PREVALENCE OF OVERWEIGHT AND ASSOCIATED FACTORS AMONG ADOLESCENTS IN HIGH SCHOOLS OF ADDIS ABABA

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Abstract

Background: - In the past three decades prevalence of overweight/obesity has significantly increased among children and adolescents in developing countries. Some of the health impacts of overweight are type two diabetic mellitus, heart disease, stroke, high blood pressure, gall bladder and fatty liver disease, arthritis and some cancer which are often referred as non-communicable diseases. Additionally, the impact has reduction on the quality of social life such as risk of teasing, bullying, social isolation and stigmatization. The end result is linked to deaths; now ranked as the fifth leading cause of death in the world.

Objective: -To determine the magnitude of overweight and associated factors among adolescents in high schools of Addis Ababa, 2014.

Methods: - Cross-sectional study was conducted from Feb 20 to Mar 10, 2014 among adolescents in high schools in Addis Ababa. A total of 446 students were selected from private and government high schools using a multi-stage sampling procedure. Self-administered questionnaires were used to collect demographic, socio-economic, dietary, physical activity and nutritional knowledge data. Then data were entered using EpiData version 3.1.and analyzed using SPSS vrison16.0. BMI-for-age was calculated using WHO AnthroPlus programs. Bivariate logistic regressions analyses were employed to identify associated variables with overweight and multi-variable logistic regression analysis was employed to identify independent predictors of overweight. All statistical tests were considered significant at p-value<0.05.

Result: -The prevalence of overweight and obesity in this study was 10.3% and 4.9% respectively. Overweight among adolescents in private high schools 13.8% was higher than those in governmental 7% (P-value=0.008). There were more females overweight 17.2% and obese 10.3% students than males 4.5% and 0.4% respectively (p-value<0.001). In addition, high SES, using >3 regular meals/day, consumption of sweet food, high PA, spent ≥3 hours/day using TV/computer and nutritional knowledge were independent predictors of overweight.

Conclusion and recommendation: - Findings revealed that more than one-tenth of adolescents in high school of Addis Ababa were overweight; factors of overweight among adolescents aged 13-19 years in the study area stem basically from the life style of adolescents. Therefore, public health plan of action to curb overweight among high schools adolescents is urgently needed in order to reduce future complication of overweight in Addis Ababa.

Key words: -High school adolescents, BMI, overweight and associated factors

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Acronym and Abbreviations

BMI: Body mass index

CDC: Communicable disease control and prevention

CI: Confidence interval

CVD: Cardiovascular disease

IOTF: International obesity task force

JU: Jimma University

MET: Metabolic equivalent time

NGO: Non-Governmental Organization

NLW: Non low weight

NNP: National nutrition program

OR: Odds ratio

PA: Physical activity

SES: Socio- economic status

SI: Sampling interval

SPSS: Statistical Package for the Social Sciences

TPA: Total physical activity

TV: Television

WHO: World Health Organization

1. Introduction

1.1. Background information

UNICEF defined adolescent as those have age between 10 and 19 years (1). World is home to 1.2 billion individuals aged 10–19 years, forming 18% of world population. The vast majority of adolescents (88%) live in developing countries (2). Adolescence is transition between childhood to adult life, is one of the most dynamic stages of human development and usually been thought of as a period characterized by good health; however, millions of adolescents face significant challenges such as overweight and obesity (1, 3).

World Health Organization defined overweight and obesity as excessive fat accumulation that may impair health (4,5). The prevalence of excess weight is increasing in both developed and developing countries, but at different rates and in different patterns (6. 7, 8). Globally, in 2005, 170 million children (aged < 18 years) were estimated to be overweight(8). Overall, about 30% of American (2008), 22%–25% of European (2008), 23.2%-34.2% of Oceanian (2007) 5.2%-36.4% of Asian adolescents (2002) and less than 20% of African (2008) adolescents were overweight or obese (7). Between 1980 and 2008, the number of people affected in the developing world more than tripled, from 250 million to 904 million. In high-income countries, the numbers increased by 1.7 times over the same period (9). In this estimate, contribution of children and adolescents overweight and obesity was high (8).

Africa is experiencing a shift from underweight to overweight (9, 10). Increasing trend in the prevalence of overweight/obesity among children and adolescents has been documented over the last few decades in Africa (12). For example in 2008, overweight prevalence in South Africa was 25.5% in KwaZul (13). Prevalence of overweight and obesity among Ghana high school adolescents age 13-15 old was 10.7% and 3.3%, respectively (14). Study conducted in Addis Ababa among non-pregnant women of age 15-49 indicated that prevalence of overweigh was16.1% but in 2011 prevalence of overweight increased to 20.6% of which the prevalence of overweight among the age group 15-19 years females was 6.5% and 7% respectively in the specified years (15). Study conducted in Hawassa 2012 in high school adolescents showed that combined prevalence of overweight/obesity was 15.6% (16). These findings showed that overweight and obesity are becoming health problem of developing country (Ethiopia).

1.2. Statement of the problem

Overweight and obesity are fast growing health issue affecting children and adolescents today. They have negative health impacts in children and adolescents, as well as in adults. Some of the health impacts of overweight and obesity are type two diabetic mellitus, heart disease, stroke, high blood pressure, gall bladder and fatty liver disease, arthritis and some cancer which are often referred as non-communicable diseases. According to the findings of recent studies its had 44% of the diabetes mellitus, 23% of the ischemic heart disease and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity(8).

Additionally, overweight and obesity in children and adolescents are associated with significant reductions in quality of life and a greater risk of teasing, bullying and social isolation (17). The most common psychosocial consequence of obesity that may appear during the childhood or adolescents is stigmatization(4). Overweight and obesity are linked to more deaths worldwide than underweight (4), hence now ranks as the fifth leading global risk for mortality (17). Among these entities, obesity has become a colossal epidemic causing serious public health concern and contributes to 2.6 million deaths worldwide every year but underweight cause 2.2 million death of children every year in the world (18). As WHO estimated in 2008 in Ethiopia the prevalence of death due to overweight and obesity was 7.4% and 1.1% respectively (18).

Economic growth, modernization, urbanization and globalization of food markets are just some of the forces thought to underlie the epidemic of overweight and obesity (1,4,7).Forces of globalization have led to a creeping homogenization in diets. Diets are changing wherever incomes are rising in the developing world, with a marked shift from fruit and vegetable to meat, fats and sugar (9). It is rare for overweight and obesity to be caused by hormonal or genetic defects but the reasons for the dramatic, worldwide increase in overweight and obesity in children and adolescents are unclear (8). Moreover, it must be noted that adulthood overweight and obesity related disease are usually traced back to obesity in childhood and adolescents. Being overweight or obese between age 14 to 19 was associated with increased adult mortality from a wide variety of systemic diseases (19). Once adults are obese; it is often difficult for them to lose weight through physical activity and healthy diet (20). Available evidences showed that one of the effective ways to prevent obesity in the adult life is prevention and management of children and adolescent overweight and obesity (10) .

2. Literature Review

2.1. Magnitude and Socio-demographic characteristics

BMI is the best available maker to estimate overweight and obesity in children and adults and Schools are a logical measurement site because they reach virtually all youth(4). BM- for-age is recommended to screen children greater than five years for at risk of overweight or obesity to identify child who may need further assessment and possible treatment (21). Recently researches used BMI-for-age for measurement of overweight and obesity for children (16,22,26).

Study conducted in Italia among high schools adolescents showed that increase in growth was reflected by increase BMI. The mean BMI at 10 years for both sexes was 16.68 and by 19 years it had risen to 21.89. In this study the overall mean BMI for males 20.01 was significantly higher than that of females 19.01. Majority 85.3% had normal weight, while the prevalence of obesity was 1.8%. The overall overweight prevalence was 16.9%. Males were significantly more overweight and obese than females(21).

Other study from Mediterranean region showed that prevalence of overweight among high school children and adolescents ranged from 5.4% in Iran to 32% in Kuwait, whereas the prevalence of obesity ranged from 1.6% in Iran to 24.8% in Kuwait. In general, overweight was more prevalent than obesity in both males and females. However, the prevalence of overweight and obesity by sex in this age group does not exhibit the same and children from the family size grate than three were more at risk than the family size less than or equal to three(23).

Study conducted in India among high school adolescents showed that as per the age and sex adjusted BMI percentiles of the WHO child growth standards 5.2% were obese, 6.2% were over-weight, 57.1% were of normal weight, and 31.5% were underweight. The prevalence of over-weight/obesity was 11.4% and greater proportion of adolescents studying in private schools were overweight/obese than the students studying in government (24).

Study on youth from Island showed that from the entire sample 17.9% were overweight and 21.5% were obese. According to the unadjusted results of this study odds of youth 15 to 19 years old being overweight/obesity was 35% and female youth 35 less likely to be overweight/obese than males (25).

Some findings from Africa indicated that prevalence of overweight or obesity among South Africa school children aged 13 to 17 years were found to be 3.2% for boys and 4.9% for girls, and overweight 14% for boys and 17.9% for girls((13). Prevalence of overweigh or obesity

among Ghana school adolescents age 13-15 old was found to be 10.7, of which 10.4% among girls and 3.2% among boys and 3.3%, i.e. male 2.5% vs. female 5.6% were obese. Both countries showed that children or adolescents from high socio economic class were more at risk than children or adolescents from low socio economic class (14)

Study conducted in Addis Ababa Ethiopia among non pregnant women of age 15-49 descriptive result shows that overall prevalence of overweight/obesity rose from 16.1% in 2000 to 20.6% in 2011, while the prevalence in female adolescents age 15-19 was 7.0% in 2000 and 2005. This might be also indicating that the socio-economic transition in Ethiopia is contributing the outcome of overweight (15). Study conducted among high school adolescents in Gondar town North West Ethiopia, indicated that out of the total students (5.4%) (with 95%CI) (4%, 7.2%) were overweight while only (0.5%) with 95%CI (0.2%, 1.2%) were obese. The combined prevalence of both overweight and obesity was 5.9%. The overweight prevalence was higher among girls (8.7%) than boys (1.6%); while 0.9% girls and none of the boys were obese. The prevalence of overweight and obesity among private high school students was 10.1% and 1.6% respectively; while 4.2% and 0.2% public students were overweight and obese respectively (26).

Other cross sectional study conducted in Hawassa town northern Ethiopia indicated that prevalence of overweight and obesity for age group 10-14 was 12.5% and 0% respectively, whereas for age group 15-19 was 12.9% and 2.8% respectively. The sex specific prevalence of overweight was 5.7% for males and 20.2% for females, whereas obesity was 1.1% for males and 4.4 % for females this might be due to concerns about body image, particularly among adolescent girls, may lead to problematic eating behaviors such as irregular meal patterns that may result in increased weight gain. Additionally the prevalence of overweight and obesity in nongovernmental school was 20.4 % and 6.5 % where as in governmental school its prevalence was around 9% and 0.8% respectively. From the study participants 59.4% were living in the family size between five and seven followed by more than eight (25.5%). The median BMI of the study participants was 19.852 kg/m2 ranging from 14.27-37.66 kg/m2. 73.10 % of the study participants were age from 16-18 years old (16).

The cause of overweight and obesity is suspected to the complex interaction of genetic, environmental and behavioral factors (27). Based on epidemiological studies, the WHO has divided the evidence for factors that might promote or protect against overweight and weight gain into four categories: convincing, probable, possible, and insufficient. Energy intake and inactivity are among the most convincing factors to be associated with the occurrence of obesity.

Home and school environment, heavy marketing of energy dense foods, and unsuitable social and economic environment are the most probable factors related to weight gain (22).

One of the determinate factors of overweight and obesity is socio economic status (5, 10) but the relationship between obesity and socioeconomic status varies across countries. The higher the socioeconomic class (SEC) the more the risk of obesity in Russia and China, while in USA, the lower the SEC the higher the risk of obesity because of adolescents from high socio economic group tend to have the high access of healthier diet (28), but the higher socio economic class the more risk in Ethiopia (14,15, 16).

Study was conducted in Pakistan secondary school children and adolescents indicate that Association of family-based factors with overweight and obesity were children whose parents were having college 23% or higher (29%) education had significantly higher risk of being overweight and obese as compared to children and adolescents whose parents were illiterate (3%) and educated up to high school (10%). Overweight and obesity were significantly higher among children with parents having higher education among both boys and girls. Children whose both parents were working (22.5%) were significantly more likely to be overweight and obese than those whose mother was a housewife (15.5%). Overweight and obesity were 9% among children having more than three siblings that significantly increased to 23% among children having one to three siblings and 35% among children having no sibling ($P < 0.001$). Children from private schools and high socio economic family were more at risk than those from low socio economic family (29).

Mother of overweight and obese children was more educated than mothers of healthy children (14, 15, 21, 24,28). Children from a lower socio-economic background are at higher risk for the development of obesity (23) but there is controversial finding that is children from families having higher socioeconomic class lead a very unhealthy life than children from low socioeconomic class (16,21,27,28, 29, 30) because they are transported to and from school by car and bus. Sports have been replaced by television, video games and the internet (32).

Parents are busier than ever, household work is done by the servants, families eat fewer home-cooked meals, breakfast skipping is a habit and snacking between meals is the norm. Case-control study finding from Bangladesh revealed that children from families having lower socioeconomic class do not afford these trends, and tend to be physically active and eat healthy food (32).

2.2. Dietary habit

There is no standardized definition of a “meal” in terms of minimum or maximum energy content or amount of food eaten. It has been proposed that analyzing the amount of energy in every meal and number of meals consumed might lead to a more sensitive outcome (31);however according to American Dietetic Association, fruits and vegetables have been promoted for the prevention of childhood and adolescent obesity because of their low energy density, high fiber content, and satiety value(28). High intake of vegetables and fruit were protective factors for overweight and obesity (23), but some study revealed consumption of fruit and vegetables were not protective factors(16) . The number of daily meals was positively associated with percent body fat, >3 meals a day were a risk factor for higher body fat (25,31). Large portions of energy-dense foods are found to be positively associated with obesity in late childhood and consumption of junk food has been associated with incidence of obesity (32).Diets are changing wherever incomes are rising in the developing world, with a marked shift from fruit and vegetable to meat, fats and sugar (9).

Higher frequency of eating fast food and snacks was associated with overweight and obesity but consumption of sugar-sweetened drinks, like soft drinks or commercially produced juices, was low, and not seen an association between these beverages and adiposity or weight status, with the exception of fruit-flavored water because the beverage contain add sugar (33). According to a study performed by Harrington a child, becoming obese increases 1.6 times for each additional can or glass of sugar-sweetened drink consumed beyond the usual daily beverage intake (34).

According to study conducted among high school students in Gonder (Ethiopia) those who did not use any sweet food item were less likely to become overweight as compared to students who use two and more sweet food items. Likewise, students who use one sweet food item were 65% less likely to become overweight as compared to students who use two and more sweet food items. Diet related factors like use of animal product food item and fruit consumption did not have significant association with overweight (26).However, contradicting findings were reported concerning the effect of sweet consumption on the prevalence overweight and obesity (16).

Increasing fruit intake and decreasing animal food item were significantly associated with less overweight chance of an individual in Turkey(16, 34). Subjects who ingested beverages and soft drink everyday tended to be overweight (21,35). In contrast to this BMI was not significantly associated with carbonated drink intake and fast food consumption was negatively associated with overweight/obesity (22).

2.3. Physical activity and sedentary lifestyle

Physical activity and sedentary behavior are two components of energy expenditure that contribute to the development of childhood obesity even though it is vary in sex (35).There is no consensus about a single cutoff point to define PA to prevent overweight and obesity (36) but one of the main factors contributing to increased adiposity is lower energy expenditure caused by decreased PA (37). Physical inactivity is now identified as the fourth leading risk factor for global mortality. Physical inactivity levels are raising in many countries with major implications for the prevalence of non-communicable diseases (NCDs) and the general health of the population worldwide (38). The amount of PA is tightly correlated with body fat accumulation and obesity and the intensity of activities plays an important role in obesity prevention (29,32,35,36). During adolescence time male adolescents are physically more active than female adolescents (35).Children who spent >4 hours on sedentary activities each day were two times more likely to be overweight or obese than children who spent less time on sedentary activities(23). Youth reporting more days per week of at least 60 minutes of exercise were moderately less likely to be overweight or obese. Engaging in sedentary activities including watching television and playing computer games for > 4 hours a day were potential risk factors for children and adolescents overweight or obesity (32,35,39) whereas regular physical activity at home for at least 30 minutes was a protective factor (24,32,39) but physical activity in the school was not associated with being overweight or obese (22,,29).

Other study showed that sports participation outside school in the study there was difference between NLW and obese individual and sports participation was associated with obesity or obesity-related measurements, a higher proportion of NLW children and adolescents engaged in sports than did obese children (32,33). Children who are exposed to psychological stress in the family are more likely to be obese (31,35)and sleep duration is positively associated with adolescent obesity (32,34). Students who travelled actively to and from school by walking or on a bike were significantly less overweight and obese than those who were driven to and from school (29, 32,34,35, 41)

2.4. Nutritional knowledge

Knowledge is an important but not a sufficient factor for dietary behavior change. Nutrition knowledge was consistently high across overweight individuals who are concerned about their weight sought out information and advice and therefore become more educated in terms of nutrition knowledge (42). Study done USA revealed that nutritional awareness had no relationship to overweight and obesity (43). Furthermore nutritional knowledge was not different between obese and non-obese adolescents. Therefore, interventions must go much further than simply promoting nutritional knowledge (44).

Knowledge is a predisposing factor for eating behavior (45).Study suggests that increase prevalence of overweight among adolescent may be deficit in overweight and obesity knowledge in the adolescents (46).Study conducted England showed that nutritionally less knowledgeable adolescents were 5.3 times more likely to be obese than knowledgeable adolescents. Children have little knowledge concerning nutrition and eating habits, indicating that the schools, parents and the media have disseminated insufficient and ineffective messages concerning healthier eating habits (47)

2.5. Conceptual framework

Families level factors

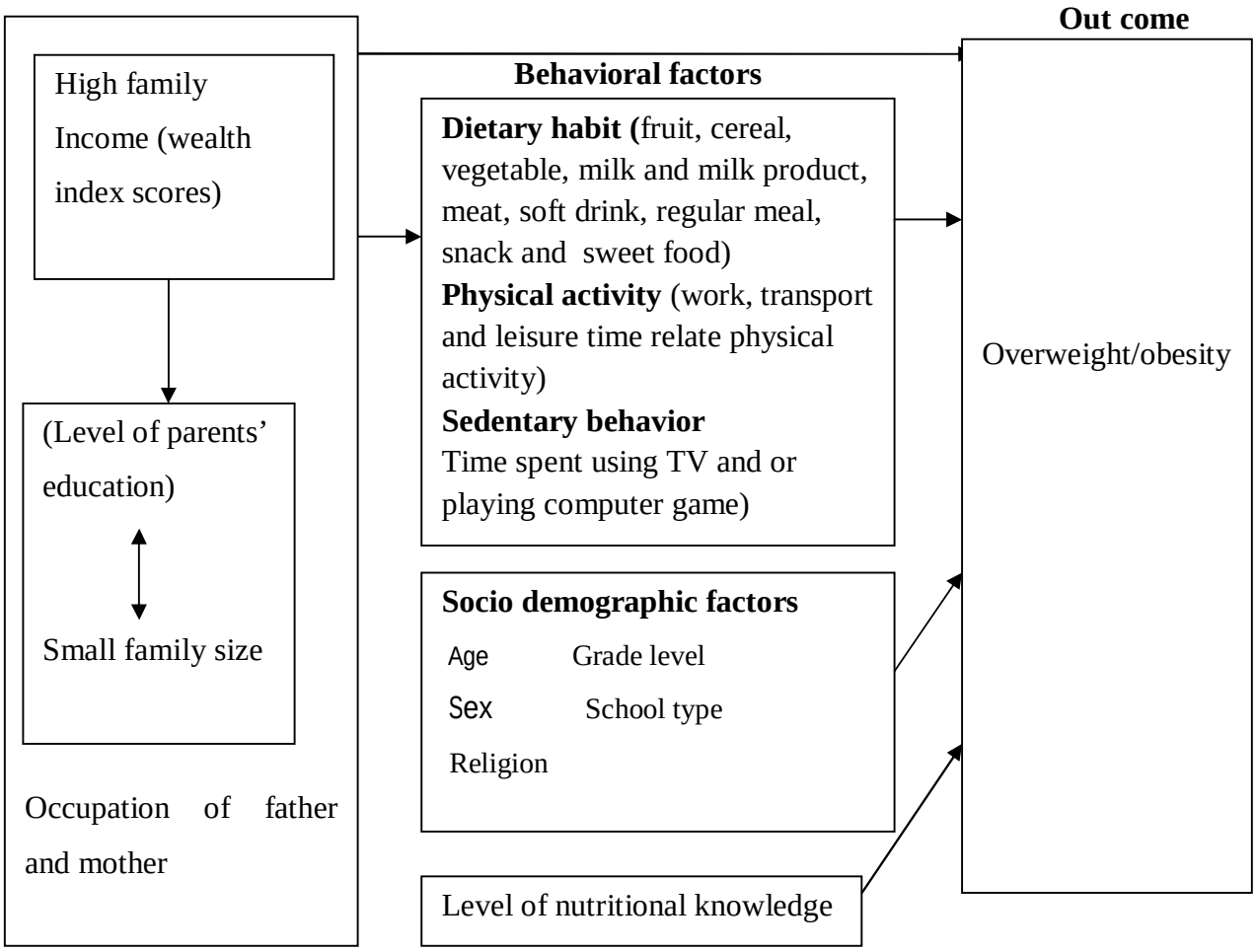


Figure 1:- Conceptual framework on factors influencing overweight**.**

2.6. Significance of the study

In Addis Ababa, it becomes common to see overweight people in all age group including school children. Therefore, this study provided reference data on the prevalence and associated factors of overweight among high schools adolescents in Addis Ababa, which is one of the economically, industrially and culturally fast growing cities in Africa.

Additionally, available evidences showed that one of the effective ways to prevent obesity in the adult life is prevention and management of adolescent overweight and obesity. A fundamental step in the prevention and control of obesity is the identification of factors contributing to the rapid increase of overweigh and obesity. Therefore, the findings will be used to insight health, nutrition and education programmer to develop strategies that can be used to reduce the prevalence of overweight and obesity in high schools adolescents.

3. Objectives

3.1. General objective

- To determine the magnitude of overweight and associated factors among adolescents in high schools of Addis Ababa, 2014

3.2. Specific objectives

- To determine the magnitude of overweight among adolescents in high schools of Addis Ababa
- To determine factors associated with overweight among adolescents in high schools of Addis Ababa.

4. Methods and Materials

4.1. Study area and period

The study was conducted in Addis Ababa from February 20 to March 10, 2014. Addis Ababa is the capital city of Ethiopia with a great diversity of ethnicity is almost home of all ethnic groups found in the country. City had 10 administrative sub-cities namely: Arada, Yeka, Gulele, Addis Ketema, Akaki-kality, Nefassilk-Lafto, Lideta, Bole, Kolfekeranio, and Kirkos. The study was including all sub cities. According to the 2011/12 Educational Bureau statistics, there were a total of 113 high schools with private(58) and governmental (53) high schools in the city, with a total 101,267 student population (40).

4.2. Study design

Institutional based cross-sectional study design was employed

4.3. Population

4.3.1. Source population

All adolescents age from 13-19 years old in high schools of Addis Ababa

4.3.2. Study population

Adolescents in selected high schools

4.4. Sample size

The sample size was determined by using a single population proportion formula by considering 95% confidence interval, 15.6% prevalence of overweight in Hawassa (16), 5% margin of error , 10% non-response rate and design effect of 2.

Sample size was determined using the fallowing formula

$$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}$$

Where: n- Is the minimum sample size required

p- Is an estimate of the proportion of the overweight and obesity in the population

d- Margin of error

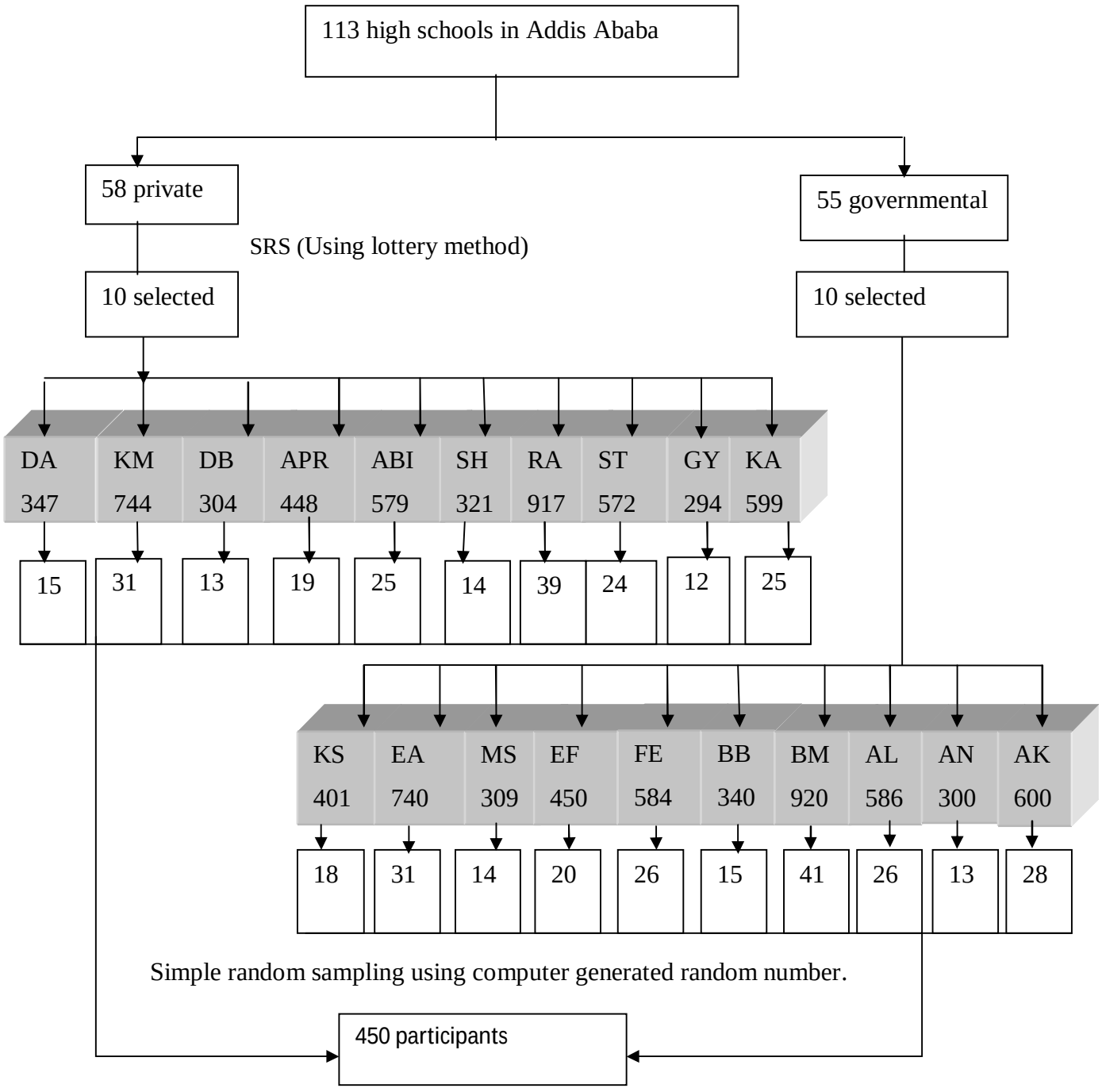
$Z_{\alpha/2}$ - The standard normal valve at (100%−α) confidence level

$$n = \frac{(1.96)^2 0.156(1-0.156)}{(0.05)^2} = 202$$

By considering 10% non-response rate and design effect is 2 then sample size increase to 445 When the size was proportionally allocated for each high school there were decimals, to avoid those decimals the sample was increased to 450.

4.5. Sampling procedure

A multi-stage stratified sampling technique was used to select study subjects. Based on their ownership high schools in Addis Ababa were classified into two categories as governmental and private. From 113 high schools in Addis Ababa (55 governmental and 58 private high schools) 20 high schools were included in this study. Both strata had almost equal high schools; therefore 10 from governmental high schools and 10 from private high schools were taken. Individuals were proportionally allocated for each selected high school. To select individual in each high school each student was coded by grade level and ID, then list of students in each high schools individually was entered into Microsoft office excel 2007, finally individuals were randomly selected using simple random sampling technique . Those selected students were identified by their Id number and grade level.



Sampling frame of high schools and adolescents in Addis Ababa

4.6. Study variables

4.6.1. Independent variables

- Socio-demographic and family level characteristics (school type, sex, age, grade level, religion, family size, father education level, mother education level, father occupation, mother occupation, wealth index scores)
- Dietary habit (fruit, cereals, vegetable, milk and milk product, meat, frequency of regular meal intake, snack and sweet food)
- Physical activity (total physical activity cumulated using work, transport and leisure time related physical activity)
- Sedentary behavior (time spent watching TV and or playing computer game)
- Nutritional knowledge

4.6.2. Dependent variable

- Overweight

4.7. Inclusion and exclusion criteria

- Students attending high school with age greater than or equal 13 up to 19years old were included in the study
- Adolescents with physical disabilities were excluded from the study.

4.8. Operational definition

Nutritional knowledge: - From ten questions developed from NNP key message for adolescents, students who scored ≥ eight correct replied were considered as "more knowledgeable" and who scored < eight correct replied were "less knowledgeable".

Overweight and obesity: - Obesity was coded as the cut point of BMI-for-age specific ≥95thpercentile, while overweight was coded as the cut point BMI-for-age specific ≥85th percentile and <95th percentile based on WHO reference2007.

Physical activity: - Activities like cleaning, painting, walking, cycling, plastering, doing household chores and swimming included as moderate physical activities; whereas activities like carrying heavy loads, running and strenuous sport included as vigorous physical activities.

Dietary habit: - Dietary habit refers to the number of days in which particular food group (e.g., fruits, vegetables, meat, milk and milk products) that participants consumed in weeks in the past months at the time of data collection.

4.9. Data collection tools and procedure

First questionnaires were developed in English version then translated into Amharic version and pre-tested on 5% of sampled non-selected high schools. Two health officers for supervision and five trained diploma nurses were employed to collect data.

Socio-demographic variables: -age, sex, grade level, religion, family size, parents level of education and occupation, ethnicity and SES such as information on the household possession of articles that did not need direct observation (house ownership, laundry machine, car, motor bicycle, refrigerator, generator, dish, toilet, pipe water, TV, and computer) were collected as a proxy variables for determination of socioeconomic association with overweight or obesity. The wealth assets used here were tested in our country in relation to factors of overweight and obesity in Hawassa and Gonder high school adolescents (16, 26). Ten nutritional knowledge questions were developed from NNP guideline key messages for adolescents (48).

Self-administered qualitative Food Frequency Questionnaires on fruit, vegetable, meat, milk and milk product, soft drink, snack, regular meal and sweet food consumption were used to collect information on the frequency of consumption of various foods in each week of past months from all the study subjects. This method was designed to obtain qualitative data on usual intake of food and class of food over a long period. Most parts of the questionnaires were adapted from WHO steps instrument for chronic disease risk surveillance (37).

The Global Physical Activity Questionnaires developed by WHO on work, transport and leisure time related physical activities were used to masseur total physical activity (37).

Anthropometric measurements

Weight and height were measured using calibrated equipment with standardized techniques. Before taking measurement participants were asked to remove their shoes, heavy outer garments and hair ornaments. Weight was recorded using digital weight scale (SECA made in Germany a carrying capacity of 150 kg and 100 g precision) by making weight of the participant was evenly distributed on both feet. Height was measured by using portable stadiometer (SECA Germany 0.1 cm precision). Training was given for data collector how to carry out the measurements on standardized techniques. Equipments were calibrated every morning before measurements carried out. Before taking measurements participants were asked to stand with his or her back to the height of rule with participants' buttocks, head, calves and heels were touching the upright rule.

4.10. Data analysis

WHO AnthroPuls anthropometric calculator was employed to calculate anthropometric indices. Data were entered by Epidata version 3.1 programs and analyzed by SPSS version 16.0. Descriptive analyses were carried out to showed frequency and proportion of participants' characteristics. Tables and graph were used to present descriptive results.

The level of knowledge in nutrition was quantified by means of 10 illustrated questions on knowledge concerning foods which are sources of fiber, carbohydrate, important of vitamins, iodine and iron and as well as on knowledge concerning healthier foods. Each question answered correctly was equivalent to one point. Wrong answers and "I don't know" was not receiving scores.

For 15 dummy coded assets principal component analysis was employed to score the factors. Assumptions for appropriateness of factor analysis were checked using presence of substantial correlations (>0.3), Kaiser-Mayer-Olkin for sample adequacy for the set of variables (>0.5) and Bartlett's test of Sphericity (0.001). All assumptions were met and four factors were computed. Finally mean of factors were used as comparison indices.

Physical activities of adolescents were asked in three comprehensive set of domain including work (moderate and vigorous), transport and leisure time related physical activity (moderate and vigorous). Based on international physical activity guideline each adolescent's physical activities were changed into MET in minutes/week, then sum of sub-activities metabolic equivalent minutes scores were commuted. Values were used to multiply physical activities in minutes

done in a week to change in to MET are: moderate PA (work and leisure domain) = 4.0 METS, vigorous PA (work and leisure domain) = 8.0 METS, and transport related walking/cycling = 3.0 METS (41)

Bivariate logistic regression analyses were employed to identify variables associated with overweight or obesity; whereas multi-variable logistic regression analysis was used to identify independent predictors of overweight and obesity. For the multi-variable logistic regression analysis, variables with significant or marginally significant associate (p-value<0.25) in the bivariate analyses were included into the model. All statistical tests were considered significant at p-value<0.05.

4.11. Data quality control

Training were provided for data collectors and tools were checked it consistence with Amharic version. Weight scales were calibrated on every morning at zero with no object on it and placed in level surface before measurements were carried out. Continuous checkup of scales were performed for reliability. Body positioning, reading measurements and recording were carefully carried out. In order to minimize errors, measurements had taken based on standardized procedure. Supervisions were provided for data collectors for correct implementation of procedures. The principal investigator was supervised and reviewed every questionnaire for completeness, and cleaned and entered data.

4.12. Ethical clearance

Research ethical review committee of Jimma University College of public health and medical sciences were approved this research project. After support letter has been given, Addis Ababa Education Bureau sent support letter for each sub-city. Finally each sub-city sent support letter for each selected high schools in that sub-city. Then nature of the study was fully explained to each school administration. After getting permission from school to participate in the study, written consent was taken from students' family by sending consent letter by students and verbal assent took from each participant student. Data obtained from each study participant were kept confidentially and all who participated in the study were acknowledged.

4.13. Dissemination plan of results

Result of this paper will be given to college of public health and medical sciences of Jimma University, Addis Ababa Administration Education Bureau and federal Ministry of Health. If possible, the paper will be presented at Ethiopian public Health Association annual conference. Attempt will be made for publication of the research on reputable Journal.

5. Results

5.1. Characteristics of study participants

A total of 446 students from both government 229(51.3%) and private 217(48.7%) were involved in this study with a response rate of 99.1%. Four sampled individuals were not included in this study because of 2 were not present on the day measurement was applied and 2 were not evaluated because they did not have their parent's consent. From study participants 243 (54.5%) were males and 203 (45.5%) were females. About half of the study participants 240(53.8) were 13-16years old, whereas the rest 260(46.2 %) adolescents were in age category 17-19 years.

Regarding religion 239 (53.6%) of study participants were orthodox, whereas100 (22.4%), 65(14.6%), 21(4.7%) and 21(4.7%) were from Muslim, Protestant Catholic and Others respectively. Concerning subjects' ethnicity about one-third 154(34.5%) were Amharas, followed by Gurages and Tigre constituting 95(20.6%) and 68(15.2 %%) of participants respectively. Regarding level of grade 160 (35.9%), 132 (29.6%), 81 (18.2%) and 73 (16.4%) participants were participated from grade nine, ten, eleven and twelve respectively (**Table 1**).

Parental educational status revealed that more than half of student fathers 240(53.8%) had attended above secondary school education followed by secondary school and primary school education constituting 102(22.9%) and 66(14.8%) respectively, whereas 38 (8.5%) of study participant fathers had no formal education. On the other hand more than two-fifth of student mothers 195(43.7%) had attended more than secondary school education, whereas 119 (26.7%), 70(15.7%) and were attended secondary school education and primary school education respectively, while rest of 13.9%(62) participant mothers had no formal.

Concerning subject's paternal occupation 131(29.4%) were government employee followed by merchant and others constituting 122(27.4%) and 106(23.8%) respectively. However, majority of subject maternal occupation were housewife 167(37.4%) and merchant 127(28.5%), while rest 98(22.0%) and 54(12.1%) were government employee and NGO employee respectively. About three-fourth 343(76.9%) of students were live in family size ≤ 4 and the remaining students 103(23.1%) were live in family size >4 (**Table 1**).

Table 1: Socio-demographic characteristics of (n=446) adolescents in high schools of Addis Ababa, 2014

Variables	**Frequency (%)**
School type	
Governmental	229(51.3)
Private	217(48.7)
Sex	
Female	203(45.5)
Male	243(54.5)
Age in year	
13-16	240(53.8)
17-19	206(46.2)
Grade level	
9	160(35.9)
10	132(29.6)
11	81(18.2)
12	7316.4)
Religion	
Orthodox	239(53.6)
Muslim	100(22.4)
Catholic	21(4.7)
Protestant	65(14.6)
Others	21(4.7)
Ethnicity	
Amhara	154(34.5)
Oromo	52(11.7)
Gurage	92(20.6)
Tigre	68(15.2)
Wolayta	44(9.9)
Hadya	15(3.4)
others	21(4.7)

Table 1 continued

Variables	Frequency (%)
Father level of education	
No formal education	38(8.5)
Primary school	66(14.8
Secondary school	102(22.9)
More than secondary	240(53.8)
Mother level of education	
No formal education	62(13.9)
Primary school	70(15.7)
Secondary school	119(26.7)
More than secondary school	195(43.7)
Father occupation	
Government employee	131(29.4)
NGO employee	87(19.5)
Merchant	122(27.4)
Others	106(23.8)
Mother occupation	
Governmental employee	98(22.0)
NGO employee	54(12.1)
Merchant	127(28.5)
House wife	167(37.4)
Family size	
≤ four	103(23.1)
> four	343(76.9)

5.2. Dietary habit, physical activity and nutrition knowledge

The dietary habits of adolescent students were assessed by food frequency measures. Based on that157 (35.2%), 155(34.8%) and 134 (30%) students consumed fruit for 3-4, < 3 and >4 days in a week respectively. Majority of adolescent students 310(69.5%) consumed cereals >4 days in a week, while 17.5% (78) and 13.0% (58) of students consumed cereals for < 3 and 3-4 days in a week respectively. Concerning vegetable 194 (43.5% students consumed vegetable >4 days in a week, while rest 28.9 %(129) and 27.6% (123) of adolescent students ate vegetables for 3-4 and < 3 days in a week respectively.

Regarding milk and milk product 145(32, 5%), 72(16.1%) and 16.4 (9.2%) adolescent students consumed milk and milk products for 1-2, 3-4 and >4 day in a week respectively, whereas 156(35.0%) students did not consume milk and milk products. Subjects by their meat consumption 38.1 %(170) and 32.5 %(145) of adolescent students ate meat for 3-4 and 1-2 days in a week respectively, whereas 11.5 %(50) of students consumed >4days in a week.

Among study subject 182(40.8%) and (98(22.0%) students took soft drink for 1-2 and 3-4 days in a week respectively, while only 13.5% of students consumed >4 days in a week. Of the study participants 306(68.6%) adolescents were using at least one snack per day. By their regular meal 63.5 %(285) of adolescents students were using 3 regular meals in a day, while 112(25.1 %) and 52(11.1%) study participants consumed < 3 and >3 regular meals in a day respectively (**Table 2**).

Table 2:-Dietary habit of (n=446) adolescents in high schools of Addis Ababa, 2014

Variables	Frequency (%)
Consuming fruit in a week	
< 3 days	155(34.8)
3-4 days	157(35.2)
> 4 days	134(30.0)
Consuming cereals in a week	
< 3days	58(13.0)
3-4days	78(17.5)
>4days	310(69.5)
Eating vegetables in week	
1-2 days	123(27.6)
3-4 days	133(29.8)
>4 days	190(42.6)
Milk and milk product in a week	
0 / no intake	156(35.0)
1-2 days	145(32.5)
3-4 days	72(16.1)
>4days	73(16.4)
Eating meat in a typical week	
0/no intake	81(18.2)
1-2 days	145(32.5)
3-4 days	170(38.1)
>4 days	50(11.2)
Soft drink in week	
0/n o intake	106(23.8)
1-2 days	182(40.8)
3-4 days	98(22.0)
>4days	60(13.5)
Using at least one snack per day	
No	140(31.4)
Yes	306(68.6)
Regular meals	
< 3 meals per day	112(25.1)
3 meals per day	285(63.5)
>3 meals per day	52(11.1)
Sweet food	
No	322(72.2)
Yes	124(27.8)

Of the total respondents 269(60.3%) adolescent students were engaged in work beside of their education; among those adolescents who were engaged in work beside of their education (85.9%) and (94.8%) of students were engaged in vigorous and moderate work related physical activity respectively. Concerning transport related activities majority 376(84.3%) adolescents walked or used bicycle at least 10 minutes per week, whereas rest 70(15.7%) adolescents did not walk or use bicycle. From total students 280(62.9%) were doing leisure time vigorous physical activity, whereas the remaining 165(37.1%) adolescents were not doing leisure time vigorous physical activity. Among adolescents who were engaged in leisure time physical activities 335(75.1%) adolescents were doing leisure time moderate physical (**Table 3**)

From total respondents 209(46.9%) were doing high physical activities and fallowed 181(40.6%) and 56 (12.6%) adolescents were doing moderate and low physical activities respectively. Concerning sedentary activity majority of adolescents 285(63.9%) spent < 3 hours in a day using TV or computer, whereas the remaining 161(36.1%) adolescents spent $\geq$ 3 hours using TV or computer.

Subjects by their nutrition related knowledge more than half students 242(54.3%) scored $\geq$ 8 ($\geq 75^{th}$percentile) out of ten nutrition related knowledge questions, hence they were more knowledgeable, while 204(45.7%) of the study participants scored < 8 ($<75^{th}$ percentile) out of ten nutrition related knowledge questions, hence they were less knowledgeable (**Table 3**).

Table 3:- Physical activity and nutritional knowledge of (n=446) adolescents in high schools of Addis Ababa, 2014

Variables	Frequency (%)
Work beside of education	
no	177(39.7)
yes	269(60.3)
Work related vigorous physical activity	
no	38(14.1)
yes	231(85.9)
Work related moderate physical activity	
no	14(5.2)
yes	255(94.8)
Walking or using a bicycle	
no	70(15.7)
yes	376(84.3)
Leisure time vigorous activities	
no	165(37.1)
yes	280(62.9)
Leisure time moderate physical activity	
no	111(24.9)
yes	335(75.1)
Total physical activity	
low	56(12.6)
Moderate	181(40.6)
high	209(46.9)
Time using TV/computer	
<3 hours in a day	285(63.9)
≥3 hours in a day	161(36.1)
Nutrition knowledge	
less knowledgeable	204(45.7)
More knowledgeable	242(54.3)

5.3. Prevalence of overweight by demographic characteristics and nutritional factors

From the total respondents the prevalence of adolescents who had normal weight was 76.2%. The prevalence of overweight and obesity in the study participants was 10.3 % and 4.9% respectively. The combined prevalence of obesity and overweight was 15.2 %, whereas prevalence of underweight among adolescents in high schools of Addis Ababa was 8.3% (**Figure 3**).

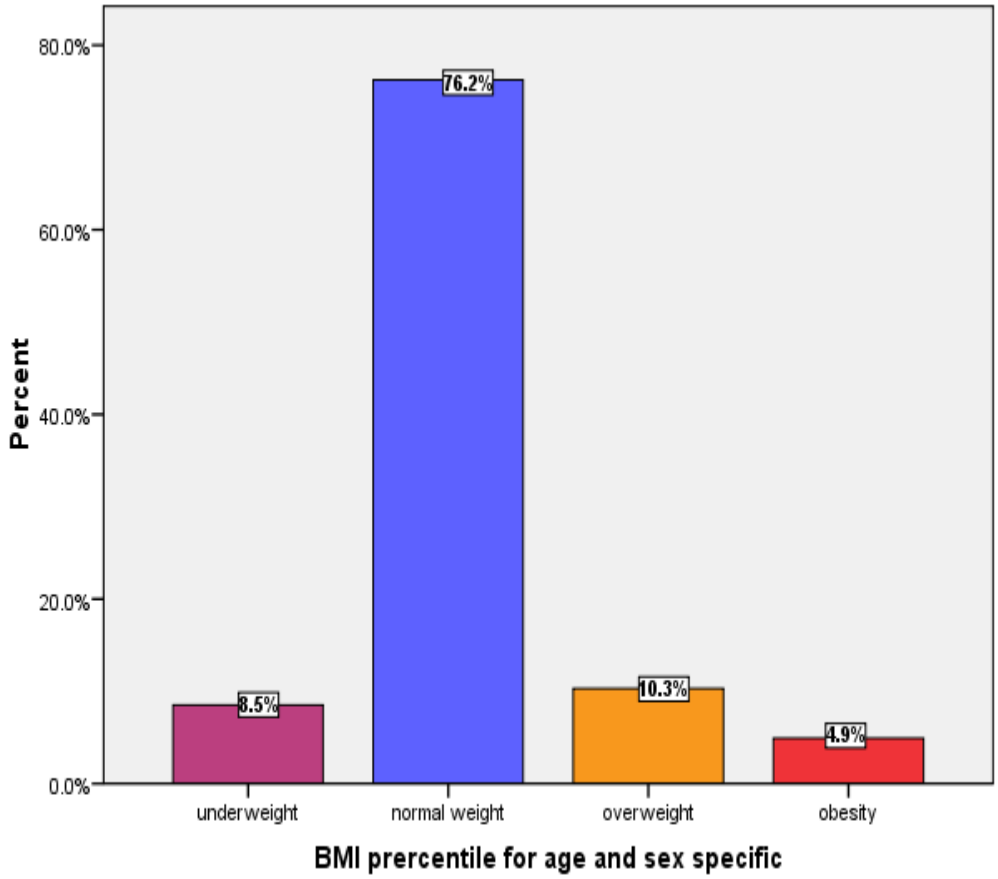


Figure 3. Nutritional status of adolescents in high schools in Addis Ababa, 2014

Of the total adolescents studying in governmental high schools 7.9% were overweight, whereas 23.0% of adolescents studying in private high schools were overweight. From female respondents 27.6% was overweight, whereas 4.9% of male students were overweight. By age category 16.2% and 13.6% of students with age 14-16 and 17-19 years old were overweight respectively. Regarding level of grade 18.1% of grade nine, 10.6% of grade ten, 17.3% of grade eleven and 15.1% grade twelve students were overweight.

Overweight status by subjects' religion 17.2% of Orthodox, 12.0% of Muslim and 19.0% of catholic students were overweight. Of the respondents 27.2% of adolescent students from family size ≤ 4 were overweight, whereas 11.7% of adolescent students from family size > 4 were overweight. Regarding respondents wealth index scores (24.8%), (12.8%) and 8.1% of adolescents from high, medium and low socio-economic family were overweight respectively (**Table 4**).

Table 4:-Overweight by socio demographic characteristics of (n=446) adolescents in high schools of Addis Ababa, 2014

Variables	Overweight		COR (95%CI)
	Yes	No	
	n (%)	n (%)	
School type			
Governmental	18(7.9)	211(92.1)	1
Private	50(23.0)	167(77.0)	3.5(1.97, 6.24)*
Sex			
Female	56(27.6)	147(72.4)	7.3(3.80, 14.14)*
Male	12(4.9)	231(95.1)	1
Age in year			
13-16	37(16.2)	200(83.8)	1
17-19	28(13.6)	178(86.4)	0.42(0.10, 1.67)
Grade level			
9	29(18.1)	131(81.9)	1
10	14(10.6)	118(89.4)	0.53(0.27, 1.06)
11	14(17.3)	67(82.7)	0.94(0.46, 1.90)
12	11(15.1)	62(84.9)	0.80(0.37, 1.70)
Religion			
Orthodox	41(17.2)	198(82.8)	1
Muslim	12(12.0)	88(88.0)	0.66(0.33, 1.31)
Catholic	4(19.0)	17(81.0)	1.1(0.36, 3.55)
Protestant	10(15.4)	55(84.6)	0.88 (0.41, 1.86)
Others	1(4.8)	20(95.2)	0.24 (0.03, 1.85)

Table 4 continued

Variables	Overweight		COR (95%CI)
	Yes	No	
	n (%)	n (%)	
Father level of education			
No formal education	6(15.8)	32(84.2)	1
Primary school	10(15.2)	56(84.8)	0.95(0.31, 2.86)
Secondary school	12(11.8)	90(88.2)	0.71(0.24, 2.05)
Above secondary	40(16.7)	200(83.3)	1.1(0.41, 2.71)
Mother level of education			
No formal education	6(9.7)	56(90.3)	1
Primary school	8(11.4)	62(88.6)	1.2(0.39, 3.68)
Secondary school	15(12.6)	104(87.4)	1.3(0.49, 3.66)
Above secondary	39(20.0)	156(80.0)	2.3(0.93, 5.80)
Father occupation			
Government employee	20(15.3)	111(84.7)	1
NGO employee	14(16.1)	73(83.9)	1.1(0.50, 2.24)
Merchant t	18(14.8)	104(85.2)	0.96(0.48, 1.91)
Others	16(15.1)	90(84.9)	1.9(0.68, 5.57)
Mother occupation			
Government employee	18(18.4)	80(81.6)	1
NGO employee	11(20.4)	43(79.6)	1.1(0.492, 2.62)
Merchant	15(11.8)	112(88.2)	0.60 (0.28, 1.25)
Housewife	24(15.5)	141(84.4)	0.76(0.38, 1.47)
Family size			
≤4	28(27.2)	75(72.8)	1
>4	40(11.7)	303(88.3)	0.35(0.20, 0.61)*
Wealth index score			
Low	12(8.1)	136(91.9)	1
Medium	19(12.80)	130(87.2)	0.80(0.41, 1.56)
High	37(24.8)	112(72.2)	2.7(1.42, 4.99)*

From adolescents consumed fruit < three days 20.9% were overweight, whereas only 9.0% of respondents consumed fruit > 4 days in a week were overweight. Among the respondents consumed vegetable < 3 days 20.3% were overweight, while 15.5% of adolescent students consumed vegetable > 4 days in a week were overweight. Additionally, 32.9% of respondents consumed milk and milk products for > 4 days in a week were overweight, whereas only 12.2% of students not consumed milk and milk products were overweight. About 32.8 % of adolescents consumed >4 day in a week were overweight, whereas only 6.8% of adolescents did not consume meat were overweight. Moreover, 19.6% and 5.7% of respondents consumed at last one snack in a day and not consumed snack in a day were overweight respectively.

Proportion of overweight was 41.2% and 21.4% among the respondents consumed > 3 and < 3 regular meals in a day respectively. Of the respondents consumed sweet food 35.5% were overweight, whereas 7.7% of adolescent students did not use sweet food were overweight.

Concerning TPA, 32.1% of inactive adolescents were overweight, whereas only 8.6% of active adolescents were overweight. About 34.2% of adolescent students who spent $\geq$ 3 hours in a day using TV or computers were overweight, whereas only (6.6%) of adolescents who spent<3 hours in a day were overweight. Finally, 25.5% and 6.6% regarding nutrition knowledgeable and less knowledgeable adolescents were overweight respectively (**Table 5**).

Table 5:-Overweight by nutritional and physical activity factors of (n=446) adolescents in high schools of Addis Ababa, 2014

Variables	Overweight		COR(95%CI
	Yes	No	
	n (%)	n (%)	
Consuming fruit in a week			
< 3 days	31(20.1)	12480.0)	2.5(1.24, 5.17)*
3-4days	25(15.9)	132(84.1)	1.9(0.92, 4.00)
>4days	12(9.0)	122(91.0)	1
Consuming Cereals in a week			
< 3 days	9(15.5)	49(84.5)	1.0(0.49, 2.35)
3=4 days	14(17.9)	64(82.1)	1.3(0.66, 2.49)
>4 days	45(14.5)	265(85.5)	1
Eating Vegetable in a week			
< 3 days	25(20.3)	98(79.7)	1.9(1.65, 2.26)*
3-4 days	17(12.8)	116(87.2)	0.61 (0.30, 1.22)
>4 days	26(13.7)	164(86.3)	1
Milk and milk product in week			
0/No intake	19(12.2)	137(87.8)	1
1-2 days	10(6.9)	135(93.1)	0.53(0.24, 1.19)
3-4 days	15(20.8)	57(79.2)	1.9(0.90, 3.99)
>4 days	24(32.9)	49(67.1)	3.5(1.78, 7.00)*
Eating meat in a week			
0/No intake	4(6.8)	55(93.2)	1
1-2 days	7(4.7)	141(95.3)	0.26(0.10, 1.69)
3-4 days	36(20.6)	139(79.4)	1.2 (0.59, 2.4)
>4 days	21(32.8)	43(67.2)	2.5(1.06, 5.70)*
Soft drink in a week			
0/No intake	14(13.1)	93(86.9)	1
1-2 days	22(12.1)	160(87.9)	0.91(0.44, 1.87)
3-4 days	19(19.6)	78(80.4)	1.6(0.76, 3.43)
>4 days	13(21.7)	47(78.3)	1.8 (0.79, 4.22)
Using at least one snack/day			
No	8(5.7)	132(94.3)	1
yes	60(19.6)	246(80.4)	4.0(1.86, 8.66)*
Regular meal in a day			
< 3 meals per day	24(21.4)	88(78.6)	1
3 meals per day	23(8.1)	260(91.9)	0.8(0.44, 1.60)
> 3 meals per day	21(41.2)	30(58.8)	3.0(1.36, 6.58)*

Table 5 continued

Variables	Overweight		COR(95%CI
	Yes	No	
	n (%)	n (%)	
Sweet food			
No	25(7.7)	300(92.3)	
Yes	43(35.5)	78(64.5)	6.3(3.63, 10.9)*
Total physical activity			
Low	18(32.1)	38(67.9)	8.0(3.88, 16.29)*
Moderate	32(17.7)	149(82.3)	1.8(1.41, 3.36)
High	18(8.6)	191(91.4)	1
Time spent using TV/ computer			
< 3 hours in a day	13(4.6)	272(95.4)	1
≥3 hours in a day	55(34.2)	106(65.8)	6.1(3.45,10.87)*
Nutrition knowledge			
Less knowledgeable	52(25.5)	152(74.5)	1
More knowledgeable	16(6.6)	226(93.4)	0.2(0.11, 0.37)*

In the bivariate logistic regression analysis trend for association school type, sex, socio economic index, family size, fruit consuming days, vegetable consuming days, milk and milk product consuming days, meat and meat product consuming days, ever have snack, sweet food, TPA, time spent using TV/computer and nutritional knowledge were significantly associated with overweight at p-value <0.05

5.4. Determinants of overweight

Variables which had a p-value < 25% in bivariate logistic regression such as school type, sex, religion, family size, wealth index score, fruit, vegetable, milk and milk product, meat, soft drink, snack, regular meal, sweet food, TPA, time spent using TV/computer and nutritional knowledge were entered in to back ward LR multi-variable logistic regression model to identified independent predictors of overweight.

There was statistical significant association between school types with overweight. Adolescent students studying in private high school were 2.8 times more likely to be overweight than studding in governmental school (AOR=2.8[95%CI: 1.31, 6.12]). Female adolescent students were 5.4 times more likely to be overweight than male adolescent students (AOR=5.4 [95%CI: 2.35, 12.46]). Family size was statistically significant with overweight or obesity in the binary logistic regression but in multi-variable logistic regression it was removed from the model. Significant association was found between overweight and wealth index scores. Adolescent students from high socio economic families were 3.4 times more likely to be overweight than adolescents from low socio economic families (AOR=3.4[95%CI: 1.14, 8.16])

From food frequency measures in the present study statistical significant associations were found between consumption of, fruit, vegetable, meat, snack, milk and milk product with overweight or obesity in the bivariate logistic regression but in multi-variable logistic regression to control potential confounds it were excluded from the final model. However, there was statistically significant association between regular meals in a day with overweight. Adolescent students using > 3 regular meals in a day were 4.4 times more likely to be overweight or obesity than adolescents using < 3 regular meals in a day (AOR=4.4 [95%CI: 1.37, 14.26]). Adolescents consumed sweet foods were 5.1 times more likely to be overweight than who did not consume sweet food (AOR= 5.1 [95%CI: 2.41, 10.83]).

Regarding total physical activity (TPA), adolescents in low (sedentary life) activity were 4.3 times more likely to be overweight than that of active adolescents (AOR= 4.3 [95%CI: 1.50, 12.45]). Overweight was significantly associated with playing computer game and or watching TV. Adolescents spent $\geq$3 hours in a day using TV and /or computer were 3.6 times more likely to be overweight than adolescents spent<3 hours in a day (AOR=3.6 [95%CI: 1.66, 7.59]). The odds of being overweight were 79% lower in more knowledgeable adolescents than less knowledgeable adolescents (AOR=0.21[0.08, 0.48]).

Table 6:- Determinants of overweight among (n=446) adolescent) in high schools of Addis Ababa, 2014

Variables	Overweight		AOR(95%CI)
	Yes	No	
	n (%)	n (%)	
School type			
Governmental	18(7.9)	211(92.1)	1
Private	50(23.0)	167(77.0)	2.8(1.31, 6.12)*
Sex			
Female	56(27.6)	147(72.4)	5.4 (2.35, 12.46)*
Male	12(4.9)	231(95.1)	1
Wealth index score			
Low	12(8.1)	136(91.9)	1
Medium	19(12.80)	130(87.2)	0. 83(0.33, 2.04)
Highest	37(24.8)	112(72.2)	3.4(1.24, 9.01)*
Using at least one snack per day			
no	8(5.7)	132(94.30	1
yes	60(19.6)	246(80.4)	2.4(0.90, 6.54)
Regular meals in a day			
< 3 regular meal	18(16.4)	92(83.6)	1
3 regular meal	37(13.0)	248(87.0)	0.74 (0.31, 1.77)
>3regular meal	13(25.5)	38(74.5)	4.4(1.37, 14.26)*
Sweet food			
No	25(7.8)	297(92.2)	1
Yes	43(34.7)	81(65.30	5.1(2.41, 10.83) *
Total physical activity			
Low	24(42.9)	32(57.1)	4.3(1.50, 12.45)*
Moderate	26(14.4)	155(85.6)	2.0(0.87, 4.75)
High	18(8.6)	191(91.40	1
Time TV or computer			
< 3 hours	19(6.7)	266(93.3)	1
≥3 hours	49(30.4)	112(69.6)	3.6(1.66, 7.59)*
Nutritional knowledge			
Less knowledgeable	52(25.5)	152(74.5)	1
More knowledgeable	16(6.6)	226(93.4)	0.21(0.08, 0.48)*

Hosmer and Lemeshow's goodness-of-fit test produce chi-square of 6.706 with p-value of 0.569 and 8 degree of freedom hence the model was good for the data.

6. Discussion

The present study used BMI-for-age classification for calculation of overweight and obesity, as BMI is the best available maker to estimate overweight and obesity in children and adults(4). The study showed that the prevalence of overweight in the study participants was 10.3 % and the prevalence of obesity was 4.9% based on BMI- for -age classification. The combined prevalence of obesity and overweight was 15.2 %.

The present study finding is comparable with the result of a study conducted in Addis Ababa on age group 15-49 years of women which contain 15-19 years female's adolescents overall prevalence where was 16.1% (15). In addition, this finding was consistent with study done in Ghana overweight prevalence was 10.7 % and obesity prevalence was 4.5% (14) and Hawassa Ethiopia prevalence of overweight and obesity was 12.9% and 2.7% respectively. However, the prevalence of overweight and obesity in this finding was lower than that of developed countries such as Itali (21), and Island (25). In addition, India (24) and Mediterranean region country Kuwait having the prevalence of overweight was 32% and obesity 9.45% respectively (23). One of the possible reasons for the differences in prevalence of overweight and obesity could be due to cultural difference in dietary intakes and difference in socio-economic status.

In this study the overall prevalence of overweight and obesity was higher in adolescents studying in private high schools than governmental high schools (significant at p-value=0.008). Similar finding were observed from different countries India (24), Pakistan (29) and the same country study done in Gonder high school adolescents (26). This finding might be related to adolescents in private schools come from families with higher socioeconomic status (16, 26, 21).

In the present study prevalence of overweight among female adolescents was higher than male adolescents. Similar study finding were observed from different studies. Study conducted in South Africa school children aged 13–17 years showed females were more likely to be overweight and obese than male (11). In addition, study finding from Ghana showed significant association between sex and overweight/obesity; where females were more likely to be overweight/obesity than males (14).

Possible reason could related to boys are generally more physically active compared to girls especially during adolescence (35). Concerns about body image, particularly among adolescent girls, may lead to problematic eating behaviors such as irregular meal patterns that may result in increased weight gain (16). However, this finding was inconsistent study done in Italia (21) and Island (25), where the prevalence were more among boys than girls. The difference might need further research.

There was clear socio-economic gradient in the prevalence of overweight. Adolescents from high socio-economic family were more likely to be overweight than adolescents from low socio-economic family. This finding was consistent with study findings from different developed countries including Russia and Itali (21, 28) and developing countries including South Africa and Ethiopia (11, 16, and 26). Similar finding from Pakistan showed where increased risk of being overweight and obesity was found in the adolescents from wealthier family (29). Diets are changing wherever incomes are rising in the developing world, with a marked shift from fruit and vegetable to meat, fats and sugar (9).This finding might be related to the diets, adolescents from higher socio-economic group were well known to adopt western life leading to greater consumption energy-dense foods which may substitute the healthier local available diet like fruits, vegetables, cereals etc and more sedentary life style because they are transported to and from school by car and bus (29). Possible reason might be adolescents from high socioeconomic family had high access to diet than low socio economic family.

Some studies from developed countries were not in line with present finding. In Island levels of overweight and obesity was higher in the lower socioeconomic groups (25). In addition, study finding from America was inconsistent with this finding (28). The possible reason for this discrepancy might be related to in developed countries adolescents in higher socioeconomic groups tend to have a healthier diet (28), while in developing countries adolescents from high socio-economic prone to energy dense food(26, 29).

According to American Dietetic Association numbers of daily meals were positively associated with body fat (31). In these findings regular meals had positive association with overweight. Adolescent students who ate more than three regular meals were 3.7 times more likely to be overweight than adolescents who ate less than three regular meals in a day. This finding was consistent with IslandPuerto (25) and Gonder (26). This result might be related to positive energy balance due to higher intake of food (28).

The consumption of sweet as a key contributor to the epidemic of overweight and obesity in children and adolescents had been strongly debated; however large portions of energy-dense foods were found to be positively associated with obesity in children and adolescents (28, 32). In the present study adolescent students using sweet food were more likely to be overweight as compared to students did not use sweet food. The result was consistent with study conducted in Ethiopia and Bangladesh (26, 32). This could be explained as sweet food item are calorie dense food which result in positive energy balance to their consumers. However, from Hawassa inconsistent finding found concerning the effect of sweet consumption on the prevalence of overweight and obesity (16). The discrepancy of result might be related to in Hawassa overweight or obese adolescent in the study area deliberately restricted consumption of sweet food in order to control additional weight gain (16), while in the present study overweight adolescents' pone to sweet food.

Physical activity and sedentary behavior are two components of energy expenditure that contribute to the development of children and adolescents overweight and obesity (35). There is no consensus about a single cutoff point to define PA to prevent overweight and obesity (36) but one of the main factors contributing to increased adiposity is lower energy expenditure caused by decreased PA (37). The finding also showed that lack of physical activity had positive association with overweight. This finding was consistent with finding from Pakistan indicated that lack of physical activity was found to be significantly associated with overweight and obesity in children and adolescents (29). Another result from USA revealed that regular physical activity was an important factor in reducing the prevalence of overweight and obesity (32, 35). Additional, consistent findings from Ethiopia (16, 26), multicenter EUROPEAN project (33) and WHO report Switzerland (37, 41) showed lack of physical activity had positive association with overweigh and obesity. This finding might be related to lack of energy expenditure because of lack of physical activity (37).

There was positive significant association between times spent watching television or using computer and overweight. This finding was consistent with finding from Bangladesh and America (32, 35, and 39). In Mediterranean region Iraq and Kuwait, it was found that children and adolescents who watched TV more than 4 hours, were more prone to be obese than those who watched less than 4 hours/day (23). This finding might be related to the lack of physical activity cause low energy expenditure (37).

In the present study adolescents had less knowledge on nutrition were more prone to overweight than adolescents who had more knowledgeable on nutrition. Similar finding from England showed that less knowledgeable adolescents were 5.3 times more likely to be obese than knowledgeable adolescents(47). Other study suggests that increase prevalence of overweight among adolescent is due to deficit in nutritional knowledge in the adolescents (46). This finding might be related to adolescents who had little knowledge concerning nutrition prone to sweet food, as knowledge is a predisposing factors for eating behavior.

Knowledge is not sufficient factor for dietary behavior change (42), hence study from USA revealed that nutritional awareness had no relationship to overweight and obesity. Furthermore nutritional knowledge was not different between obese and non-obese adolescents (44). The difference might be related to overweight individuals, who are concerned about their weight sought out information and advice and therefore become more educated in terms of nutrition knowledge (42), while in this study overweight individual might not have access for information on nutrition.

7. Limitation of the study

There are some limitations like media exposure to message that encourage intake of high energy dense food was not addressed in this study.

BMI cannot differentiate level of overweight as fat mass and fat free mass, hence the study might be subjected to misclassification bias.

8. Conclusion and recommendations

This study revealed that more than one-tenth of adolescents were overweight; overweight factors in the study area stem basically from the life style and nutritional knowledge of adolescents. School type, being female, higher socioeconomic status , more than three regular meals in a day, using sweet food, low levels of physical activity, time spent watching television and/or playing computer game for more than three hours per day and less knowledgeable about nutrition were identified as major contributing factors of overweigh among high schools adolescents of Addis Ababa. Even though under nutrition is ominous in Addis Ababa, the researchers fear that increased overweight/obesity is creating conducive environment for increased morbidity of adolescents related to psychosocial problems and non-communicable diseases.

Concerning major finding researcher recommend the following points in order to control the problem of overweight among adolescents in the study area.

- Addis Ababa health office should to have plan of action to curb overweight and obesity among adolescents in high school of Addis Ababa in order to reduce future complication of overweight and obesity.
- Adolescents and their families should receive health education on diet and physical activity through urban health extension worker and mass-media.
- Each high school in Addis Ababa should provide nutrition education through school media and keeping students active during physical education class.
- Adolescent girls and private schools should be the first target for intervention.

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Appendix

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES

Appendix I: - English version Consent form

Appendix.I.1. Written consent form for students family

I am following master program in Jimma University on reproductive health. Conducting research is necessary for fulfillment of the master program. For that I am conducting research on high schools adolescents in Addis Ababa. The research will provide information about the contributing factors of overweight that can help to develop prevention strategies in high schools. Your child is among the selected adolescents in high schools in Addis Ababa. Hence, I would like to ask your willingness for your child to participation in this study. We will ask your child a few questions about family income, family occupation, and family level of education, dietary habit, physical activity and sedentary behavior. We will take also height and weight measurement. The name of your child will not be written in this form and will never be used in connection with any information he or she telling us. All information given by your child will be kept strictly confidential. The participation in this study is completely voluntary and he or she will not obligate to answer any question which he or she does not wish to answer.

Family: Name---------- signature----------

Principal investigator: Name----------signature----------

If no, writing your reason for refusal.

Appendix I.2.Verbal assent form before administering questionnaire for students

Greeting

How are you, I am----------. I am working in this research as data collector.

I would like to ask you to file few questions about family income, family occupation, and family level of education, dietary habit, physical activity and sedentary behavior. We will take also your height and weight measurement. The information you will give us is help to improve the prevention and control activities of adolescents overweight in high schools. Your name will not be written in this form and never be used in connection with any information you telling us. All information you telling us will be kept strictly confidential. The participation in this study is completely voluntary and you are not obligate to answer any question which you do not wish to answer. This interview will take about 40 minutes. Could I have your permission to continue?

1. If yes, continue the interview.
2. If no, skip to the next participant.

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

Appendix: - Questionnaires

Appendix II.1.English version questionnaires

Questions on socio demographic variables to be filled by students

Interviewer code: _____ Date: _____

Name of Interviewer: _____

Location

No.			Code
1.	Participant identification Number_____	……	
2.	Verbal assent has been taken?	1. Yes 2. no	L1
3.	School name	…….	L2
4.	School code	…….	L5
5.	Date of completion of the questionnaire	…….	L7
6.	Sub city of schools	……..	L8
7.	Sub city of the family	……..	L9
8.	Schools type	1. Governmental 2. Private	L10

Demographic information

Note: Code DK for DON'T KNOW or DON'T REMEMBRE except for where answers are mandatory such as school code, school name, age, sex

No.	Demographic and socio-economic information	Response	Code
9.	Sex	1. Male 2. Female	D1
10.	Age of the respondent	ddd/mmm/yyy-------/----------/--------	D2
11.	Religion	1. Orthodox 2. Muslim 3. Catholic 4. Protestant 5. Others specifies……	D3
12.	Ethnicity	1. Amhara 2. Oromo 3. Gurage 4. Tigre 5. Others specifies……	D4
13.	Who is head of house hold in your families?	1. mother 2. Father 3. Others	D5
14.	What is the highest level of	1. No formal education	D6

	education your father completed?	2. Primary school 3. Secondary school 4. College completed 5. University completed 6. Post graduate degree	
15.	What is the highest level of education your mother completed?	1. No formal education 2. Primary school completed 3. Secondary school completed 4. College completed 5. University completed 6. Post graduate degree	D7
16.	What is the occupation of your father?	1. Government employee 2. NGO employee 3. Daily laborer 4. Merchant 5. Retired	D8
17.	What is the occupation of your mother?	1. Government employee 2. NGO employed 3. Self employed 4. House wife 5. Merchant 6. Retired	D9
18.	How many people including you live in your house holed	Number of people ⌊__⌋⌊__⌋	D10

Household asset

	Does the household have any of the following properties? **(Circle)**	**Yes**	**No**
19.	Living house ownership	1	0
20.	Digital camera/Tape recorder/CD player	1	0
21.	Functioning Television	1	0
22.	Generator used during electric power interruption	1	0
23.	Functioning dish	1	0
24.	Functioning refrigerator	1	0
25.	Computer	1	0
26.	Motor Cycle	1	0
27.	Car	1	0
28.	Laundry machine	1	0
29.	Touch screen mobile(mother and father)	1	0

30.	Sofa	1	0
31.	Flush toilet	1	0
32.	Ventilated improved toilet	1	0
33.	Pip Water	1	0

Questions on overweight and obesity Risk Factor to be filed by students

Note: Code DK for DON'T KNOW or DON'T REMEMBRE except for where answers are mandatory such as school code, school name, age, sex **Behavioral questions**

Please circle your response.

Dieting habit			
The next questions asking about fruits, meat, milk, soft drink and vegetables that you usually ate in the past six month. As you answer these questions please think of in usual week in past six months			
S.no	Questions	Circle your response and fill the blank space	Code
34.	In a typical week on how many days do you eat fruit like (Ripe mangoes, avocado, orange, papayas and other locally available fruits)?	0 1 2 3 4 5 6 7	H1
35.	How many **s**ervings of fruit do you eat on one of those days?	1 2 3 4 5 >5	H2
36.	In a typical week on how many days do you eat Cereals? (Engera, maize, barley, wheat (including bread), sorghum/millet, rice…)	0 1 2 3 4 5 6 7	H3
37.	How many **s**ervings of cereals do you eat on one of those days?	1 2 3 4 5 >5	H4
38.	In a typical week on how many Days do you eat vegetables?	0 1 2 3 4 5 6 7	H5
39.	How many servings of vegetables do you eat on one of those days?	1 2 3 4 5 >5	H6
40.	In a typical week on how many days do you drink at least a cup of milk?	0 1 2 3 4 5 6 7	H7
41.	How many **servings** of milk do you drink on one of those days?	1 2 3 4 5 >5	H8
42.	In atypical week on how many days do you eat milk product (like cheese, yogurt, and butter)?	0 1 2 3 4 5 6 7	H9
43.	How many servings of milk product do you eat on one of	1 2 3 4 5 >5	H10

	those days?		
44.	In atypical week on how many of days do you eat meat?	0 1 2 3 4 5 6 7	H11
45.	How many servings of meat do you eat on one of those days?	1 2 3 4 5 >5	H12
46.	In typical week how many of day do you drink soft drink (like coca cola, Pepsi, Fanta etc)?	0 1 2 3 4 5 6 7	H13
47.	How many servings of soft drink do you drink on one of those days?	1 2 3 4 5 >5	H14
48.	Do you ever have a snack?	1. Yes 2. No	H15a
49.	How many meal do you have a day other than snacks?	1 2 3 > 4	H16
50.	List foods that you ever bought in addition to the regular meal	1. Cake 2. Biscuit 3. Ice cream 4. Chocolate 5. Others specify……..	H18
51.	When you study and watching TV/movies do you eat food?	1. Yes 2. No	H22

Note: Code DK for DON'T KNOW or DON'T REMEMBRE except for where answers are mandatory such as school code, school name, age, sex

Physical activity			
Questions about time you spend doing different physical activities in usual week in the past six months			
No.	Questions	Response	Code
52.	Do you engaged in Work besides your education?	1. yes 2. no **if no go to P8**	P1
53.	<u>If your answer in P1 is yes</u> Does your work involve vigorous – intensity activity at least 10 minutes continuously that can cause large increases in breathing or heart rate?	1. Yes 2. No **If no, go to P5**	P2
54.	<u>If yes for Q P2</u> In a typical week on how many days do you do vigorous –intensity activities as part of your work?	1 2 3 4 5 6 7	P3
55.	How much time do you spend doing		P4

	vigorous –intensity activities at work on a typical day?	Hours: minutes └__┴__┘ : └__┴__┘	
56.	Does your work involve moderate-intensity activity at least 10 minutes continuously that causes small increases in breathing or heart?	1. Yes 2. No **If no go to P8**	P5
57.	In a typical week on how many days do you do moderate –intensity activities as part of your work?	1 2 3 4 5 6 7	P6
58.	How much time do you spend doing moderate –intensity activities at work on a typical day?	Hours: minutes └__┴__┘ : └__┴__┘	P7
	Travel to and from places		
	The next questions exclude the physical activities at work beside of your education that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example work, school, place of worship.		
59.	Do you walk or use a bicycle for at least 10 minutes continuously to get to and from places?	1. Yes 2. No **If no, go to P11**	P8
60.	In a typical week on how many days do you walk or use a bicycle for at least 10 minutes continuously?	1 2 3 4 5 6 7	P9
61.	How much time do you spend walking or bicycling for travel in a typical day?	Hours: minutes └__┴__┘ : └__┴__┘	P10
	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)		
62.	In your leisure time, do you do any vigorous activities like running, strenuous sport, weight lifting for at least 10 minutes continuously?	1. Yes 2. No **If no, go to P14**	P11
63.	<u>If yes</u> In a typical week on how many days do you do vigorous –intensity sports, fitness as part of your leisure time?	1 2 3 4 5 6 7	P12

64.	How much time do you spend doing vigorous –intensity sports, fitness or recreational activities in a typical days?	Hours: minutes └─┴─┘ : └─┴─┘	P13
65.	In your leisure time, do you do any moderate-intensity activities that can cause small increases in breathing or heart rate like brisk, walking, cycling, or swimming for at least 10 minutes at a time?	1. Yes 2. No **If no, go to P17**	P14
66.	<u>If yes</u> In a typical week on how many days do you do moderate –intensity activities as part of your leisure time?	1 2 3 4 5 6 7	P15
67.	How much time do you spend doing moderate –intensity sports, fitness or activities in a typical days?	Hours: minutes └─┴─┘ : └─┴─┘	P16
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 a car, bus, reading, playing card or watching television), but not include time **spent sleeping and where in during learning in school or doing home work**			
68.	On an average school day, how many hours do spend by watch TV/movies, playing computer game and setting?	a. Zero hour b. Less than 1 hour per day c. 1 hour per day d. 2 hours per day e. 3 hours per day f. 4 hours per day g. 5 or more hours per day	

Note: Code DK for DON'T KNOW or DON'T REMEMBRE except for where answers are mandatory such as school code, school name, age, sex

The next 14 questions are asking knowledge about nutrition			
S.no	**Questions**	**Please choose your answer**	
69.	What you eat can make a difference in your chances of getting heart disease or cancer.	F	T
70.	People who are overweight are more likely to have health problems than people who are not overweight.	F	T
71.	People who are underweight are more likely to have health problems than people who are who not underweight.	F	T
72.	Eating fruits and vegetables protects you from diseases.	F	T
	Most of the vitamin C we get comes from fruits and vegetables.	F	T
73.	Fruits and vegetables contain vitamins and _____.	a. protein b. fiber c. cholesterol d. fat e. I don't know	
74.	The bread, cereal, rice and pasta group is a good source of _____?	a. Carbohydrate b. Vitamin D c. Vitamin C d. Calcium e. I don't know	
75.	Nutrient is most important for healthy vision is?	a. Vitamin K b. Iron c. Calcium d. Vitamin A e. I don't know	
76.	Nutrient is most important for prevention of goiter?	a. Iodine b. Iron c. Calcium d. Sodium e. I don't know	
77.	Nutrient is most important for prevention of anemia	a. Iodine b. Iron c. Calcium d. Sodium e. I don't know	

Physical measurement

No.	Measurement	Response	Code
1.	Height	Centimeters ……	M1
2.	Weight	Kilogram …….	M2

ጅማ ዩኒቨርሲቲ

የማህበርሰብ ጤና ና የህክምና ሳይንስ ኮሌጅ

Annex III. የስምምነት ቅጽ

ለቤተሰብ የሚላክ የስምምነት ቅጽ

እርስዎ ልጅ በከተማው ውስጥ ባሉ ትምህተ ቤት ዉስጥ በሚማሩ ልጆ ላይ በሚደረግ ምርምር ላይ እንዲሳተፍ/እንድትሳተፉ በአክብርዎት እየተጠየኮት ነው። ይህ ቅጽ ሰለ ምርምሩ ማብራሪያ ይሰጣል። በምርምሩ ለመሳተፍ ከመወሰንዎ በፊት ሰለምርምሩ የተሰጠውን መረጃ በሚገባ ያንብቡ።

ምርምሩ ለምንድን ነው የሚካሄደው?

የዚህ ምርምር አላማ በከተማው ውስጥ ሀይስኩል የሚማሩ ተማሪዎች የሚገኝ የውፍረት መጠንን መለካት እና ውፍረትን ከሰዎች አመጋገብና ውፍረት ሊያሰከትላቸው ከሚችል የጤና ሁኔታ አንፃር ጥናት ማካሂድ ነው።

በምርምሩ 445 ከተማው ዉስጥ ባሉ ሀይስኩል የሚማሩ ተማሪዎች ሲሳተፉ የእርስዎ እንደአንዱ ተመረጠዋል/ለች። ምርጫው ማንኛውንም አይነት ነገር መሠረት ያደረገ አይደለም።

በምርምሩ ላይ የሚኖርዉ/ራት ሚና

የተወሰኑ ጥያቀዎችን እጠይቀዋለሁ/ታሁ፣ ከዚያም በኋላ ክብደቱን/ቷን፣ ርዝመቱን/ቷን፣ እለካልሁ:: ከዚያም ወደ መጨረሻው እንደርሳለን::እርሶ ግን የልጆ ተሳትፎ በመፍቀድ ይተባበሩን::

ከጥናቱ ጋር የተያያዙ ችግሮች

የእርስዎ ልጅ በዚህ ጥናት በመሳተፉ/ፏ ለምንም አይነት ችግር ወይንም አደጋ አይጋለጥም/ አትጋለጥም ::

ከጥናቱ የሚገኙ ጥቅሞች:

ጥናቱ በከተማው ዉስጥ ባሉ የሀይስኩል ተማሪዎች ከውፍረት ጋር የተያያዙ ችግሮች ላይ ያተኩራል:: ውፍረት ለ ጤና ጠንቅ ከሆኑ ነገሮች አንዱ እንደሆነ ይታወቃል:: እናም የተማሪዎች የውፍረት ችግርና ውፍረትን ሊያስከትሉ የሚችሉ ቅድመሁንታዎች ከታየ ለከተማዉ ጤና ቢሮ፣ ለከተማዉ ትምህርት ቢሮ፣ እና መንግስታዊ እና መንግስታዊ ላልሆኑ ድርጅቶች ስለ ችግሩ እናሳውቃለን፣ ተገቢውም እርምጃ እንዲወሰድ እናሳስባለን::

ሚስጥራዊነት:

የርሶ ልጅ የሚሰጠን/የምትሰጠን መረጃ በሚስጥር ይጠበቃል:: መረጃው ለዚህ ምርምር ጥቅም ብቻ ይውላል::

ተሳትፎ

የርሶ ልጅ በዚህ ምርምር የሚኖርዉ/ራት ተሳትፎ በሙሉ ፈቃደኝነትዎ ላይ የተመሠረተ ይሆናል:: በጥናቱ ላይ ያለመሳተፍ መብት ይኖርዋል/ራታል:: የርሶ ልጅ በዚህ ምርምር ሊሳተፍ/ልትሳተፍ ከተስማሙ በፊርማዎ ያርጋግጡልን::

የእናት ወይም የአባት ሙሉ

ስም፣……ፊርማ……

ጥናቱን የሚያጠናዉ ሰዉ

ስም……ፊርማ……

Annex IV. የአማርኛ መጠይቆች

ውፍረትና ተዛማጅ ከውፍረት ጋረ የተያያዙ ችግሮች

አከባቢያዊ መጠይቆች በተማሪዎች የሚሞሉ

መጠይቁ የጠየቀዉ ሰዉ ስም----------

መጠይቁ የጠየቀዉ ሰዉ ስም መለያ ቁጥር----------

ተ.ቁ	መጠይቆች	የመልሶች ምርጫ	መለያ ቁጥር
1.	የተሳታፊዉ መለያ	----------	
2.	የቃል ስምምነት ተወስዷል?	1. አዎ 2. አይደለም	
3.	ትምህርት ቤቱ የሚገ ኘበት ክፍለ ከተማ	……	
4.	የትምህርት ቤቱ መለያ ቁጥር	……	
5.	መጠይቁ የተጠየቀበት ቀን	……	
6.	ቤተሰብ የሚገኘበት ክፍለ ከተማ	……...	
7.	የትምህት ቤቱ ባለቤት?	1. የመንግስት 2. የግል	

የግልና ማህበራዊ መረጃዎች

ተ.ቁ	ጥያቄዎች	መልስ	መ.ቁ
8.	ጸታ	1. ወንድ 2. ሴት	D1
9.	እድሜዎ ስንት ነዉ?	_____በሙሉ ዓመት	D2

10.	ኃይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ካቶሊክ 4. ፕሮቴስታንት 5. ሌላ	D3
11.	ብሔር	1. አማራ 2. ኦሮሞ 3. ጉራጌ 4. ትግራይ 5. ሌላ ይለይ.....	D4
12.	የቤተሰቡ አስተዳዳሪ ማነው?	1. እናት 2. አባት 3. ሌላ ይለይ.....	D5
13.	የአባት የትምህት ደርጃ ስንት ነዉ?	1. መደበኛ ትምህርት አልተከታተለም 2. የአንደኛ ደርጃ ትምህርት አጠናቋል 3. የሁለተኛደርጃ ትምህርት አጠናቋል 4. የኮሌጅ ትምህርት አጠናቋል 5. ዲግሪዉን ጨርሶል 6. ማስትር ዲግሪ አለዉ	D6
14.	የእናት የትምህት ደርጃ ስንት ነዉ?	1. መደበኛ ትምህርት አልተከታተለችም 2. የአንደኛ ደርጃ ትምህርት አጠናቃለች 3. የሁለተኛደርጃ ትምህርት አጠናቃለች 4. የኮሌጅ ትምህርት አጠናቃለች 5. ዲግሪዉን ጨርሳለች ማስትር ዲግሪ አላት	D7

15.	የአባት ስራ ምንድነዉ?	1. የመንግስት ሰራተኛ 2. መንግስትአዊ ያልሆኑ ድርጅቶቸ ሰራተኛ 3. የራሱ ስራ ይሰራለ 4. ነጋዴ 5. ጡረታ ወጥቷል	D8
	የእናት ስራ ምንድነዉ?	1. የመንግስት ሰራተኛ 2. መንግስትአዊ ያልሆኑ ድርጅቶቸ ሰራተኛ 3. የራሷ ስራ ትሰራለች 4. የቤት እመቤት ናት 5. ነጋዴ ጡረታ ወጥቷል	D9
16.	የቤተሰቡ ወራዊ ገቢ ምን ያህል ነው?	.....ብር	D10

መኖሪያ ቤት ዉስጥ ስለሚገኙ ጥሪቶች መጠይቅ

ከሚከተሉት ውስጥ በቤትዎ ውስጥ ያሉ ሆነው የሚሰሩትን አለ ወይም የለም በማለትያመልክቱ?		አዎ	አይደለም
17.	የናንተ መኖሪያ ቤት የግላቹ ነው	1	0
18.	ዲጂታል ካሜራ/ ቴፕ ሪከረደር/ ሲዲ ማጫወቻ	1	0
19.	መብራት በጠፋ ሰአት የምትጠቀሙት ጀኔሬተር	1	0
20.	ዲሽ	1	0
21.	ኮምፒተር	1	0
22.	ሞተር ሳይክል	1	0
23.	መ ኪና	1	0
24.	የልብስ ማጠቢያ ማሽን	1	0
25.	ተች ስክሪን ሞባይል (የአባት እና አባት)	1	0
26.	ሶፋ	1	0

27.	በዉሃ የሚሰራ ሽንት ቤት	1	0
28.	የራሳቹ የሆነ የቧን ዉሃ	1	0

ከባህሪ ጋር የተያያዙ ጥያቄዎች

የአመጋገብ ልምድ			
ከዚህ ቀጥሎ ለባለፍዉ ስድስት ወር አዘዉትረዉ ስለተመገቡትን ነገር የሚጠይቁ ጥያቄዎች			
29.	አብዛኛዉን ጊዜ በአንድ ሳምንት ዉስጥ ስንት ቀን ፍራፍሬዎችን ይመገባሉ? ለምሳሌ ማንጎ፣ አቮካዶ፣ ብርትኳን፣ ፓፓያ ና ሌሎችም	0 1 2 3 4 5 6 7	H1
30.	ፍራፍሬ ከሚመገቡባቸዉ ቀናት ዉስጥ በአንዱ ቀን እነዚህን ፍራፍሬዎች በቀን ስንት ጊዜ ይጠቀማሉ?	1 2 3 4 5 >5	H2
31.	አብዛኛዉን ጊዜ በአንድ ሳምንት ዉስጥ ስንት ቀን የአዝርእት ዝርያዎችን (የጤፍ፣እንጀራ፣ በቆሎ፣ ገብስ፣ ስንዴ፣ ሩዝ ወዘተ) ይመገባሉ?	0 1 2 3 4 5 6 7	H3
32.	የአዝርእት ዝርያዎችን ከሚመገቡባቸዉ ቀናት ዉስጥ በአንዱ ቀን እነዚህን የአዝርእት ዝርያዎችን በቀን ስንት ጊዜ ይጠቀማሉ?	1 2 3 4 5 >5	H4
33.	አብዛኛዉን ጊዜ በአንድ ሳምንት ዉስጥ ስንት ቀን አትክልቶችን ይመገባሉ?	0 1 2 3 4 5 6 7	H5
34.	አትክልት ከሚመገቡባቸዉ ቀናት ዉስጥ በአንዱ ቀን እነዚህን አትክልቶች በቀነ ስንት ጊዜ ይጠቀማሉ?	1 2 3 4 5 >5	H6
35.	አብዛኛዉን ጊዜ በአንድ ሳምንት ዉስጥ ስንት ቀን ቢያንስ ሲኒ ወተት ይጠጣሉ?	0 1 2 3 4 5 6 7	H7
36.	ወተት ከሚጠጡባቸዉ ቀናት ዉስጥ በአንዱ ቀን ስንት ጊዜ ይጠጣሉ?	1 2 3 4 5 >5	H8
37.	አብዛኛዉን ጊዜ በአንድ ሳምንት ዉስጥ ስንት ቀን የወተት ዉጤቶች ይመገባሉ? ለምሳሌ አይብ፣ ረጎ እናም ሌሎችም	0 1 2 3 4 5 6 7	H9
38.	የወተት ዉጤቶች ከሚጠጡባቸዉ ቀናት ዉስጥ በአንዱ ቀን ስንት ጊዜ ይጠጣሉ?	1 2 3 4 5 >5	H10

39.	አብዛኛዉን ጊዜ በአንድ ሳምንት ውስጥ ስንት ቀን ስጋ ይመገባሉ?	0 1 2 3 4 5 6 7	H11
40.	ስጋ ከሚመገቡባቸዉ ቀናት ዉስጥ በአንዱ ቀን ስንት ጊዜ ይመገባሉ?	1 2 3 4 5 >5	H12
41.	አብዛኛዉን ጊዜ በአንድ ሳምንት ውስጥ ስንት ቀን ለስላሳ መጠጦች ይጠጣሉ? ለምሳሌ ኮካ፣ ፐፕሲ እናም ሌሎችም?	0 1 2 3 4 5 6 7	H13
42.	ለስላሳ መጠጦች ከሚመገቡባቸዉ ቀናት ዉስጥ በአንዱ ቀን ስንት ጊዜ ይጠጣሉ?	1 2 3 4 5 >5	H14
43.	በቁርስና በምሳ መካከል ወይም በምሳና በእራት መካከል ወይም ከመደበኛዉ አመጋገብ በተጨማሪ ምግብ ይጠቀማሉ?	1. አዎ 2. አይደለም መልሱአ አይደለም ከሆነ ወደ H14 ይህዱ	H15a
44.	ከላይ ለተጠቀሰዉ ጥያቄ መልስዎ አዎ ከሆነ በቀን ስንት ጊዜ ይጠጣሉ?	1 2 3 4 5 6	H15b
45.	ከላይ በተራ ቁጥረ H13a የጠቀሱትን ምግብ ሳይጨምር በቀን ሰንት ጊዜ ይመገባሉ?	1 2 3 > 4	H16
46.	ምሳዎን እንዴት ያገኛሉ?	1. ከቤት በማመጣት ወይም ቤተ በመሄድ 2. ከትምህርትቤት ካፊቴሪያ በመግዛት 3. 1በትምህርት ቤቱ አቅራበያ በሚገኝ ምግብ ቤት በመግዛት.	H17
47.	ከመደበኛ ምግብ በተጨማሪ ገዝተዉ የሚጠቀሙአቸዉን የምግብ አይነቶች ሁሉ ይጥቀሱ	1. ኬክ 2. ብስኩት 3. አይስክሬም 4. ሳቡሳ 5. ቸኮሌት 6. ቆቆር 7. ሌላ ካለ ይጠቀስ ……..	H18
48.	ፊልም ቤት በሚሄዱበት ጊዜ ምግብ ገዝተዉ ይጠቀማሉ?	1. አዎ 2. የለም 3. ፊልም ቤት አልሄድም	H19
49.	ቴሌቪዝን ቁጭብለዉ በሚያዩበት ጊዜ ምግብ ይመገባሉ?	1. አዎ 2. የለም 3. ቴሌቪዝን አላይም	H20
50.	በሚያነቡበት ጊዜ ምግብ ይጠቀማሉ?	1. አዎ 2. የለም	H21

የሰዉነት እንቅስቃሴ ሁኔታ			
በባለፈ ስድስት ወር በሳምንት ውስጥ ስላደርጉት የሰውነት እንቅስቃሴን በተመለከተ የሚጠይቁ ጥያቄዎች			
ተ.ቁ	ጥያቄዎች	መልስ	መ.ቁ
51.	ከትምህት በተጨማሪ ስራ ትሰራለህ	1. አዎ 2. አይደለም አይደለም ካልክ ወደ ጥያቄ **P8 ሒድ**	P1
52.	<u>በጥያቄ **P1** መልስህ አዎ ከሆነ</u> ስራዎ ከፍተኛ ውጥረት የሚያስከትሉ ሥራዎችን ማለትም በልብዎ ላይና በሳምባዎ ላይ ከፍተኛ የሆነ የልብ ምትና የትንፋሽ ፍጥነት የሚጨምሩ ሥራዎችን (ተግባራትን) በትንሹ 10 ደቂቃ ያህል ያከጋውናሉ?	1. አዎ 2. አይደለም አይደለም ካልክ ወደ ጥያቄ **P8 ሒድ**	P2
53.	<u>በጥያቄ **P2** መልስህ አዎ ከሆነ</u> አብዛኛዉ ጊዜ በአንድ ሳምንት ውስጥ ለምን ያህል ቀናት ከፍተኛ ውጥረት የሚያስከትሉ ሥራዎችን ይሰራሉ?	1 2 3 4 5 6 7	P3
54.	በአንድ ቀን ውስጥ ለምን ያህል ሰዓት ነው ከፍተኛ ውጥረት የሚያስከትሉ ሥራዎችን የሚሰሩትን?	ሰዓት ፤ደቂቃ ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋	P4
55.	ስራዎ መካከለኛ ውጥረት የሚያስከትሉ ሥራዎችን ማለትም በልብዎ ላይና በሳምባዎ ላይ መጠነኛ የሆነ የልብ ምትና የትንፋሽ ፍጥነት የሚጨምሩ ሥራዎችን (ተግባራትን) በትንሹ ለ 10 ደቂቃ ያህል ያከጋውናሉ?	1. አዎ 2. አይደለም አይደለም ካልክ ወደ ጥያቄ **P8 ሒድ**	P5
56.	አብዛኛዉ ጊዜ በሳምንት ውስጥ ለምን ያህል ቀናት መካከለኛ ውጥረት የሚያስከትሉ ሥራዎችን ይሰራሉ?	1 2 3 4 5 6 7	P6
57.	በአንድ ቀን ውስጥ ለምን ያህል ሰዓታት ነው መካከለኛ ውጥረት የሚያስከትሉ ሥራዎችን የሚሠሩት?	ሰዓት ፤ደቂቃ ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋	P7
ጉዞን በተመለከተ			
ከቦታቦታ የሚንቀሳቀሱበትን ሁኔታ በተመለከተ የሚጠይቁ ጥያቄዎች			
58.	በእግርዎ ወይም በፐዳል ሳይከል ለ10 ደቂቃ ያህል ይጓዛሉ?	1. አዎ 2. አይደለም አይደለም ካልክ ወደ ጥያቄ **P11 ሒድ**	P8

59.	አብዛኛዉ ጊዜ በአንድ ሳምንት ውስጥ ለምን ያህል ቀናት ነው በእግርዎ ወይም በፐዳል ሳይክል ሳያቋረጡ በትንሹ ለ10 ደቂቃ ያህል የሚጉዋዙት?	1 2 3 4 5 6 7	P9
60.	በአንድ ቀን ለምን ያህል ሰዓታት ነው በእግርዎ ወይም በፐዳል ሳይክል የሚጉዋዙት?	ሰዓት ፤ደቂቃ ⌊__⌊__⌋ : ⌊__⌊__⌋	P10
በሚዝናኑበት ጊዜ ስለሚደረግ እንቅስቃሴ በተመለከተ			
በባለፈ ስድስት ወር በሳምንት ውስጥ ስለሚያደርጉት የሰውነት እንቅስቃሴን በተመለከተ የሚጠይቁ ጥያቄዎች እ			
61.	በሚዝናኑበት ጊዜ ከፍተኛ ውጥረት የሚያስከትሉ ሥራዎችን ማለትም በልብዎ ላይና በሳምባዎ ላይ ከፍተኛ የሆነ የልብ ምትና የትንፋሽ ፍጥነት የሚጨምሩ የመዝናኛ እንቅስቃሴዎችን (ተግባራትን) ቢያንስ ለ 10 ደቂቃ ያህል ያከጋውናሉ? ለምሳሌ ፣ መሮጥ፣ ኩዋስ መጫወት፣ ከባድ ክብደት መሸከም፣ መቆፈርንና የመሳሰሉትን?	1. አዎ 2. አይደለም አይደለም ካልክ ወደ ጥያቄ **P14 ሒድ**	P11
62.	አብዛኛዉ ጊዜ በአንድ ሳምንት ውስጥ ለምን ያህል ቀናት ነው ከፍተኛ ውጥረት የሚያስከትሉ እንቅስቃሴዎችን (ተግባራትን) ቢያንስ ለ10 ደቂቃ ያህል የሚየከናውኑት?	1 2 3 4 5 6 7	P12
63.	በአንድ ቀን ለምን ያህል ሰዓታት ነው ከፍተኛ ውጥረት የሚያስከትሉ ሥራዎችን እንቅስቃሰዎችን የሚያከናውኑት?	ሰዓት ፤ደቂቃ ⌊__⌊__⌋ : ⌊__⌊__⌋	P13
64.	ሲዝናኑ በሰውነቶ ላይ መካከለኛ ውጥረት የሚያስከትሉ ሥራዎችን ማለትም በልብዎ ላይና በሳምባዎ ላይ መጠነኛ የሆነ የልብ ምትና የትንፋሽ ፍጥነት የሚጨምሩ ተግባራትን ቢያንስ ለ 10 ደቂቃ ያህል ያከጋውናሉ? ለምሳሌ ደረጃ መውጣትን፣ መዋኘትን፣ የእጅ ኩዋስ መጫወትንና የመሳሰሉትን?	1. አዎ 2. አይደለም አይደለም ካልክ ወደ ጥያቄ **P17 ሒድ**	P14
65.	አብዛኛዉ ጊዜ በአንድ ሳምንት ውስጥ ለምን ያህል ቀናት ነው በሰውነቶ ላይ መካከለኛ ውጥረት የሚያስከትሉ ስፖረታዊና የመዝናኛ እንቅስቃሰዎችን (ተግባራትን) ቢያንስ ለ10 ደቂቃ ያህል የሚየከናውኑት?	1 2 3 4 5 6 7	P15

66.	በአንድ ቀን ለምን ያህል ሰዓታት ነው መካከለኛ ውጥረት የሚያስከትሉ ስፖረታዊና የመዝናኛ እንቅስቃሴዎችን(ተግባራትን) የሚየከናውኑት?	ሰዓት ፤ደቂቃ ⌊__⌊__⌋ : ⌊__⌊__⌋	P16
በእረፍት ላይ ስለሚሳልፉት ጊዜ			
67.	አብዛኛዉ ጊዜ በአንድ ቀን ውስጥ ለምን ያህል ሰዓታት ነዉ ቴሌቪዥን ቁጭ ብለዉ የሚያዩት ወይም በኮምፒትር ጌም ቁጭ ብለዉ የሚጫወቱት?	1. ዜሮ ስአት 2. ከአንድ ሰዓት ያነሰ ነው 3. በቀን አንድ ሰዓት ይሆናል 4. በቀን ሁለት ሰዓት ይሆናል 5. በቀን ሶስት ሰዓት ይሆናል 6. በቀን አራት ሰዓት ይሆናል 7. በቀን አምስት ሰዓት ና ከዛበላይ ይሆናል	

የሚቀጥሉት 10 ጥያቄዎች የምግብ እዉቀት ይጠይቃሉ (ይዳስሳሉ)			
ተ.ቁ	መጠይቆች	መልሱን ያክብቡ	
68.	ያመጋገብ ስርአታችን ካንሰር ሊያመጣብን ይችላል	1. እዉነት	2. ሀሰት
69.	ከመጠን በላይ ክብደት ያላቸዉ ሰዎች ከሌላቸዉ ሰዎት የበለጠ የጤና እንከን ይናርባቸዋል	1. እዉነት	2. ሀሰት
70.	ከመጠን በታች ክብደት ያላቸዉ መጠነኛ ክብደት ካላቸዉ ሰዎት የበለጠ የጤና እንከን ይኖርባቸዋል	1. እዉነት	2. ሀሰት
71.	የጓ ሮ አትክልትና ፍራፍሬ መመገብ ከበሽታይከላከላሉ	1. እዉነት	2. ሀሰት
72.	አብዛኛዉ ጊዜ ቪይታሚን C ከጓ ሮ አትክልትና ፍራፍሬ ነዉ የሚገኝ ዉ	1. እዉነት	2. ሀሰት
73.	የጓ ሮ አትክልትና ፍራፍሬ ቪይታሚንና ---------- ይኖራቸዋል	1. ፕሮቲን 2. ፊይበር 3. ኮለስትሮል 4. ቅባት 5. አላዉቅም	
74.	ዳቦ፣ ጥራጥሬ፣ ሩዝ እንዲሁም ፓስታ የምን ምንጭ ናቸዉ	1. የካርቦሃይድሬት 2. ቫይታሚን D 3. ቫይታሚን C 4. ካልሸየም 5. አላዉቅም	
75.	ለአይን ጥራት የሚርዳ ንጥርነገር የቱ ነዉ	1. ቫይታሚን A 2. አይረን 3. ካልሸየም 4. ቫይታሚን A 5. አላዉቅም	

76.	እቅርት ለመከላከል የሚርዳ ንጥርነገር የቱ ነዉ	1. አዮዲን 2. አይረን 3. ካልሽየም 4. ሶድየም 5. አላዉቅም
ASSURANCE OF PRINCIPAL INVESTIGATOR		
77.	ደማነስን ለሚከላከል የሚርዳ ንጥርነገር የቱ ነዉ	1. አዮዲን 2. አይረን 3. ካልሽየም 4. ሶድየም 5. አላዉቅም

አሁን የሰውነትዎን መጠን መለካት ስለሚያስፈልግ እንዲተባበሩኝ ጠይቆታለሁ		
ቁመት	_____cm	M1
ክብደት	_____kg	M2

Name of the student: _____

Date._____ Signature _____

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor:_____

Date._____ Signature _____