-10 ክፍል 6. 11-12 ክፍል 7. ኮሌጅ/ቴክኒክና ሙያ ያጠናቀቀች 8. ዩኒቨርሲቲ እና ከዛ በላይ ያጠናቀቀች
1.6	የአባትህ/ሽ የሥራ ሁኔታ?	1. የቀን ሰራተኛ 2. የግል ድሪጅት ሰራተኛ 3. ነጋዴ 4. የመንግስት ሰራተኛ 5. ሥራ አይሰራም 6. በህይወት የለም 7. አላውቅም 8. ሌላ ከሆነ ————
1.7	የእናትህ/ሽ የሥራ ሁኔታ?	1. የቀን ሰራተኛ 2. የግል ድሪጅት ሰራተኛ 3. ነጋዴ 4. የመንግስት ሰራተኛ 5. የቤት እመቤት 6. በህይወት የለችም 7. አላውቅም 8. ሌላ ከሆነ ————

1.8	የቤተሰብህ/ሽ የወር ገቢ	---------- ብር

ክፍል ሁለት፡ የአመጋገብ ሁኔታ

ከዚህ ቀጥሎ ባለፈው አንድ ዓመት አዘውትረህ/ሽ ስለተመገብካቸው/ሺያቸው ምግቦች በተመለከተ እጠይቃሀለሁ/እጠይቃሻለሁ።

ተ.ቁ	ጥያቄ	መልስ
2.1	በተለምዶ ፍራፍሬዎች በምን ያህል ጊዜ ይመገባሉ?	1. በልቼ አላውቅም 2. በሳምንት ከአንድ ጊዜ በታች 3. በሳምንት አንድ ጊዜ 4. በሳምንት ከሁለት እስከ አራት ጊዜ 5. በቀን አንድ ጊዜ 6. በቀን ከሁለት ጊዜ በላይ
2.2	በተለምዶ አረንጓዴ ተክሎች እና አትክልቶች በምን ያህል ጊዜ ይመገባሉ?	1. በልቼ አላውቅም 2. በሳምንት ከአንድ ጊዜ በታች 3. በሳምንት አንድ ጊዜ 4. በሳምንት ከሁለት እስከ አራት ጊዜ 5. በቀን አንድ ጊዜ 6. በቀን ከሁለት ጊዜ በላይ
2.3	በተለምዶ ዳቦ እና የእህል ውጤቶች በምን ያህል ጊዜ ይመገባሉ?	1. በልቼ አላውቅም 2. በሳምንት ከአንድ ጊዜ በታች 3. በሳምንት አንድ ጊዜ 4. በሳምንት ከሁለት እስከ አራት ጊዜ 5. በቀን አንድ ጊዜ 6. በቀን ከሁለት ጊዜ በላይ
2.4	በተለምዶ ስጋና እና እንቁላል በምን ያህል ጊዜ ይመገባሉ?	1. በልቼ አላውቅም 2. በሳምንት ከአንድ ጊዜ በታች 3. በሳምንት አንድ ጊዜ 4. በሳምንት ከሁለት እስከ አራት ጊዜ 5. በቀን አንድ ጊዜ 6. በቀን ከሁለት ጊዜ በላይ
2.5	በተለምዶ ወተት፣ አይብ እና እርጎ በምን ያህል ጊዜ ይመገባሉ?	1. በልቼ አላውቅም 2. በሳምንት ከአንድ ጊዜ በታች 3. በሳምንት አንድ ጊዜ 4. በሳምንት ከሁለት እስከ አራት ጊዜ 5. በቀን አንድ ጊዜ 6. በቀን ከሁለት ጊዜ በላይ
2.6	በተለምዶ ስኳር አዘል እና ጣፋጭ ምግቦች በምን ያህል ጊዜ ይመገባሉ?	1. በልቼ አላውቅም 2. በሳምንት ከአንድ ጊዜ በታች 3. በሳምንት አንድ ጊዜ 4. በሳምንት ከሁለት እስከ አራት ጊዜ 5. በቀን አንድ ጊዜ 6. በቀን ከሁለት ጊዜ በላይ

ክፍል ሦስት፡ የአመጋገብ ልምድ

ከዚህ ቀጥሎ በአለፈው አንድ ዓመት ስለነበረህ/ሽ የአመጋገብ ሁኔታ እጠይቃለሁ/ሻለሁ።

ተ.ቁ	ጥያቄ	መልስ
3.1	አብዛኛውን ጊዜ በቀን ለምን ያህል ጊዜ ይመገባሉ?	1. በቀን ከአንድ ጊዜ በታች 2. በቀን አንድ ጊዜ 3. በቀን ሁለት ጊዜ 4. በቀን ሦስት ጊዜ 5. በቀን ከሦስት ጊዜ በላይ
3.2	በተለምዶ ቁርስ በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.3	በተለምዶ ምሳ በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.4	በተለምዶ በሻይ ሰዓት በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.5	በተለምዶ ራት በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.6	በተለምዶ በመኝታ ሰዓት በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.7	በተለምዶ ፈጣን ምግቦችን(fast foods) በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.8	በተለምዶ በስብ የተጠበሱ ምግቦችን በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም
3.9	በተለምዶ በስጋ ውስጥ በአይን የሚታይ ስብን በምን ያህል ጊዜ ይመገባሉ?	1. በየቀኑ 2. አንዳንድ ጊዜ 3. በልቼ አላውቅም

ክፍል አራት፡ የአካላዊ እንቅስቃሴ መጠይቅ

ከዚህ በታች ስለ ግለሰባዊ አካላዊ ተግባራት ደረጃዎች የቀረቡ ጥያቄዎች ናቸው። እባክዎን ዝርዝሮቹን ያንብቡና ራስዎን ፈጣን ግለሰብ አድርገው ባይቆጥሩም ጥያቄዎቹን ይመልሱ። ሁሉንም ተግባራት በመመልከት፣ በት/ቤት የሚሰሯቸውን፣ በቤት እና በጓሮ ስራዎች፣ ከቦታ ወደ ቦታ ለመሄድ ፣ እና በትርፍ ጊዜዎ ውስጥ ለመዝናኛ፣ ለእንቅስቃሴ ወይም ለስፖርት የሚሰሯቸውን።

	ጠንካራ የአካላዊ ተግባር ስለ ሁሉም ጠንካራ ተግባራት ከባድ አካላዊ ጥረት ስለሚጠይቁ ባለፉት 7 ቀናት ውስጥ ሰርቱዋቸው ስለነበሩ አካላዊ ተግባራት ብቻ ያስቡ። ጠንካራ ተግባራት ትንፋሽዎ ከተለመደው በላይ እንዲኩብድ እና ከባድ እቃ ማንሳት፣ ኤሮቢክስ ወይም ብስኪሌት ማብረር ሊጨምሩ ይችላሉ። በአንድ ጊዜ ቢያንስ ለ 10 ደቂቃዎች ይሰሩዋቸው የነበሩ አካላዊ ተግባራትን ብቻ ያስቡ።		
ቁጥር	**ጥያቄ**	***መልስ***	**ኮድ**
4.1	ከትምህርትዎ በተጨማሪ በስራ ውስጥ ይሳተፋሉን?	1. አዎ 2. አይ	
4.2	ባለፉት 7 ቀናት ለምን ያህል ቀናት ጠንካራ አካላዊ ተግባራትን ሰርተው ነበር?	1. _____ ቀናት/በሳምንት 2. አላውቅም/እርግጠኛ አይደለሁም	
4.3	በእነዚህ ጠንካራ አካላዊ ተግባራት ከእነዛ ቀናት በአንዱ በተለምዶ ምን ያህል ሰዓት በጠቅላላው አጥፍተው ነበር?	1. _____ ሰዓት/በቀናት 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	
4.4	የተግባርዎ አካሄድ ቀን በቀን የሚለይ ከሆነ፣ ባለፉት 7 ቀናት ጠንካራ አካላዊ ተግባራት በመስራት ምን ያህል ጊዜ በጠቅላላው አጥፍተው ነበር?	1._____ ሰዓት/በቀናት 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	
	መካከለኛ አካላዊ ተግባር ባለፉት 7 ቀናት ውስጥ ሰርቱዋቸው ስለነበሩ መካከለኛ አካላዊ ጥረቶች ያስቡ። መካከለኛ አካላዊ ተግባራት አተነፋፈስዎን በተወሰነ ደረጃ ከተለመደው የበለጠ አስቸጋሪ ያደርጓቸዋል። እንዲሁም ቀላላል ጭነቶችን፣ ብስክሌት ለመደበኛ ፍጥነት መንዳት፣ ወይም ጠረጴዛ ቴኒስ መጫወት ሊጨምሩ ይችላሉ። መራመድ አይጨምርም፣ እንደገና ቢያንስ ለ 10 ደቂቃዎች ሰርተዋቸው የነበሩ አካላዊ ተግባራትን ብቻ ያስቡ።		
ቁጥር	**ጥያቄ**	***መልስ***	**ኮድ**
4.5	ባለፉት 7 ቀናት ለምን ያህል ቀናት መካከለኛ አካላዊ ተግባራትን ሰርተው ነበር?	1. _____ ሰዓት/በቀን 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	
4.6	በእነዚህ መካከለኛ አካላዊ ተግባራት ከእነዛ ቀናት በአንዱ በተለምዶ ምን ያህል ሰዓት በጠቅላላው አጥፍተው ነበር?	1. _____ ሰዓት/በቀን 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	

4.7	የተግባርዎ አካሄድ ቀን በቀን የሚለይ ከሆነ፣ ባለፉት 7 ቀናት መካከለኛ አካላዊ ተግባራት በመስራት ምን ያህል ጊዜ በጠቅላላው አጥፍተው ነበር ?	1. _____ ሰዓት/በቀን 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	
	መራመድ (Walking) አሁን ባለፉት 7 ቀናት ውስጥ በመራመድ ስላጠፉዋቸው ጊዜዎች ያስቡ። እነዚህም በት/ቤት እና በቤትዎ፣ ከቦታ ወደ ቦታ በእግር ለመጓዝ፣ እና ለመዝናኛ፣ ለስፖርት የእንቅስቃሴ ተግባራት ወይም ለመዝናኛ ያደረጉዋቸውን ብቻ ሊጨምሩ ይችላሉ።		
4.8	ባለፉት 7 ቀና ለምን ያህል ቀናት በአንድ ጊዜ ቢያንስ ለ 10 ደቂቃዎች ተጉዘው ነበር?	1. _____ ቀናት/በሳምንት 2. አላውቅም/እርግጠኛ አይደለሁም	
4.9	በመራመድ ከእነዛ ቀናት በአንዱ በተለምዶ ምን ያህል ሰዓት በጠቅላላው አጥፍተው ነበር?	1. _____ ሰዓት/በቀን 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	
4.10	የተግባርዎ አካሄድ ቀን በቀን የሚለይ ከሆነ፣ ባለፉት 7 ቀናት በመራመድ ምን ያህል ጊዜ በጠቅላላው አጥፍተው ነበር?	1. _____ ሰዓት/ቀናት 2. _____ደቂቃ/ በቀን 3. አላውቅም/እርግጠኛ አይደለሁም	
	መቀመጥ(Sitting) በመጨረሻ፣ ባለፉት 7 ቀናት በሳምንቱ እረፍት ቀናት በመቀመጥ ያጠፉዋቸውን ጊዜያት ያስቡ። እነዚህም በትምህርት ክፍል፡ በቤት፣ የትምህርት ስራ ሲሰሩ እና በትርፍ ጊዜዎ ያጠፉትን ሰዓት ይጨምራሉ። ይህም በዴስክ ላይ፣ ጓደኞችዎን በመጎብኘት፣ ቴሌቭዥን ለመመልከት ተቀምጠው ወይም ተጋድመው ያጠፉትን ጊዜ ይጨምራል።		
	ባለፉት 7 ቀናት በሳምንቱ ቀናት ተቀምጠው ለጠቅላላው ምን ያህል ጊዜ አጥፍተዋል?	1. _____ሰዓታት/ሳምንታት 2. _____ደቂቃዎች/ሳምንታት 3. አላውቅም	

ክፍል አምስት፡ የሰደንታሪ ክንውን መጠይቅ

ከዚህ ቀጥሎ ከቦታ ቦታ ሲንቀሳቀሱ በብዛት የሚጠቀሙባቸው መጓጓዣ እንደ መኪና፣ ባቡር፣ የእግር ጉዞ እና ከኢንተርኔት፣ ከተለያዩ ጌሞች ወይም ከቴሌቪዥን ጋር የሚያሳልፉትን ጊዜ የሚጠይቁ ናቸው።

ቁጥር	ጥያቄ	መልስ	ኮድ
5.1	ከቤት ወደ ትምህርት ቤት ለመሄድ የምትጠቀመው/ሚው የመጓጓዣ አይነት	1. የእግር ጉዞ 2. ብስክሌት 3. መኪና	

5.2	በተለምዶ በቲቪ ፕሮግራሞችን ፣ በቪዲዮ ጌሞች ወይም በኢንተርኔት ምን ያህል ጊዜ ያጠፋሉ	1. <30 ደቂቃ 2. 30-60 ደቂቃ 3. 60-90 ደቂቃ 4. >=120 ደቂቃ 5. ምንም ደቂቃ አላጠፋም	

ክፍል ስድስት፡ የእንቅልፍ መጠን መረጃ መጠይቅ

ከዚህ በታች ስለ ግለሰባዊ የሌሊት እንቅልፍ ጊዜ የቀረቡ ናቸው። እባክዎን ጥያቄዎቹን ሲመልሱ በሳምንታት ወይም በትምህርት ጊዜያቶች (ከሰኞ እስከ አርብ) እና በእረፍት ቀናት (ቅዳሜና እሁድ) የሚተኙትን እንቅልፍ ብቻ ያስቡ።

ቁጥር	ጥያቄ	መልስ	ኮድ
6. 1	በትህምርት ጊዜያቶች በስንት ሰዓት ይተኛሉ?	------ ሰዓታት/ሳምንታት	
6. 2	በትህምርት ጊዜያቶች በስንት ሰዓት ከእንቅልፍዎ ይነሳሉ?	------ ሰዓታት/ሳምንታት	
6.3	በእረፍት ቀናት በስንት ሰዓት ይተኛሉ ?	----- ሰዓታት/የእረፍት ቀናታት	
6.4	በእረፍት ቀናት በስንት ሰዓት ከእንቅልፍዎ ይነሳሉ ?	----- ሰዓታት/የእረፍት ቀናታት	

ክፍል ሰባት፡ አንትሮፖሜትሪክ ልኬት

ቁጥር	ልኬት	ንባብ	ኮድ
7.1	ቁመት	በሴንቲ ሜትር ————————	
7.2	ክብደት	በኪሎ ግራም ————————	

ስለትብብርዎት በጣም እናመሰግናለን።

Addis Ababa University

College of Health Science

School of Public Health

Title: Assessment of Sleep duration and Overweight/Obesity among High School Adolescents in Addis Ababa, Ethiopia

By: Dessalegn Dereje

Approved by examining board

_____

Chairman, Department Graduate Committee

Mr. Robel Yirgu _____

Advisor

_____ _____

Examiner

_____ _____

Examiner