ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF PUBLIC HEALTH

The effect of school environment on overweight/obesity among private school adolescents in Addis Ababa, Ethiopia: 2016.

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APPROVED BY THE BOARD OF EXAMINERS

This thesis, by Tsedey Moges is accepted in its present form by the board of examiners as fulfilling for the degree of masters in public health nutrition.

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List of abbreviations

AACAEB	Addis Ababa City Administration Education Bureau
BMI	Body Mass Index
BAZ	BMI for age Z-score
CDC	Center for Disease Control
CSA	Central Statistics Agency
EDHS	Ethiopian Demographic Health Survey
FAO	Food and Agricultural Organization
GPAQ	Global Physical Activity Questionnaire
IQR	Inter Quantile Range
KG	Kindergarten
Km	Kilometer
NCD	Non Communicable Disease
PA	Physical Activity
PCA	Principal Component Analysis
SD	Standard Deviation
TPA	Total Physical Activity
TV	Television
TPA	Total Physical Activity
USA	United States of America
WHO	World Health Organization

Abstract

Introduction: Obesity was formally recognized as a global epidemic in 1997 by World Health Organization (WHO). It has more than doubled in children and quadrupled in adolescents in the past 30 years. In our country, among adolescents, high magnitudes have been shown especially in private schools (10-23%). Though there are studies that have showen the magnitude and individual level determinants, little is known about environmental-level determinants especially school environment and particularly adequacy of space in schools. School environment could affect largely since adolescents spend majority of their time in schools.

Objectives: The study was aimed at comparing the magnitude of overweight and obesity among adolescents in private schools with and without adequate space for physical activity and exploring other environmental and individual-level determinants among private school adolescents in Addis Ababa, Ethiopia.

Methods: School based comparative cross-sectional study was conducted among adolescents 10-19 years old. A total of 20 private schools were included in the study in which 10 were with adequate space and the rest 10 without adequate space for physical activity. A three stage random sampling technique was used to select the study participants. Adolescents were interviewed using pre-tested structured questionnaire. Weight and height measurements were done using standardized weighing scales and measuring boards respectively. Body Mass Index (BMI) for age Z-score was compared to WHO 2007 growth reference standards using WHO Anthro plus version 1.0.4 software. Data were entered and cleaned using EpiData 3.1 and all statistical tests were done using STATA version 12.1 software. Descriptive statistical tests, bivariate and multivariate logistic regression analysis were done to identify factors associated with overweight and obesity.

Results: Out of the sampled adolescents, 1277 respondents participated in the study with response rate of 99.3%. The overall magnitude of overweight & obesity among the study participants was 17.0% which was significantly higher in schools without adequate space for physical activity (19.4% versus 14.6%) with p-value of 0.01. In the bivariate analysis, adolescents in schools without adequate space for physical activity

had 1.86 times higher odds of being in lower physical activity level and 1.41 times higher odds of being overweight/obese with p-value of 0.001 and 0.041 respectively. The partial correlation between adequacy of space and overweight/obesity accounting for the explanatory power of physical activity was also significant with partial correlation coefficient 0.06 and p-value 0.0341. Those in the middle wealth quintile, low Physical activity, traveling with private car from home to school, irregular breakfast consumption and ≤ 3 meals per day also had increased odds of being overweight / obese in the multivariate analysis.

Conclusions: The findings of the study gave insight on the effect of inadequate space in schools as an important contributor to physical inactivity and a higher burden of overweight and obesity. Low physical activity and traveling with private car were also found to be significant factors associated with overweight and obesity among private school adolescents.

Recommendations: Based on the the results of this study, it is important that officals responsible for urban development and licensing of private schools consider availability of a reasonably adequate space for schools and work with relevant regulatory bodies to ensure implementation according to the guidelines.

School officials should design their schools in a way having adequate space for physical activity. Lastly the school community and the general public should promote adolescents to be physically active and walk to schools.

1. Introduction

1.1 Background

Overweight and obesity was defined as “abnormal or excessive accumulation of fat that may impair health” and formally recognized as a global epidemic in 1997 by WHO (1). It is a disorder of energy metabolism that occurs when the balance between energy intake and expenditure is disrupted. It involves body fatness or excessive adipose tissue stores that can be associated with medical or psychosocial morbidity (2).

It can be assessed based on BMI, the most commonly used tool to measure overweight and obesity in adults. In children and adolescents, “young people between the ages of 10 and 19 years”, BMI for age is used because it is age and sex specific at this age group (3-5).

Adolescence is a critical stage of rapid physical, cognitive and emotional changes. Next to infancy, it is the only period that there is rapid physical growth resulting in an increase in calorie and nutrient demand. Adolescence drive for individualization and peer influence also contribute for unhealthy food choices, increasing trends in fast food and eating outside. Physical inactivity, sedentary behaviors and substance abuse are also experienced in adolescence. On the other hand they usually are increasingly concerned with their body appearance - thinness for girls and muscular for boys. So that all these changes or modifications put adolescents at greater risk for overweight and obesity (6).

The causes for adolescent overweight and obesity can be seen as individual level and environmental which can be further subdivided into physical and social environment. From individual level factors poor dietary habit, physical inactivity and sedentary behavior are the major ones (7).

Especially, in the case of adolescents, social environmental factors such as peer influence and Medias like electronic and social Medias contribute largely. Medias can promote unhealthy foods and on the other hand adolescents spent much time on them. Physical Environmental factors like school environment also have a great impact on the weight status of adolescents since students spend most of their time in school. Fast food vendors and restaurants around schools, availability of open space for physical activity

and School curriculum on nutrition and physical activity are some of the factors under school environment (7).

Physical activity for adolescents includes playing games, transportation, recreation, chores, sports or planned exercise in schools, family or community activities. WHO recommends 60 minutes moderate to vigorous intensity daily physical activity for adolescents globally irrespective of gender, race, ethnicity or income level (8).

Physical inactivity is identified as the fourth leading risk factor (6%) for global mortality next to high blood pressure, tobacco use and high blood glucose level. In many countries physical inactivity levels are increasing with major implications for the general health of the community and prevalence of non-communicable diseases worldwide. Overweight and obesity are responsible for 5% of global mortality (8).

Schools can promote physical activity and healthy eating, provide healthy foods and adequate space for physical activity and educate children on nutrition and healthy life, and can also act in the reverse. WHO, Center for Disease Control (CDC) and American Heart Association all have called on schools to assume leadership role in promoting physical activity among children and adolescents (9). Generally schools play a great role on adolescent's overweight/obesity status, so does overweight/obesity on the adolescent's school performance. Severely overweight children and adolescents are four times more likely to report impaired school functioning related to health issues than healthy weight children and adolescents (7, 10).

Adolescent obesity has both immediate and long-term health effects. Usually overweight or obese adolescents tend to be overweight or obese in their adulthood so that they are more at risk for adult health problems such as heart disease, type 2diabetes, stroke, several types of cancer, and osteoarthritis (11, 13).

A large number of overweight children have asthma. Gallstones and type2 diabetes which was known as adult onset diabetes, has also become increasingly prevalent among overweight children and adolescents (12, 13).

Heart diseases, High Blood Pressure and liver Problems like Nonalcoholic Steato Hepatitis (NASH) which can lead to cirrhosis are also common in overweight and obese children and adolescents (12, 13).

Obstructive sleep apnea, which can lead to heart failure over a long period of time, is a risk for overweight children and adolescents (12, 13).

Social and psychological problems such as stigmatization and poor self-esteem also greatly affect overweight and obese adolescents (11-13).

1.2 Statement of the problem

The prevalence of overweight and obesity has reached alarming levels, affecting virtually both developed and developing countries of all socio-economic groups, irrespective of age, sex or ethnicity (11). Though it is preventable, most of the world's populations live in countries where overweight and obesity kills more people than underweight and these includes all high income and most middle income countries (1).

Analysis of trend data among 188 countries shows 2.1 billion people which accounts for nearly 30% or two third of the world's population are either overweight or obese. The rise in global obesity rates over the last three decades has been substantial and widespread, presenting a major public health epidemic in both the developed and the developing world (14).

The magnitude as well as the severity of overweight and obesity specifically in adolescents is also increasing at an alarming rate that makes it one of the most serious health problems which affects this age group (3). Obesity has more than doubled in children and quadrupled in adolescents in the past 30 years (11).

In United States the prevalence of adolescent obesity aged 12–19 years increased from 5% to nearly 21% from 1980 up to 2012 (11). Life style factors such as high portion sizes, high proportion of saturated fats, low access to healthy and affordable foods and food marketing targeting children and adolescents have been shown to be determinants in US. School environment like close proximity of fast food restaurants to schools, high-fat snacks and sweetened beverages sold at schools are also other causes. Physical inactivity both inside and outside schools and more time spent on screen like TV and computer are also shown to be factors for adolescent overweight and obesity (7).

Fast food consumption, high fat and sugary diet, low physical activity and screen time are also indicated as causes in many countries like Australia, Spain, Brazil and Canada (16-19).

Currently almost 2/3rd of the world's obese people live in developing countries and increases are likely to continue unlike developed countries in which the increase began in the 1980s, accelerated from 1992 to 2002 and have slowed since 2006 (14).

Studies done in some African countries such as, South Africa, Ghana and Uganda shows that high socio economic status, living in urban settings, high fat and sugary diet, smoking cigarette, loneliness are associated with overweight and obesity (20, 21).

We can see that obesity is largely been determined by modifiable life style factors such as unhealthy dietary behavior, low physical activity and sedentary behavior and also environmental factors. So that in Developed countries it is increasingly being recognized that system based multi-level intervention approaches that address both individual and environmental factors should be considered. Interventions that only focus on specific individual, social or environmental factors could not be much effective (22).

Cross-sectional studies conducted in urban settings of Ethiopia, like Addis Ababa and Gondar among school adolescents have shown high magnitude of the problem. The study conducted in Addis Ababa has shown significantly higher prevalence among private than government schools (12.7% vs. 4.3%). Same is true with another study in Addis Ababa (23.0% versus 7.9%) and a study conducted in Gondar in which higher prevalence is seen among private school adolescents (10.1% vs. 4%). Being in private school, female sex, consumption of high animal products and sweet food items and physical inactivity were factors found to be associated in those studies (20, 21, 36 and 45).

As a result of urbanization in Ethiopia especially in cities like Addis Ababa, residential areas are becoming more crowded. Shared buildings that don't have open space have been expanding and there is a problem of space distribution in general. So that adolescents may not have adequate space to be active. Schools, especially private, are also affected by this problem and since students spend most of their time in school, they should have been a better opportunity for adolescents to be physically active. So it is important to see the effect of availability of adequate space for physical activity in schools on adolescent physical activity level and overweight and obesity (22).

Though studies conducted in Ethiopia showed the magnitude and individual level determinants of overweight/obesity, little is known about environmental level factors. Unless both factors are addressed, intervening individual factors only could not be much effective in promoting sustainable prevention of obesity (23). So this study was aimed

at assessing both environmental and individual-level determinants in private school adolescents because previous studies showed higher magnitude in private than governmental schools. Especially this study was aimed to give insight on the effect of school environment, specifically, the effect of availability of adequate space in schools on adolescent's physical activity level and overeight/obesity. It could also give more powerful results with a better sample size in the case of individual-level determinants as well.

1.3 Significance of the study

The results of this study could be used for policy makers and relevant stakeholders to design and implement an effective prevention and control strategies and programs that could address both the immediate (individual-level) and underlying (environmental level) factors of overweight and obesity. It could also give insight on the effect of availability of adequate space in schools on promoting physical activity and preventing overweight/obesity.

2. Literature Review

2.1 Magnitude of overweight and obesity

More than 50% (671 million) of the world's obese people live in 10 countries and they are US, China, India, Russia, Brazil, Mexico, Egypt, Germany, Pakistan and Indonesia in descending order from those with the most obese people (14).

Obesity has increased substantially worldwide among children and adolescents. There is nearly 50% increase in the prevalence of overweight and obesity between 1980 and 2013. Particularly high rates of child and adolescent obesity were seen in Middle Eastern and North African countries and notably among girls (14).

A 5 year cohort of 585 adolescent students in Vietnam shows the prevalence of overweight increased from 12.5% to 16.7% and obesity from 1.7% to 5.1% over the 5 year (23).

Based on a cluster analysis conducted in USA among adolescents, the prevalence of obesity was 14.6% in males and 11.0% in females, while five-year incidence was 10.6% and 14.1% among males and females respectively (24). In other ways a study in China among adolescents showed higher prevalence of overweight and obesity among boys (26.7%) than girls (16.6%) unlike other studies that showed higher prevalence in females (25).

It has been shown that obesity is rising alarmingly in developing countries as well. A prevalence study among high family income school adolescents in India showed higher prevalence rates of overweight and obesity which was 28.5% and 4.2% respectively. The rate of overweight was found to be even highest when compared to rates from USA and Great Britain (26). Another study again in India among randomly selected school adolescents also showed 6.2 % and 5.2% prevalence of overweight and obesity respectively (27).

A systematic review conducted among sub Sub-Saharan African countries on a total of 283 articles revealed the trend towards increasing proportions of overweight/obesity over time in school-aged children while there was a persistent problem of underweight. For the entire time period, weighted averages of overweight/obesity and obesity were 10.6% and 2.5% respectively (20).

Higher prevalence of overweight and obesity among private than government high school adolescents also found in a comparative study conducted in Addis Ababa which was 12.7% vs. 4.3% (21)**.** Another study in Addis Ababa Arada sub city among high school adolescents aslo showed 9.4% prevalence of overweight and/or obesity (29).

A study in Gondar had revealed 21.3% and 5.9% prevalence of overweight and obesity respectively (30). Another study conducted there in Gondar also showed 5.4% and 0.5% overall prevalence of overweight and obesity respectively. The prevalence was higher in those studying in private schools (10.1%) than those studying in government schools (4%) (31).

2.2 Individual-level determinants of overweight/obesity

2.2.1 Dietary habit

In a study in Germany total food and beverages, energy-providing food and beverages, water and tea and high intakes of meat and sausages were also significantly associated with overweight and obesity (32).

It was also found that obese adolescents had less favorable dietary habits (e.g. lower intake of breakfast, fruits and milk) though they had lower intake of sugar-sweetened drinks and sweets/chocolates in a study done in Saudi (33).

It has been shown that daily breakfast consumption is associated with less overweight and obesity and healthier dietary and physical activity-related behaviors in a study conducted in India. But the relationship was statistically significant for boys only. More government school students which had been considered as lower in socio economic status were found to consume breakfast daily as compared to Private school (higher socio economic status (73.8% vs. 66.3%). Depression was negatively associated with daily breakfast eating and Positive values and beliefs about healthy eating, body image satisfaction and positive peer and parental influence were positively associated with daily breakfast consumption (34).

For girls, not having breakfast every day was related to higher odds of being overweight or obese in a study done in China (25). Skipping breakfast, consumption of fruits < 4

days per week and energy intake were also found to increase the risk of obesity in a case-control study among adolescents age 14-18 in Sri Lanka (35).

A study conducted in low income African countries (Ghana and Uganda) among school going adolescents found that overweight status was not associated with intake of fruits, vegetables and sedentary behavior unlike many other studies that showed a positive association. Rather, among girls, smoking cigarettes and loneliness and among boys, smoking cigarettes were found to be associated with overweight or obesity (19).

In Ethiopia, a study in Addis Ababa among high school adolescents showed that consumption of animal products more than once a day and lacking daily breakfast are significantly associated with overweight/Obesity (36). It has also been shown that consuming sweet food item was significantly associated with overweight and obesity according to a study conducted in Gondar (31).

2.2.2 Physical Activity and sedentary behavior

A 5 year cohort of 585 adolescent students in Vietnam found that physical activity and sedentary behavior were significantly associated. Time spent in moderate to vigorous physical activity decreased significantly from 87 to 50 min/day and in contrast, time spent in sedentary behavior increased from 512 to 600 min/day while the prevalence of overweight/obesity increased (23).

Obese adolescents have found to be significantly less active, especially in terms of vigorous activity as stated in a study done in Saudi (33). Screen viewing > 2 hours/ day also significantly increased the risk of obesity while increased physical activity decreased the risk based on a study conducted in Sri Lanka (35).

According to a study conducted in China, in boys, longer sleep duration (>9 hours) was found to be protective of overweight and obesity (25).

In Ethiopia, in a study conducted in Addis walking at least 30 minutes in a day were found as having a protective effect (29). But another study in Gondar showed at least 10 minutes moderate or vigorous sport activity continuously was only marginally significant (31)

2.3 Environmental factors associated with overweight/obesity

A cluster analysis conducted in USA showed adolescents in School Clubs & Sports clusters had the lowest odds of obesity, despite relatively average diets and other behaviors (24).

A large scale cross-cultural explorative study conducted in England and Saudi Arabia among adolescents' age 15 – 17 stated that gender and geographical location seems to affect adolescents' physical activity level and obesity. Less physical activity and higher percentage of overweight and obesity were recorded in females than males and among young adolescents from Saudi Arabia than youths in England. Cultural and environmental differences such as lack of opportunities to exercise, particularly for females, due to societal norms and constraints as well as lifestyle habits were the anticipated causes for the difference in physical activity and weight status (37).

Based on an electronic record review analysis in Massachusetts conducted among children and adolescents age 4-19, living in closer proximity to recreational open spaces was associated with lower BMI *z*-score. Children who lived in closest proximity (0.0-0.2km) to the nearest recreational open space had a lower BMI *z*-score compared with those living farthest away (0.7-14.6km). Living in neighborhoods with fewer recreational open spaces and less residential density, less traffic density, less sidewalk completeness and intersection density were also associated with higher cross-sectional BMI *z*-score and with an increase in BMI *z*-score over time (38).

Another study in Massachusetts among urban students from KG up to 12th grade found a density of sit-down restaurants, and fast-food outlets to be associated with BMI z-scores. But open space was not found to be important predictor of BMI (39).

Low percentage of parks/recreation facilities and low perceived safety of them were associated with higher BMI z-scores in a school-based study on adolescents in Minnesota but green space density and supermarket accessibility were not associated with BMI (40).

A qualitative study conducted in rural South Africa on adolescent girls' revealed availability was the barrier for consumption of fruits and vegetables and regular

breakfast eating. Female caregivers and school meal programs were found to facilitate healthy eating practices. Household chores, walking long distances to school, traditional dancing and extramural activities such as netball and soccer in schools and community were also found to be important facilitators of physical activity (41).

2.4 Other factors associated with overweight/obesity

2.4.1 Genetics

According to a study in China, having an overweight mother or father was associated with increased odds of overweight or obesity for both boys and girls (25). Strong association with obesity has also been observed for parental overweight and low socio economic status in a study conducted among adolescents in Germany (32).

In Ethiopia, a study conducted in Addis Ababa found that having small family size and living in male headed household was significantly and positively associated with overweight and/or obesity (29).

2.4.2 Gender and Age

A study conducted in low income African countries (Ghana and Uganda) among school going adolescents indicated a 10.4% prevalence of overweight or obesity among girls and 3.2% among boys. Obesity prevalence only was 0.9% and 0.5% among girls and boys, respectively (19).

Based on a systematic review conducted among sub Sub-Saharan African countries also, body composition measures were found to be higher in girls than boys (20).

EDHS 2000-2011 analysis study among Addis Ababa women showed women's age was positively associated with overweight and obesity (28). It was also found that Overweight was 4.47 times higher among female sex in a study conducted in Gondar (31).

Another study in Addis Ababa in Arada sub-city among high school students showed that overweight/obesity prevalence increases with increasing age and higher prevalence was seen among those age 17-19 than those age 15-17 years (29).

2.4.3 Socio-economic status

High family income was associated with higher odds of being overweight and obesity in a study conducted in China (25).

Most studies in developed countries showed low socio-economic status associated with more overweight and obesity prevalence than those with higher socio-economic status. A study in Germany found that most of the determinants of obesity were found to occur more often among adolescents with low socioeconomic status (32). Similar result was also found in a study conducted in Spain that revealed adolescents from low family socio-economic status exhibit higher prevalence of overweight and obesity. Obesogenic behaviors such as sedentary behavior and skipping breakfast decrease as family socio-economic status increase (17).

A case-control study on adolescents 14 – 18 years of age in Sri Lanka found high family income and being first born in family significantly increased the risk of obesity (35).

Body composition measures were found to be higher in urban living and higher socioeconomic status children to rural populations or those of lower socioeconomic status according to a systematic review conducted among sub Sub-Saharan African countries (20).

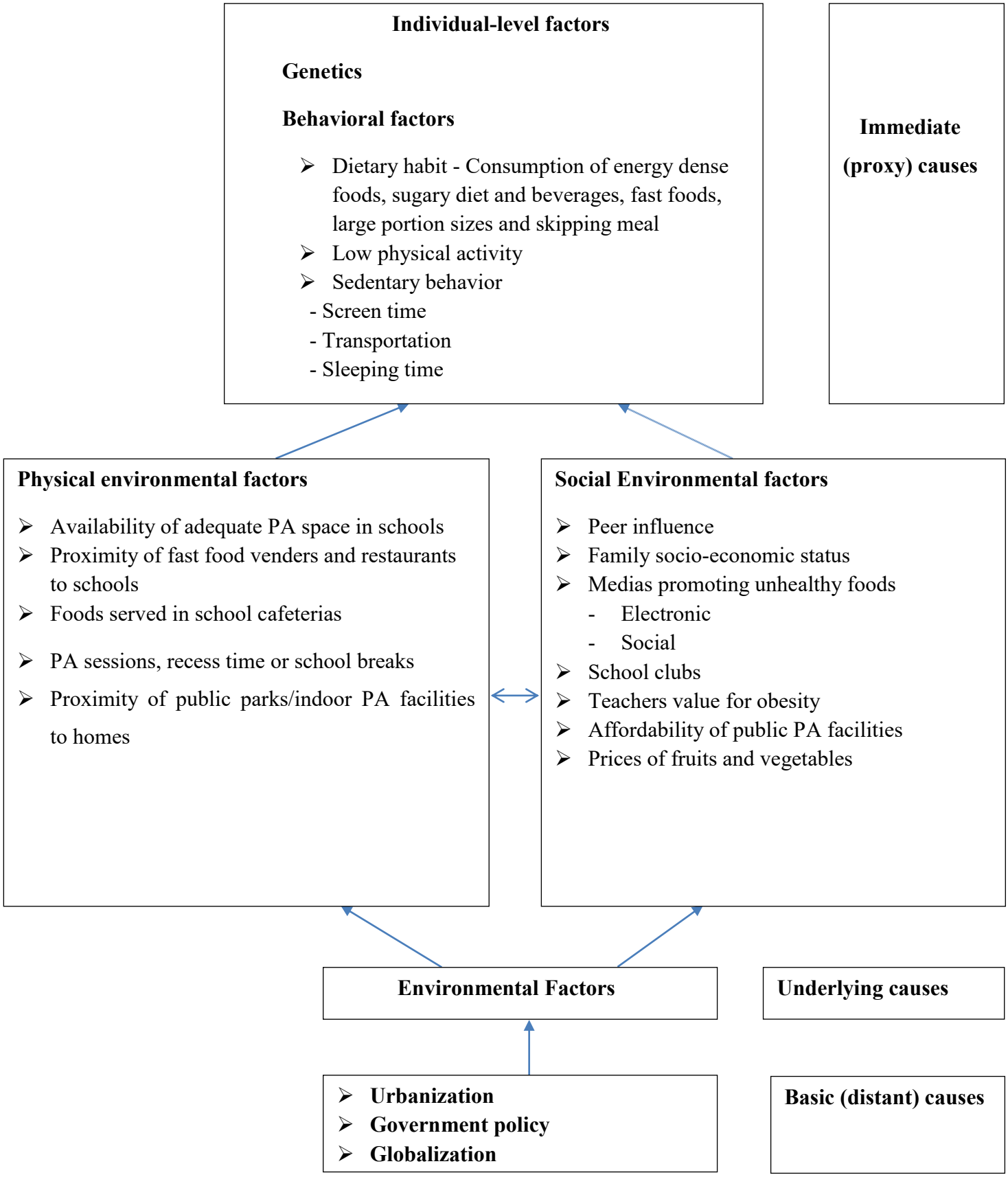
In Ethopia similar results have been found with most studies in developing countries. Analysis study of EDHS 2000, 2005 and 2011 among Addis Ababa women showed high socio-economic status proxies (household wealth quintile, educational attainment, access to improved source of drinking water and television watching) were positively associated with being overweight (28).

Learning in private school and being with middle income family than those of lower income family were also positively associated in another study in Addis Ababa (29). Same result have been found in Gondar in which overweight was 2.53 times higher among students of private school that are considered to be from family of a better socio-economic status (31).

2.4.4 Policy Factors

In 116 member countries of WHO, a systematic policy review was conducted from 2004-2013 in low and middle income countries. NCD prevention strategies (salt consumption, fat consumption, fruit and vegetable intake or physical activity) were found in 47% countries but only few proposed actions to promote healthier diets and physical activity. In Africa, Europe, America and Eastern Mediterranean the coverage of policies that specifically targeted at least one of the risk factors reviewed was lower when it was compared to South-East Asia and Western Pacific. So that the policy response to address the NCD challenges through diet and physical activity in low and middle income countries is inadequate and strategies targeting the private sector were less frequently encountered than strategies targeting the general public or policy makers (42).

2.5 Conceptual frame work



The above conceptual frame work was adopted from different literatures.

3. Objectives

3.1 General objective

To evaluate the effect of school environment on overweight/obesity and explore other environmental and individual-level determinants among private school adolescents in Addis Ababa, Ethiopia, in 2015/16.

3.2 Specific Objectives

- To compare the magnitude of overweight/obesity among schools with and without adequate PA space.
- To explore other environmental and individual-level determinants of overweight/obesity.

4. Methodology

4.1. Study Area

The study was conducted in Addis Ababa, the capital city and also the largest city in Ethiopia which covers 530.14 square kilometers. Addis Ababa is found with an altitude of 2300 meters and is located at $9^0$1'48"N with subtropical highland climate. The city has three layers of administration: city government, 10 sub cities and 116 woreda administrations. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Addis Ababa has a total population of 2,739,551, of whom 1,305,387 are men and 1,434,164 women; all of the population is urban inhabitants (43).

According to Addis Ababa City Administration Education Bureau (AACAEB), the responsible organization to coordinate the overall educational activities of the city, there were 2154 schools in all 10 sub cities under its administration. Out of the total schools 462 were governmental, 28 public and 1664 of them were private schools. From the private schools 930 were Kindergartens, 591 primaries, 143 secondary and 57 with both primary and secondary education.

4.2. Study Period

The study was conducted from January 1 2015-February 30 2016 in Addis Ababa.

4.3. Study design

School based comparative cross sectional study was conducted using interviewer administered questionnaires in selected private schools.

4.4. Population

4.4.1 Source population

All private school adolescents age 10-19 years in Addis Ababa during the study period.

4.4.2. Study Subjects

All adolescents age 10 – 19 years in selected private schools during the study period.

4.4.3. Inclusion criteria

- ✓ All adolescents from 10-19 years of age who were attending class in the selected private schools for at least one year and above.

4.4.4 Exclusion criteria

- ✓ Pregnancy during data collection
- ✓ Visible physical deformity

4.5. Sample size determination

Sample size was calculated by using epi info 7 stat calc.

For 1st objective

Using double population proportion formula

$$n1 = \frac{\{z\,\alpha/2\sqrt{\left(1+\frac{1}{r}\right)}+Z\beta\sqrt{P1(1-P1)+\frac{P2(1-P2)}{r}}\}^2}{(p1-p2)^2}$$

With the assumptions of;

- P1- 50% (proportion of overweight & obese adolescents in schools without adequate space for PA)
- P2- 40% (proportion of overweight & obese adolescents in schools with adequate space for PA) a 10% difference was assumed because of lack of previous study
- P- Pooled proportion (p1+rp2)/1+r = 0.45 (45%)
- α - 0.05 probability of committing type 1 error (1.96)
- β - 20% probability of rejecting a true difference
- r- the proportion of n1 to n2 is 1 to 1

n1 = 408 and n = 816 since the proportion of n1 and n2 is 1 to 1 and considering 5% non-response rate the sample become 857. Finally considering a design effect of 1.5 (because similar previous studies used 1.5 design effect) the sample size was 1286.

The sample size adequacy for prevalence was also checked using single population proportion formula

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

With the assumptions of

- z zα/2- 1.96 (standard score corresponding to 95 % confidence interval)
- d- 4 % (margin of error)

- P- 12.7% (expected prevalence of overweight and obesity among private school adolescents (36).

Then by adding 5% non-response rate the sample became 312 and using design effect of 1.5 the final sample size became 468.

For 2nd objective

The sample size was calculated using double population proportion formula for two determinants of overweight/obesity

❖ For dietary habit; considering meat consumption > once in a day as an exposure, with the following assumptions

- P1- 7.4% (proportion of overweight & obese among adolescents who consumed meat, egg and fish ≤ once in a day) (36).
- P2- 21.8 % (proportion of overweight & obese among adolescents who consumed meat, egg and fish > once in a day) (36).
- P- Pooled proportion (p1+rp2)/1+r = 0.146 (14.6%)
- α - 0.05 probability of committing type 1 error (1.96)
- β - 20% probability of rejecting a true difference
- r- the proportion of n1 to n2 is 1 to 1

The sample size for dietary habit was calculated to be 225 after adding 5% non-response rate and the final sample size is 338 considering design effect of 1.5.

❖ For physical activity pattern; with the following assumptions

- P1- 5.7% (proportion of overweight & obese among adolescents who used foot/bicycle for transportation)
- P2- 11.5% (proportion of overweight & obese among adolescents who used car for transportation) (from a study conducted in Addis Ababa)
- P- Pooled proportion (p1+rp2)/1+r = 0.146 (14.6%)
- α - 0.05 probability of committing type 1 error (1.96)
- β - 20% probability of rejecting a true difference
- r- the proportion of n1 to n2 is 1 to 1

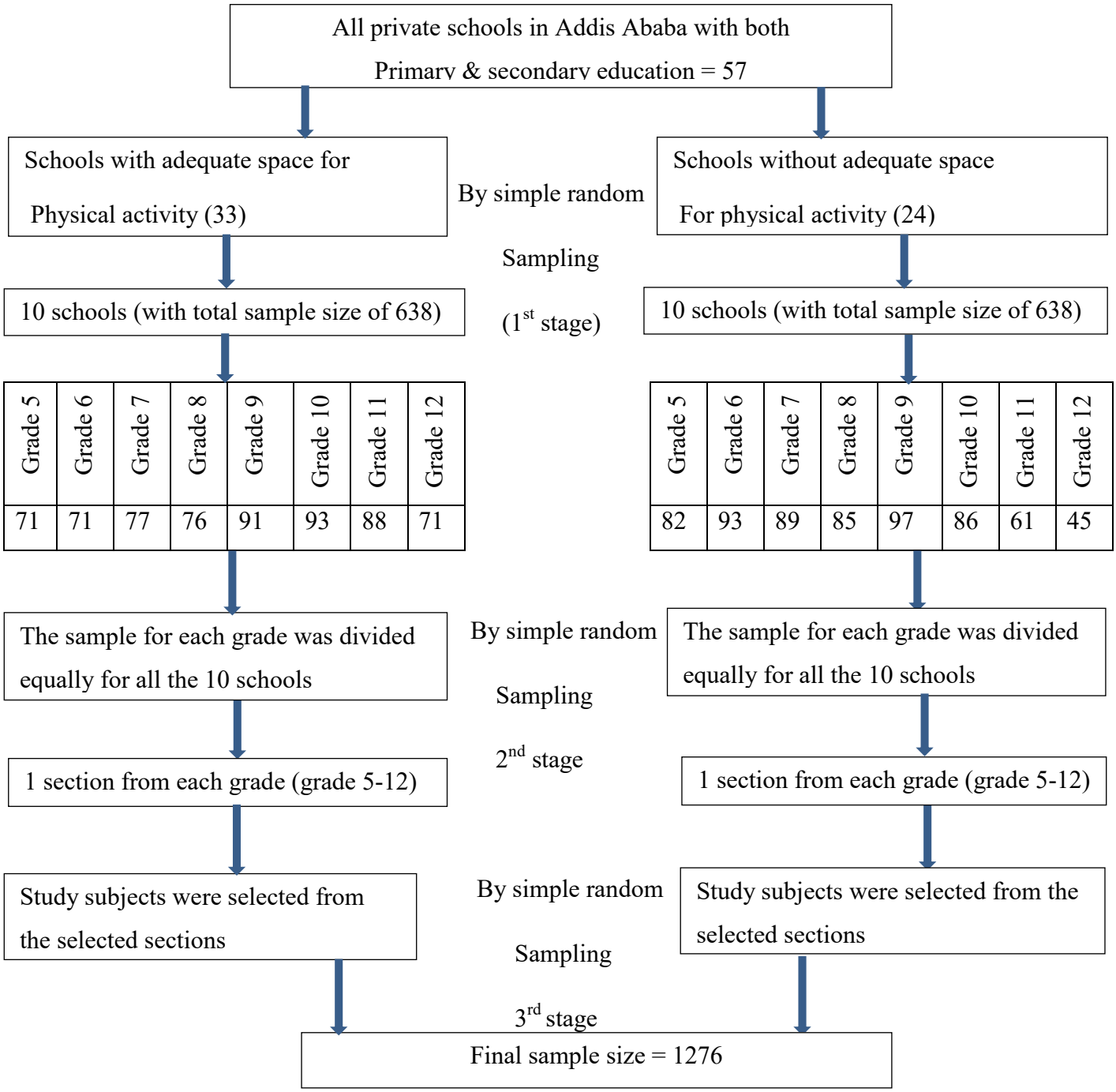
The sample size for physical activity pattern become 840 considering 5% non-response rates and finally it became 1260 after considering design effect of 1.5.

Accordingly, the sample size calculated for the first objective using double population proportion formula yielded the largest sample size which was 1286 So that it was the final sample size of this study.

4.6 Sampling procedure

A three stage random sampling technique was used to select the study participants. The sample schools were all private schools having both primary and secondary education in Addis Ababa (grade 5 – 12). A total of 20 schools, 10 from each category (with and without adequate space for physical activity) have been selected randomly with sample size of 643 for each. The sample size for each grade was allocated proportionally considering the sum of the student size in each grade of all schools in each category. Then the allocated sample size for each grade was divided for all the schools under each category equally. 1 section was selected randomly from each grade by lottery method. Finally study subjects were selected by simple random sampling, lottery method, from the selected sections within each grade using students list.

4.6.1 Schematic presentation of the sampling procedure



4.7 Data collection procedures

A questionnaire that measures the socio-demographic characteristics was used. Socioeconomic status was assessed using household fixed asset and housing condition questions.

FAO Food frequency questionnaire to assess the nutritional determinants and WHO Global Physical Activity Questionnaire (GPAQ) to assess physical activity and sedentary behavior of adolescents were used. Both questionnaires are modified according to the objective of the study. Environmental determinants were assessed based on a questionnaire adopted from different literatures.

The measurements were done and questionnaires were filled by data collectors (10 high school graduates) by interviewing the study participants except questions about School environment which was filled by interviewing school administrator and observation by the principal investigator.

Data quality assurance was done before, during and after data collection. Before data collection, standardization of data collectors on measurement errors was done during training. A two days practical training was given for the data collectors on weight and height measurement and data collection techniques and procedures based on the questionnaires and also about the purpose of the study. The training was given by the principal investigator.

Weight and height measurements were done by the data collectors using calibrated equipment and standardized techniques. Students were wearing light closes (school uniform) during body weight measurements and height was measured with bare foot. Weight was measured using standard digital balance with a precision of 0.1 kg and height using a measuring board with a precision of 0.1 cm. Measurement scales were being carefully handled and calibrated every morning by placing 2 kilogram iron bars before data collection started and the data collectors check whether the scales are at 0.00 reading before each measurement.

The questionnaire was pretested on other than the sampled adolescents and few modifications were done. Standardized measurement scales were used. During the data collection, the procedure was observed closely by the supervisors and the principal investigator. Data quality and completeness was assessed every day after data collection.

4.8 Data Analysis procedures

Data were coded, entered and cleaned using Epi data version 3. 1. All statistical tests were performed using STATA version 12.1 data analysis software. The WHO 2007 growth reference was used as a standard reference for classifying adolescents based on BMI for age using WHO Anthro plus software version 1.0.4. BMI for age Z-score (BAZ) ≤ -2 were classified as severely thin, > -2 and ≤ -1 as thin, >-1 and < +1 as normal weight, ≥ +1 and < +2 as overweight and ≥ + 2 as obese. Data were cleaned for outliers and corrected by transforming in to categorical variable if they were numeric or by omitting extreme values (highest and lowest value).

Descriptive statistical analysis was conducted using frequency, percentage, mean (SD), median (IQR) and p-value to describe the study population by explanatory variables and BMI for age (BAZ) status.

Principal component analysis (PCA) was conducted to transfer the asset information into latent factors and the first PCA explaining most of the variation based on the objective of the study was taken as a wealth score. The wealth score was divided into 5 wealth quintiles (Lowest, second, middle, fourth and highest).

The Global Physical Activity Questionnaire (GPAQ) Analysis Guide was used to assess the physical activity level of study participants. Subjects were asked about days per week and hours per day they spend on different activities that were grouped under comprehensive domains of school, home or public physical activity facilities regular activity, transport and leisure time (recreational) moderate and vigorous intensity activities. Then minutes spend on each domain of physical activity were calculated and multiplied by number days of physical activity to get a week's physical activity in minutes. Finally physical activity minutes in each domain were summed up together and classified by 7 to get the total physical activity (TPA) level per day. The TPA was then categorized into three as High (TPA ≥ 60 minutes per day based on WHO recommendation of physical activity for adolescents) Medium (30-59 minutes) and Low (< 30 minutes per day).

Sedentary time spent per day was categorized as < 8 hours ≥ 8 hours per day based on the mean sedentary time. Means of transportation from home to school and school to home was analyzed after recoding based on two way and one way transportation.

Monthly based food frequency questionnaire was used and later recoded to a daily frequency (< once a day and ≥ once a day) except for oil and fat which was recoded as a weekly frequency (< once a week and ≥ once a week) based on previous literature. Daily meal frequencies were also later recoded as daily and not daily frequency (36).
Bivariate analysis was carried out using crude odds ratio to assess the association between dependent and independent variables. The significance of relationship between dependent and independent variables was tested using p value < 0.05 as significance relationship.

Partial correlation test was done to test the effect of adequacy of space on overweight/obesity accounting for the effect of physical activity.

Multivariate analysis was finally conducted to identify the factors associated with overweight/obesity after controlling for the possible confounding effect of other predictor variables. Variables with p value <0.2 on the bivariate analysis were entered to the multivariate model and then stepwise backward regression procedure was applied.

4.9 Study Variables

Dependent variables

- Overweight and obesity

Independent Variables

- Age
- Sex
- Family socioeconomic status
- Availability of adequate space in schools
- School clubs
- Physical activity sessions per week
- School break
- Proximity of fast food venders to schools
- Types of foods served in school cafeterias
- Proximity of Public physical ativity facilities to home
- Home to school distance
- Having Television in bed room
- Time spent on Tv
- Frequency of watching fast food and sugary diet advertisements
- Skipping meal
- Daily meal frequency
- Different food items consumption frequency
- Physical activity level
- Sedentary behaviour

- Sleeping hour
- Transportation

4.10 Operational Definitions

1. Schools with adequate space for physical activity: those schools that have playground of basketball, volley ball and hand ball (three in one) (≥ 1592 square meters playground) (44).

2. Schools without adequate space for physical ativity: those schools that have either one or two of the three playgrounds; basketball, volley ball and hand ball ground) or (< 1592 square meters playground) (44).

3. School performance:

- For those > grade 10 (based on EGSECE result)
    - poor = < 2.00
    - satisfactory= 2.00-2.4
    - Good= 2.5-2.9
    - Very good= 3-3.4
    - Excellent= ≥ 3.5
- For ≤ grade 10 (based on Average result)
    - Poor = < 50.00
    - satisfactory = 50-67
    - Good- 68-79
    - Very good = 80-89
    - Excellent = ≥ 90

4. Total Physical activity (TPA) = total minutes spent on moderate to vigorous intensity physical activites per day at school, home, public physical activity facilities as a regular exercise, home works, recreation and/or transportation.

- Low TPA = < 30 minutes TPA per day
- Moderate TPA = 30– 59 minutes TPA per day
- High TPA = ≥ 60 minutes TPA per day

5. School environment**:** physical and social environment inside and around a school compound such as width of space for physical activity in schools, proximity of fast food vendors around schools, availability of school caféteria and types of foods served in school cafeteria, physical activity sessions per week and school breaks.

4.11 Ethical consideration

Ethical clearance was obtained from Addis Ababa University School of Public Health ethical clearance committee. The purpose of the study was explained to school officials and permission was also found from the sample schools to conduct the study. Informed consent was obtained from adolescents greater than 18 years old and from parents of under 18 years' adolesents and ascent from the sample adolescents' age less than 18 years.

5. Results

5.1 Descriptive statistics

5.1.1. Sociodemographic characteristics

Out of the sampled 1286 adolescent students, a total of 1277 participated in this study with a response rate of 99.3%. Analysis was done based on 1276 respondents after 1 observation was excluded because of many missing data. 638 (50%) of the respondents were from schools with adequate space for physical activity while the rest 50% from schools without adequate space for physical activity. Mean (SD) of age of the respondents was 14.4 ± 2.4 in which 49.6% were beween the age of 10-14 and 50.4% of them from 15-19 years. There were 638 (50%) males and 638 (50%) female respondents and all are from grade 5-12.

77.5% of the respondents were Orthodox Christian followed by protestant (13.7%) and Muslim (6.5%). 61.7% of the respondent's fathers and 50.9% mothers attended more than secondary school.

Table 1: Sociodemographic characteristics of adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Characteristics	School has adequate space				Total		P value
	Yes		No				
	n	%	n	%	n	%	
Age in years							
10-14	303	47.5	330	51.7	633	49.6	
15-19	335	52.5	308	48.3	643	50.4	0.131
Sex							
Male	293	45.9	345	54.1	638	50.0	
Female	345	54.1	293	45.9	638	50.0	0.04
Grade							
5-8	295	46.2	349	54.7	644	50.47	
9-12	343	53.8	289	45.3	632	49.5	0.02
School performance (n=1262)							
Excellent	235	37.1	188	29.9	423	33.5	
Very Good	178	28.1	216	34.4	394	31.2	
Good	175	27.6	197	31.4	372	29.5	0.02
Satisfactory & Poor	46	7.3	27	4.3	73	5.8	
Religion							
Orthodox	494	77.4	495	77.6	989	77.5	

Muslim	25	3.9	58	9.1	83	6.5	
Protestant	99	15.5	76	11.9	175	13.7	<0.01
Catholic	14	2.2	2	0.3	16	1.2	
Other	6	0.9	7	1.1	13	1.0	
Father's Educational status (n=1034)							
No formal education	21	3.9	40	8.1	61	5.9	
Primary school (grade 5-8)	23	4.2	52	10.6	75	7.2	
Secondary school (grade 9-12)	122	22.5	138	28.1	260	25.1	<0.01
Above secondary school	377	69.4	261	53.2	638	61.7	
Mother's Educational status (n=1054)							
No formal education	33	6.0	38	7.5	71	6.74	
Primary school	42	7.7	72	14.2	114	10.8	
Secondary school	150	27.4	183	36.2	333	31.6	<0.01
Above secondary school	323	58.9	213	42.1	536	50.8	
Living with							
With both parents	499	78.5	490	77.2	989	77.8	
With mother/ father only	90	14.1	83	13.1	173	13.6	
With brothers/sisters	16	2.5	18	2.8	34	2.7	0.434
With relatives	31	4.9	44	6.9	75	5.9	
Family size							
≤ 5	332	52.04	329	51.6	661	51.8	
> 5	306	48.0	309	48.4	615	48.2	0.867

5.1.2. School Environment

From all the 20 schools sampled, 69.3% of them had (46-90 minutes) outdoor physical activity sessions and 90.8% had physical activity club. 75.7% of the schools had cafeteria & all serve fast foods & sweet drinks and 48.6% serve sweet foods. Fast food vendors are available within 10 minutes walking distance in 84.0% of the schools.

Table 2: School environment determinants of overweight/obesity among adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	**School has adequate space category**				**Total**		**P Value**
	Yes		**No**				
	n	**%**	**n**	**%**	**n**	**%**	

School outdoor physical education session per week							
≤ 45 minutes	130	20.4	196	30.7	326	25.6	
46-90 minutes	442	69.3	442	69.3	884	69.3	<0.01
>90 minutes	66	10.3	0	0.0	66	5.2	
School recess (break) time							
15 minutes	0	0.0	179	28.1	179	14.0	
20 minutes	128	20.1	277	43.4	405	31.7	<0.01
30 minutes	510	79.9	182	28.5	692	54.2	
Physical activity club							
No	66	10.3	51	8.0	117	9.2	
Yes	572	89.7	587	92.0	1159	90.8	0.146
School cafeteria							
No	124	19.4	186	29.2	310	24.3	
yes	514	80.6	452	70.9	966	75.7	<0.01
Cafe serve sweet foods (n=966)							
No	192	37.4	305	67.5	497	51.5	
yes	322	62.7	147	32.5	469	48.6	<0.01
Proximity of fast food vendors							
≥10 minutes	130	20.4	74	11.6	204	16.0	
5-10 minutes	254	39.8	244	38.2	498	39.0	<0.01
< 5 minutes	254	39.8	320	50.2	574	45.0	

5.1.3. Physical activity and sedentary behavior

Median (Inter quintile range (IQR)) of total physical activity (TPA) per day among the total respondents was 66.1 (68.6) minutes. Among participants in schools without adequate space for physical activity, the median (IQR) TPA was 57.9 (60.00) minutes which was lower than students in schools with adequate space for physical activity (73.4 (73.6)) minutes per day. Adolescents were classified by their TPA level based on WHO recommendation of at least 60 minutes physical activity per day for adolescents. 54.1% of the study participants met the WHO recommendation and classified as having high level TPA while the rest were insufficiently active and classified as moderate (30-59 minutes) and low (<30 minutes) TPA per day which accounts for 26.4% and 19.5% respectively. Considering sedentary time per day 47.1% of adolescents spent at least 8 hours (above the mean sedentary time) per day.

Table 3: Physical activity level and sedentary behavior of adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Total Physical Activity (TPA) per day in minutes									
School has adequate space	**High**		**Moderate**		**Low**		**Total**		**P-Value**
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Yes	386	55.9	151	44.8	101	40.6	638	50.0	
No	304	44.1	186	55.2	148	59.4	638	50.0	<0.01
Total	690	100.0	337	100.0	249	100.0	1276	100.0	

Sedentary behavior - Time spent sitting or reclining per day							
School has adequate space	**<8 hours**		**>8 hours**		**Total**		**P-Value**
Yes	358	53.0	280	46.6	638	50.0	
No	317	47.0	321	53.4	638	50.0	0.021
Total	675	100.0	601	100.0	1276	100.0	

Table 4: Median (IQR) of total physical activity (TPA) level per day based on age and sex among private school adolescents in Addis Ababa, 2016

Total physical activity (TPA) in minutes		**Median**	**Inter Quantile Range (IQR)**
Age in years	10-14	68.57	71
	15-19	61.71	65
	Total	68.57	71
Sex	Male	77.93	67.86
	Female	52.14	59.86
	Total	66.07	68.57

Table 5: Mean (SD) or median (IQR) of age, BMI for age z-score (BAZ) & Total physical activity (TPA) per day among private schools with and without adequate space for physical activity in Addis Ababa, 2016

		Mean	Standard Deviation	Median	Inter Quantile Range
Age in years	School has adequate space	14.53	2.40	-	-
	School has not adequate space	14.35	2.33	-	-
	Total	14.44	2.37	-	-
BMI for age Z score (BAZ)	School has adequate space	-0.19	1.23	-	-
	School has not adequate space	-0.22	1.31	-	-
	Total	-0.21	1.27	-	-
Total Physical Activity (TPA) in minutes	School has adequate space	-	-	73.43	73.57
	School has not adequate space	-	-	57.86	60.00
	Total	-	-	66.07	68.57

5.1.4. Nutritional status of adolescents in private schools with and without adequate space for

Based on the WHO 2007 reference chart, the BAZ of the study population was slightly deviated to the left (thinness/severe thinness) (fig. 1). Females were more overweight / obese and males were more thin/severely thin than females (fig. 2).

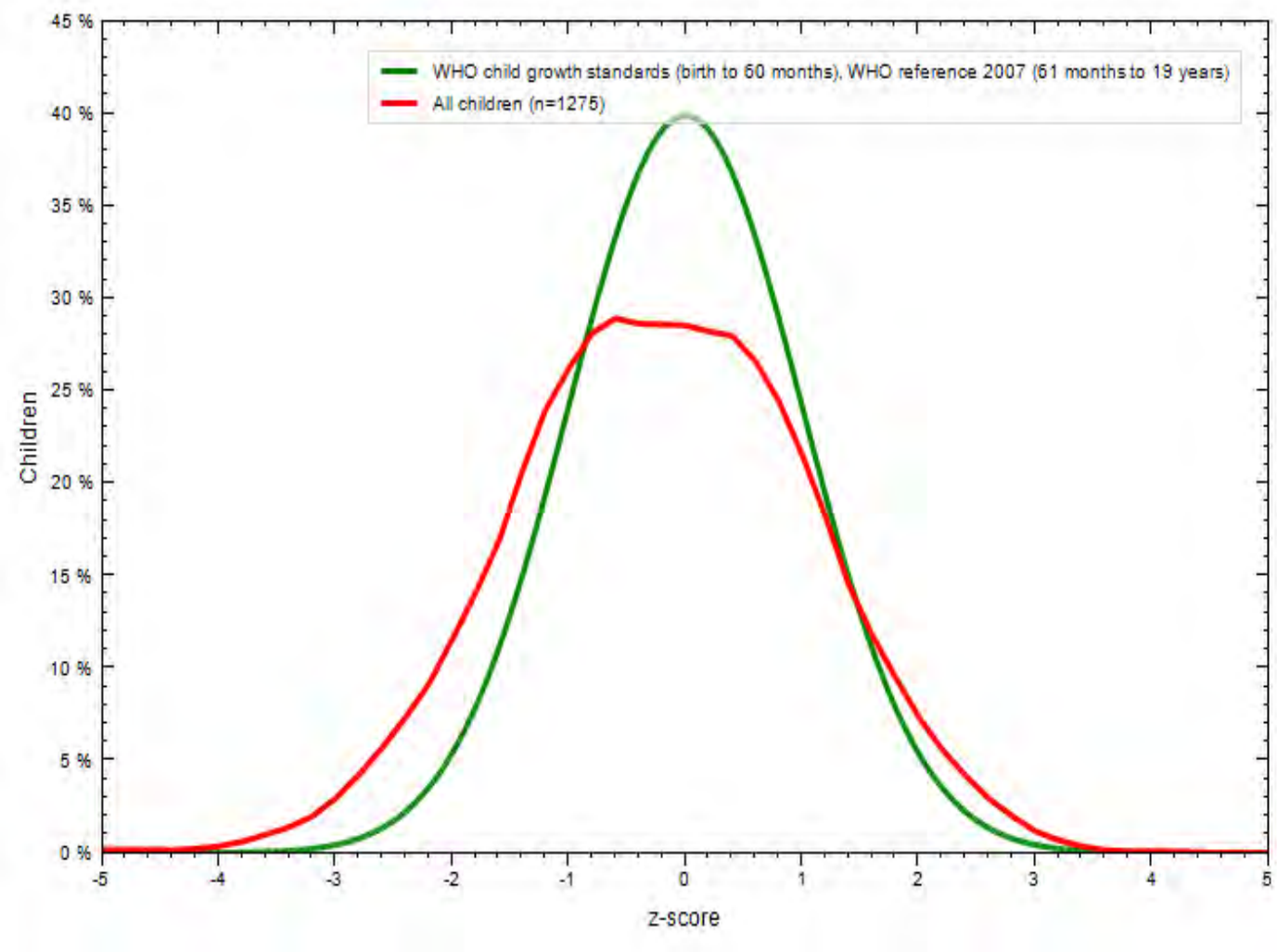


Figure 1 Comparison of BMI for age Z-score (BAZ) of the study population with the 2007 WHO growth reference population (n=1276)

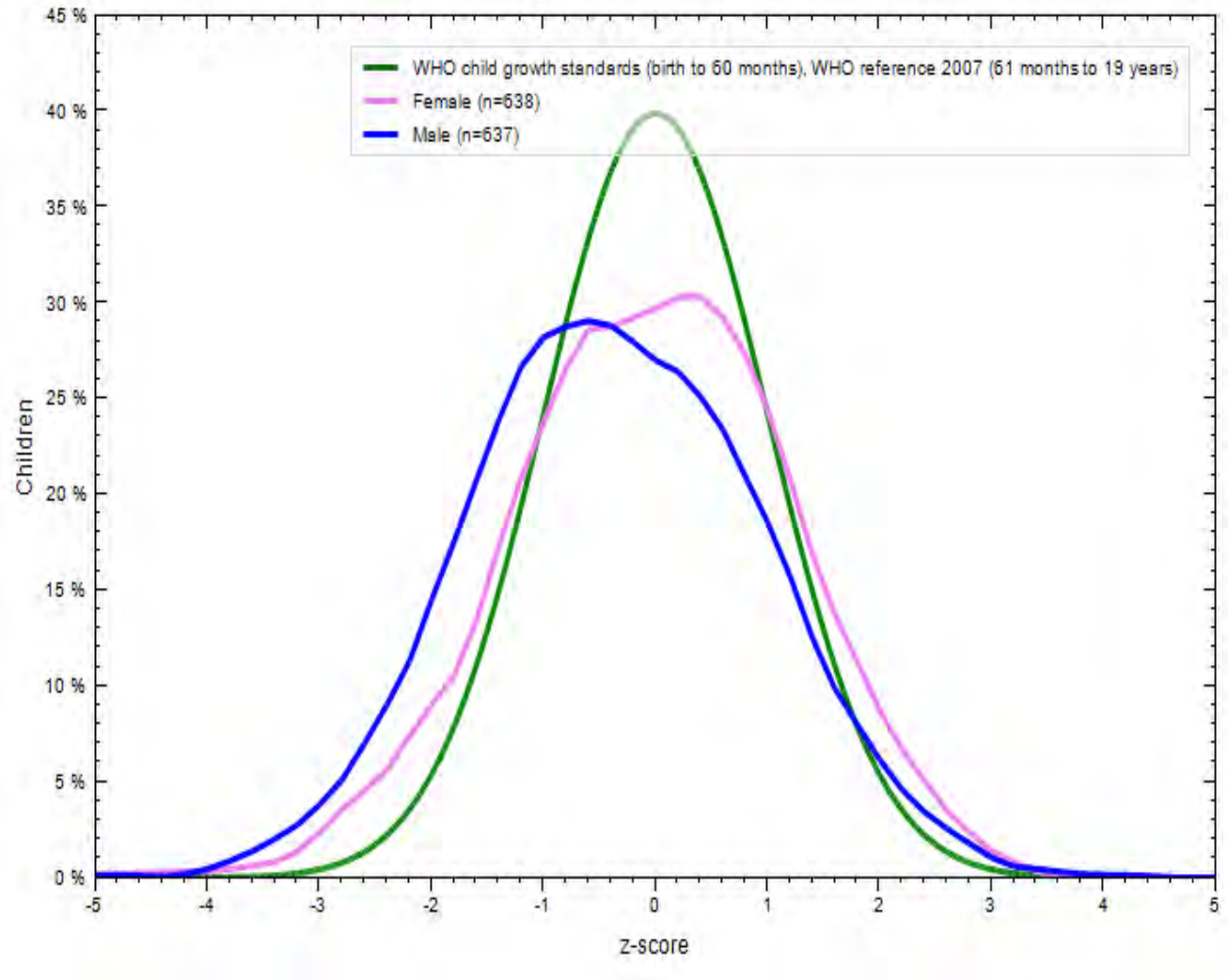


Figure 2 Comparison of BMI for age Z-score (BAZ) of the study population classified by sex with the 2007 WHO growth reference population (n=1276)

The overall magnitude of overweight and obesity was 17.0% and it was significantly higher in schools without adequate space for physical activity than in schools with adequate space for physical activity (19.4% versus 14.6%) with p-value of 0.01 (fig. 3). Similarly thinness and severe thinness were also more prevalent in schools without adequate space for physical activity (29.6% versus 23.8%) with p-value 0.019 (fig. 4)

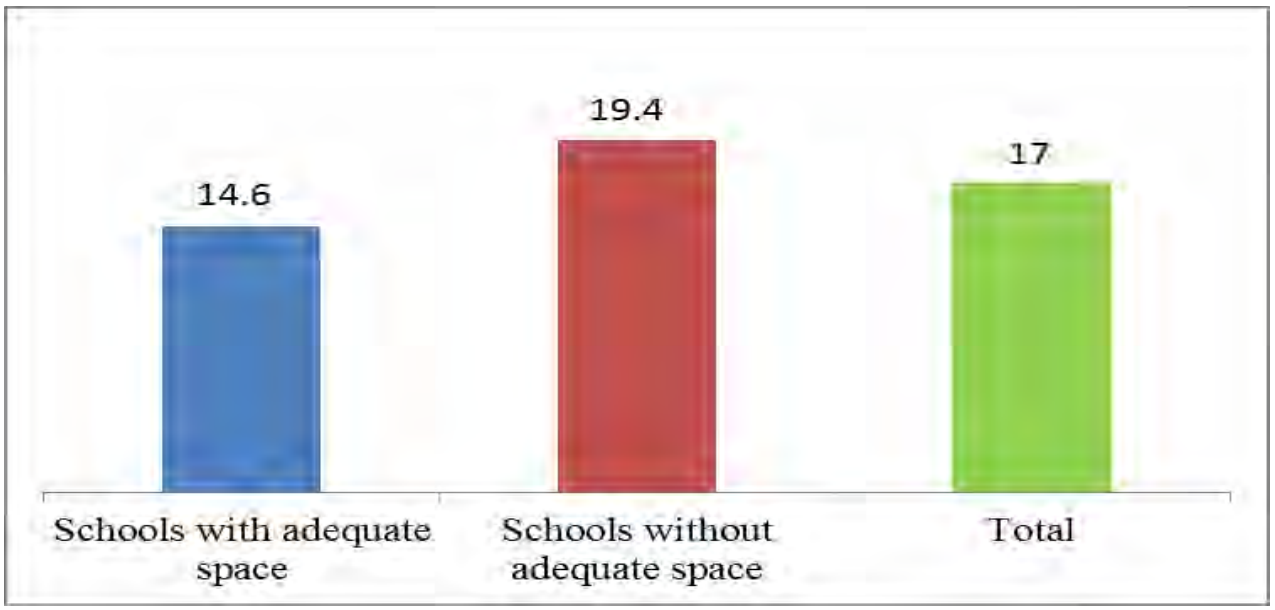


Figure 3 Percentage of overweight and obesity among adolescents in private schools with and without adequate physical activity in Addis Ababa, 2016

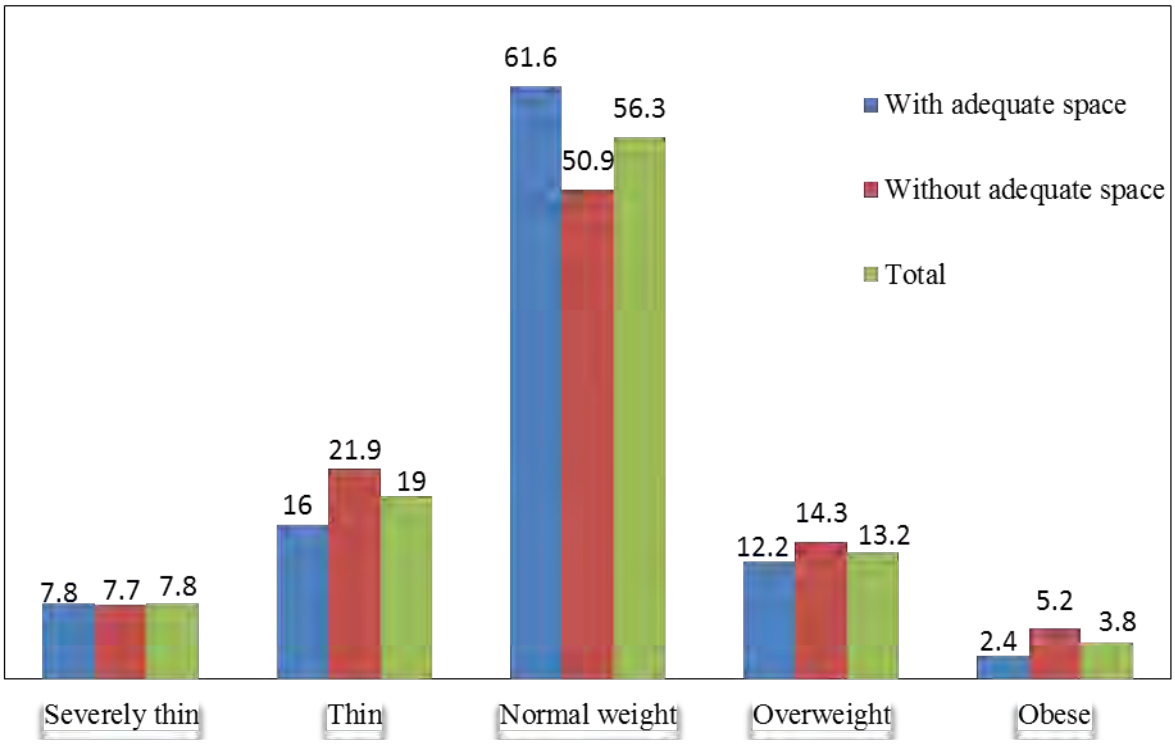


Figure 4 Percentage of severely thin, thin, normal weight, overweight and obese adolescents in schools with & without adequate space for physical activity

As the width of space for physical activity in schools increases, the magnitude of overweight and obesity was found to decrease (fig. 5).

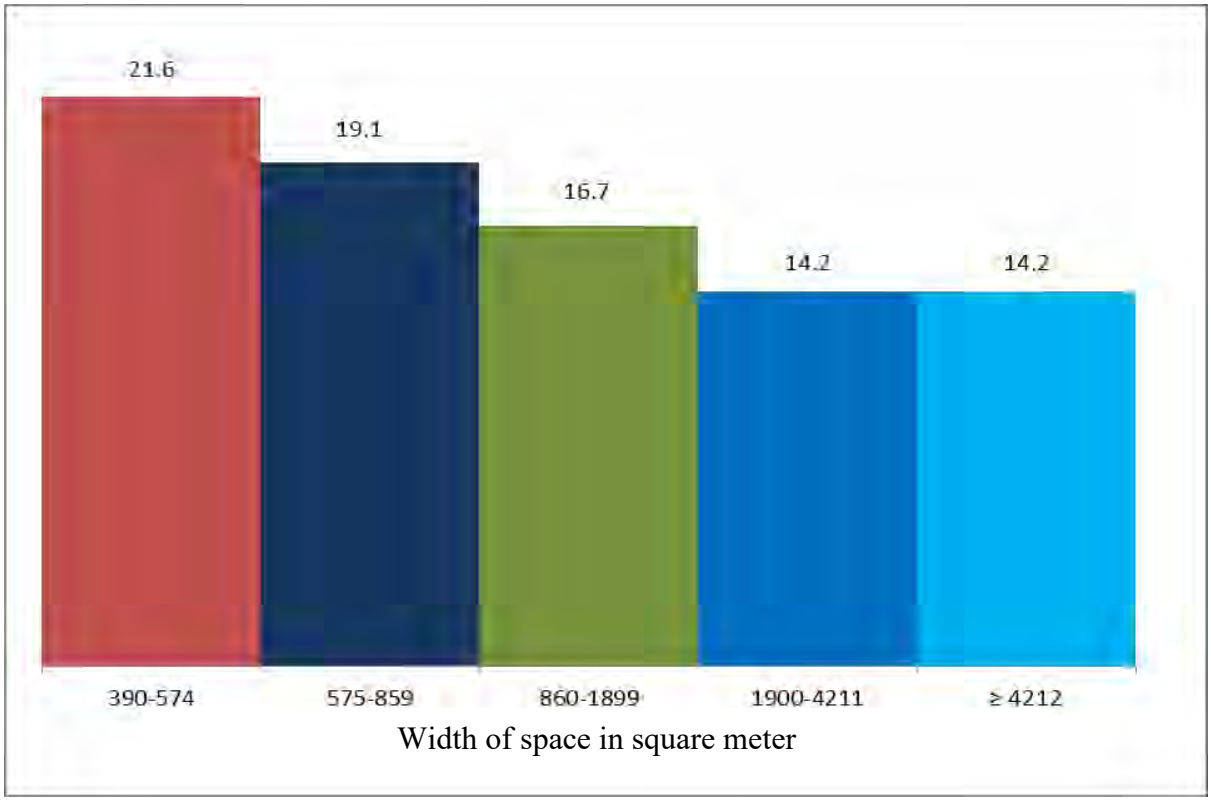


Figure 5 Percentage of overweight and obesity compared to width of school's space for physical activity in private schools Addis Ababa, 2016

Table 6: Comparison of overweight/obesity by age sex and physical activity level, among private school adolescents in Addis Ababa, Ethiopia, 2016

Characteristics		**Thin/severely thin**				**P value**
		Yes		**No**		
		n	%	n	%	
Age	10-14	176	27.8	457	72.2	
	15-19	165	25.7	478	74.3	0.387
Sex	Male	203	31.8	435	68.2	
	Female	138	21.6	500	78.4	<0.001
Total physical activity	High	186	27.0	504	73.0	
	Moderate	89	26.4	248	73.6	0.979
	Low	66	26.5	183	73.5	
School has adequate	Yes	152	23.8	486	76.2	

space	No	189	29.6	449	70.4	0.019

Table 7: Comparison of overweight/obesity by age sex and physical activity level, among private school adolescents, Addis Ababa, Ethiopia 2016

Characteristics		**Overweight/Obesity**				**P value**
		Yes		**No**		
		n	%	n	%	
Age	10-14	106	16.8	527	83.25	
	15-19	111	17.3	532	82.74	0.806
Sex	Male	89	14.0	549	86.05	
	Female	128	20.1	510	79.94	0.004
Total Physical Activity (TPA)	High	98	14.2	592	85.80	
	Moderate	56	16.6	281	83.4	<0.001
	Low	63	25.3	186	74.7	
School has adequate space	Yes	93	14.6	545	85.4	
	No	124	19.4	514	80.6	0.021

5.1.5 Food consumption frequency

As described in table 2 below, based on food frequency questionnaire, 90.0% consumed cereal products and 10.4% consumed meat at least once per day. 15.8% of respondents also consumed oil and fat at least once a week.

Table 8: Different food item consumption frequency of adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	**School have adequate space**				**Total**		**P value**
	Yes		**No**				
	n	**%**	**n**	**%**	**n**	**%**	
Bread or other cereal products							
≥ Once a day	575	90.1	573	89.8	1148	90.0	
< Once a day	63	9.9	65	10.2	128	10.0	0.852
Vegetables							
≥ Once a day	239	37.5	219	34.3	458	35.9	
< Once a day	399	62.5	419	65.7	818	64.1	0.243
Fruits							

≥ Once a day	241	37.8	192	30.1	433	33.9	
< Once a day	397	62.2	446	69.9	843	66.1	0.004
Milk, cheese or yoghurt							
≤ Once a day	570	89.3	591	92.6	1161	91.0	
> Once a day	68	10.7	47	7.4	115	9.01	0.04
Meat							
≤ Once a day	567	88.9	576	90.3	1143	89.6	
> Once a day	71	11.1	62	9.7	133	10.4	0.410
Egg							
≤ Once a day	617	96.7	622	97.5	1239	97.1	
> Once a day	21	3.3	16	2.5	37	2.9	0.404
Legumes, nuts or seeds							
≥ Once a day	321	50.3	296	46.4	617	48.3	
< Once a day	317	49.7	342	53.6	659	51.7	0.161
Sugary or sweet foods							
≤ Once a day	545	85.4	573	89.8	1118	87.6	
> Once a day	93	14.6	65	10.2	158	12.4	0.017
Sugar drinks like sweetened juice or soft drinks							
≤ Once a day	579	90.8	604	94.7	1183	92.7	
> Once a day	59	9.2	34	5.3	93	7.3	<0.01
Oil and fat							
≤ Once a week	514	80.6	560	87.8	1074	84.2	
> Once a week	124	19.4	78	12.2	202	15.8	<0.01
Fast foods							
≤ Once a day	592	92.8	620	97.2	1212	95.0	
> Once a day	46	7.2	18	2.8	64	5.0	<0.01

5.1.6 Meal pattern, sleeping time & means of transportation

Concerning daily meal pattern 27.8% of the study participants did not consume breakfast and 33.3% dinner daily. Also 10.8% consumed snack at least twice a day. Majority of the participants (36.6%) walked from home to school & from school back to home followed by 23.0% who used public transport, 18.3% contract taxi (school bus) and 9.7% private car as a means of transportation.

Table 9: Meal pattern, sleeping time & means of transportation of adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	School has adequate space				Total		P-Value
	Yes		No				
	n	%	n	%	n	%	
Meal frequency per day							
>3 meals	251	39.3	302	47.3	553	43.3	
≤ 3 meals	387	60.7	336	52.7	723	56.7	<0.01
Breakfast consumption pattern							
Daily	430	67.4	491	77.0	921	72.2	
Not daily	208	32.6	147	23.0	355	27.8	<0.01
Lunch consumption pattern							
Daily	548	85.9	574	90.0	1122	87.9	
Not daily	90	14.1	64	10.0	154	12.1	0.025
Snack consumption pattern							
Daily	308	48.3	407	63.8	715	56.0	
Usually	330	51.7	231	36.2	561	44.0	<0.01
Snack frequency per day (n=1211)							
Less than once a day	99	16.5	120	19.6	219	18.1	
Once a day	417	69.6	444	72.6	861	71.1	<0.01
≥ Twice a day	83	13.9	48	7.8	131	10.8	
Dinner consumption pattern							
Daily	407	63.8	444	69.6	851	66.7	
Not daily	231	36.2	194	30.4	425	33.3	0.028
Sleeping Time							
< 8 Hours	179	28.1	136	21.3	315	24.7	
8-10 Hours	426	66.8	467	73.2	893	70.0	0.020
> 10 Hours	33	5.2	35	5.5	68	5.3	
Means of transportation							
Two way (from home to school & from school back to home) (n=1117)							
Walking	173	31.2	294	52.2	467	41.8	
Public transportation	152	27.4	141	25.0	293	26.2	
Contract taxi/school bus	144	26.0	89	15.8	233	20.9	<0.01
Private car	85	15.3	39	6.9	124	11.1	
One way (from home to school or from school back to home) (n=159)							
Walking/ Cycling	18	21.4	14	18.7	32	20.1	

Public transportation	22	26.2	23	30.7	45	28.3	0.850
Contract taxi/school bus	5	5.9	6	8.0	11	6.9	
Private car	39	46.4	32	42.7	71	44.6	

5.1.7 Home environment

Table 10: Home environment profile of adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016.

Variable	School has adequate space for physical activity				Total		P Value
	Yes		No				
	n	%	n	%	n	%	
Walking distance from home to school (n=1265)							
≤15minutes	144	22.8	236	37.2	380	30.0	<0.01
16-30 minutes	199	31.5	241	38.0	440	34.8	
31-45 minutes	70	11.1	48	7.6	118	9.3	
46-60 minutes	117	18.5	65	10.3	182	14.4	
>60 minutes	101	16.0	44	6.9	145	11.5	
Walking distance from home to public physical activity facilities (n=1182)							
≤15minutes	293	47.4	323	57.3	616	52.1	<0.01
16-30 minutes	160	25.9	131	23.2	291	24.6	
31-45 minutes	28	4.5	25	4.4	53	4.5	
46-60 minutes	89	14.4	54	9.6	143	12.1	
>60 minutes	48	7.8	31	5.5	79	6.7	
Having television in bed room							
No	458	71.8	466	73.0	924	72.4	0.616
Yes	180	28.2	172	27.0	352	27.6	
Time spent on Television							
≤ 2.00 hours per day	391	61.3	433	67.9	824	64.6	0.014
> 2.00 hours per day	247	38.7	205	32.1	452	35.4	
Frequency of watching fast food and sugary diet advertisements							
Never	24	3.8	40	6.3	64	5.0	

Sometimes	279	43.7	334	52.4	613	48.0	<0.01
Usually	164	25.7	138	21.6	302	23.7	
Daily	171	26.8	126	19.8	297	23.3	

5.2 Bivariate logistic regression analysis

5.2.1 Sociodemographic characteristics

During the bivariate logistic regression analysis statistically significant association was found for sex and socioeconomic status in which females were found to have 1.55 times higher odds of being overweight/obese than males, COR(95%CI) = 1.55 (1.01-2.36) and P-value=0.044. Those at the middle wealth quintile have 2.30 times higher odds of being overweight/obese than those in the lowest wealth quintiles (COR (95%CI) = 2.30 (1.25-4.26) and P-value = 0.011.

Table 11: Sociodemographic characteristics & overweight/obesity among adolescents in private schools with & without adequate space for physical activity in Addis Ababa, 2016

Variable	Overweight/Obesity				COR (95% CI)
	Yes		No		
	n	%	n	%	
Age in years					
10-14	106	16.8	527	83.3	1.00
15-19	111	17.3	532	82.7	1.04 (0.66-1.63)
Sex					
Male	89	14.0	549	86.1	1.00
Female	128	20.1	510	79.9	1.55 (1.01-2.36) *
Grade					
5-8	112	17.4	532	82.6	1.00
9-12	105	16.6	527	83.4	0.95 (0.64-1.39)
School performance (n=1262)					
Excellent	71	16.8	352	83.2	1.00
Very Good	55	14.0	339	86.0	0.80 (0.57-1.14)
Good	73	19.6	299	80.4	1.21 (0.82-1.79)
Satisfactory & Poor	16	21.9	57	78.1	1.39 (0.80-2.42)
Religion					
Orthodox	163	16.5	826	83.5	1.00
Muslim	14	16.9	69	83.1	1.03 (0.57-1.86)
Protestant	37	21.1	138	78.9	1.36 (0.93-1.99)
Catholic	1	6.3	15	93.8	0.34 (0.03-3.23)
Other	2	15.4	11	84.6	0.92 (0.14-5.60)
Father's educational status					

No formal education	8	13.1	53	86.9	1.00
Primary school (grade1-8)	11	14.7	64	85.3	1.14 (0.38-3.4)
Secondary school (grade 9-12)	51	19.6	209	80.4	1.62 (0.69-3.76)
Above secondary school	105	16.5	533	83.5	1.30 (0.67-2.53)
Mother's educational status					
No formal education	11	15.5	60	84.5	1.00
Primary school (grade1-8)	14	12.3	100	87.7	0.76 (0.25-2.36)
Secondary school (grade 9-12)	59	17.7	274	82.3	1.17 (0.47-2.95)
Above secondary school	87	16.2	449	83.8	1.06 (0.50-2.24)
Living with					
With both parents	169	17.1	820	82.9	1.00
With father/mother only	32	18.5	141	81.5	1.10 (0.62-1.96)
With siblings	4	11.8	30	88.2	0.65 (0.16-2.57)
With relatives	12	16.0	63	84.0	0.920.42-2.02)
Family size					
≤ 5	112	16.9	549	83.1	1.00
> 5	105	17.1	510	82.9	1.01 (0.74-1.37)
Socioeconomic status (Wealth index)					
Lowest	32	12.5	225	87.6	1.00
Second	38	14.5	224	85.5	1.19 (0.70-2.03)
Middle	61	24.7	186	75.3	2.30 (1.25-4.26) *
Fourth	43	16.9	212	83.1	1.43 (0.94-2.17)
Highest	43	16.9	212	83.1	1.43 (0.87-2.33)

* = statistically significant

5.2.2 School environment

Students in schools without adequate space for physical activity had 1.41 times higher odds of being overweight/obese than those students in schools with adequate space for physical activity, COR (95% CI) = 1.41 (1.02-1.96) and P-value = 0.041.

Table 12: School environment & overweight/obesity among adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	Overweight/Obesity				COR (95% CI)
	Yes		No		
	n	%	n	%	
School has adequate space for physical activity					
Yes	93	14.6	545	85.4	1.00
No	124	19.4	514	80.6	1.41 (1.02-1.96) *
School outdoor physical education classes per week					
≤ 45 minutes	61	18.7	265	81.3	1.00
46-90 minutes	148	16.7	736	83.3	0.87 (0.55-1.38)
>90 minutes	8	12.1	58	87.9	0.60 (0.19-1.88)
School recess (break) time					
15 minutes	38	21.2	141	78.8	1.00
20 minutes	66	16.3	339	83.7	0.72 (0.45-1.16)
30 minutes	113	16.3	579	83.7	0.72 (0.41-1.29)
Physical activity club					
No	14	12.0	103	88.0	1.00
Yes	203	17.5	956	82.5	1.56 (0.76-3.22)
School cafeteria					
No	55	17.7	255	82.3	1.00
yes	162	16.8	804	83.2	0.93 (0.67-1.29)
Cafe serve sweet foods (n=966)					
No	86	17.3	411	82.7	1.00
yes	76	16.2	393	83.8	0.92 (0.60-1.42)
Proximity of fast food vendors					
≥ 10 minutes	35	17.2	169	82.8	1.00
5-9 minutes	80	16.1	418	83.9	0.92 (0.57-1.51)
< 5 minutes	102	17.8	472	82.2	1.04 (0.75-1.46)

* = statistically significant

5.2.3 Physical activity and sedentary behavior

Adolescents with low physical activity level (TPA < 30 minutes per day) were found to have an increased odds of being overweight/obese than adolescents who had high level of TPA, COR (95%CI) = 2.05 (1.42-2.96) and P-value = 0.001. Sedentary behavior was also significantly associated of which ≥ 8 hours sedentary time had increased odds of

overweight/obesity than < 8 hours sedentary time, COR (95% CI) = 1.66 (1.07-2.59) and P-value = 0.027.

Table 13: Physical activity, sedentary behavior & overweight/obesity among adolescents in private schools with and without adequate space for physical activity in Addis Ababa 2016

Variable	Overweight/Obesity				COR (95% CI)
	Yes		No		
	n	%	n	%	
Total Physical Activity Level					
High	98	14.2	592	85.8	1.00
Moderate	56	16.6	281	83.4	1.20 (0.84-1.73)
Low	63	25.3	186	74.7	2.05 (1.42-2.96) *
Time spent sitting or reclining per day					
<8 hours	92	13.6	583	86.4	1.00
≥8 hours	125	20.8	476	79.2	1.66 (1.07-2.59) *

* = statistically significant

The odds of being in schools without adequate space for physical activity among those who had low level of TPA is 1.86 times higher than those who had high level of TPA, COR (95% CI) = 1.86 (1.37-2.53) at significant level of p value 0.001. Similarly adolescents with moderate TPA level also had 1.56 times higher odds of being overweight or obese than those with high level TPA, COR (95% CI) = 1.56 (1.15-2.15) at p-value of 0.008.

Table 14: Physical activity and adequacy of space for physical activity in private schools in Addis Ababa, 2016

Variable	School has adequate space				COR (95% CI)
	Yes		No		
	n	(%)	n	(%)	
Total Physical Activity Level					
High	304	44.1	386	55.9	1.00
Moderate	186	55.2	151	44.8	1.56 (1.15-2.15) *
Low	101	59.4	101	40.6	1.86 (1.37-2.53)
Time spent sitting or reclining per day					
<8 hours	317	47.0	358	53.4	1.00
≥8 hours	321	53.4	280	46.6	1.29 (0.97-1.73)

5.2.4 Food consumption frequency

From the list of different food item consumption frequencies, Milk, cheese or yoghurt consumption > once per day was found to have 0.51 times decreased odds of being overweight/obese than those who consumed ≤ once per day. COR (95% CI) = 0.49 (0.26-0.91) which was statistically significant, P-value = 0.027. Consuming meat > once a day was also significantly associated with 1.35 times higher odds of being overweight/obese than consuming meat ≤ once a day. COR (95%CI) = 1.35 (1.02-1.78) and P-value = 0.038. The remaining food item consumption frequencies were not significantly associated with overweight/obesity.

Table 15: Different food item consumption frequency of adolescents & overweight/obesity in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	Overweight/Obese				COR (95% CI)
	Yes		No		
	n	%	n	%	
Bread or other cereal products					
≥ Once a day	196	17.1	952	82.9	1.00
< Once a day	21	16.4	107	83.6	0.95 (0.55-1.66)
Vegetables					
≥ Once a day	76	16.6	382	83.4	1.00
< Once a day	141	17.2	677	82.8	1.05 (0.70-1.57)
Fruits					
≥ Once a day	73	16.9	360	83.1	1.00
< Once a day	144	17.1	699	82.9	1.01 (0.70-1.50)
Milk, cheese or yoghurt					
≤ Once a day	206	17.7	955	82.3	1.00
> once a day	11	9.6	104	90.4	0.49 (0.26-0.91) *
Meat					
≤ Once a day	189	16.5	954	83.5	1.00
> Once a day	28	21.1	105	78.9	1.35 (1.02-1.78) *
Egg					
≤ Once a day	213	17.2	1026	82.8	1.00
> Once a day	4	10.81	33	89.2	0.58 (0.21-1.65)
Legumes, nuts or seeds					
≥ Once a day	91	14.8	526	85.3	1.00

< Once a day	126	19.1	533	80.9	1.37 (0.89-2.09)
Sugary or sweet foods					
≤ Once a day	188	16.8	930	83.2	1.00
> Once a day	29	18.4	129	81.7	1.11 (0.70-1.76)
Sweet or sugar drinks					
≤ Once a day	203	17.2	980	82.8	1.00
> Once a day	14	15.1	79	85.0	0.85 (0.40-1.84)
Oil and fat					
≤ Once a week	189	17.6	885	82.4	1.00
> Once a week	28	13.9	174	86.1	0.75 (0.48-1.18)
Fast foods					
≤ Once a day	202	16.7	1010	83.3	1.00
> Once a day	15	23.4	49	76.6	1.53 (0.79-2.96) *

* = statistically significant

5.2.5 Meal pattern, sleeping time and means of transportation

Consumption of ≤ 3 meals per day had 2.05 times higher odds of being overweight/obese than consuming > 3 meals per day, COR (95% CI) = 2.05 (1.42-2.96), P-value=0.001. Skipping meal or irregular breakfast and dinner consumption had 2.07 and 1.72 times higher odds of being overweight/obese than those who consume daily with COR (95% CI) = 2.07 (1.35-3.18), 1.72(1.38-2.15) and P-value = 0.003 & < 0.001 respectively. Those who used private car as means of transportation from home to school and from school back to home had significantly higher odds of being overweight/obese, COR (95% CI) = 1.99 (1.23-3.22) and P-value = 0.008.

Table 16: Meal pattern, sleeping time, means of transportation & overweight/obesity among adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	**Overweight/Obesity**				**COR (95% CI)**
	Yes		**No**		
	n	**%**	**n**	**%**	
Meals per day					
> 3 meals	64	11.6	489	88.4	1.00
≤ 3 meals	153	21.2	570	78.8	2.05 (1.42-2.96) *
Breakfast consumption pattern					
Daily	128	13.9	793	86.1	1.00

Not daily	89	25.1	266	74.9	2.07 (1.35-3.18) *
Lunch consumption pattern					
Daily	193	17.2	929	82.8	1.00
Not daily	24	15.6	130	84.4	0.89 (0.49-1.61)
Snack consumption pattern					
Daily	111	15.5	604	84.5	1.00
Not daily	106	18.9	455	81.1	1.27 (0.90-1.78)
Snack frequency per day (n=1211)					
Less than once a day	39	17.8	180	82.2	1.00
Once a day	146	17.0	715	83.0	0.94 (0.61-1.45)
≥ Twice a day	16	12.2	115	87.8	0.64 (0.36-1.13)
Dinner consumption pattern					
Daily	122	14.3	729	85.7	1.00
Not daily	95	22.4	330	77.7	1.72 (1.38-2.15) *
Sleeping Time					
< 8 Hours	58	18.4	257	81.6	1.00
8-10 Hours	149	16.7	744	83.3	0.89 (0.59-1.33)
> 10 Hours	10	14.7	58	85.3	0.76 (0.34-1.73)
Means of transportation					
Two way (from home to school & from school back to home) (n=1117)					
Walking	67	14.4	400	85.7	1.00
Public transportation	52	17.8	241	82.3	1.29 (0.73-2.29)
Contract taxi/school bus	36	15.5	197	84.5	1.09 (0.72-1.64)
Private car	31	25.0	93	75.0	1.99 (1.23-3.22) *
One way (from home to school or from school back to home) (n=159)					
Walking/cycling	7	21.9	25	78.1	1.00
Public transportation	9	20.0	36	80.0	0.89 (0.19-4.21)
Contract taxi/school bus	3	27.3	8	72.7	1.34 (0.27-6.55)
Private car	12	16.9	59	83.7	0.73 (0.24-2.22)

* = statistically significant

5.2.6 Home environment

No significant association was found for home environmental determinants.

Table 17: Home environment & overweight/obesity among adolescents in private schools with and without adequate space for physical activity in Addis Ababa, 2016

Variable	Overweight/Obesity				COR (95% CI)

	Yes		No		
	n	%	n	%	
Walking distance from home to school (n=1265)					
≤15minutes	71	18.7	309	81.3	1.00
16-30 minutes	75	17.1	365	83.0	0.89 (0.60-1.34)
31-45 minutes	18	15.3	100	84.8	0.78 (0.47-1.30)
46-60 minutes	31	17.0	151	83.0	0.89 (0.51-1.55)
>60 minutes	20	13.8	125	86.2	0.70 (0.40-1.22)
Walking distance from home to public physical activity facilities (n=1182)					
≤ 15minutes	99	16.1	517	83.9	1.00
16-30 minutes	50	17.2	241	82.8	1.08 (0.67-1.75)
31-45 minutes	13	24.5	40	75.5	1.70 (0.88-3.26)
46-60 minutes	23	16.1	120	83.9	1.00 (0.50-2.00)
> 60 minutes	14	17.7	65	82.3	1.12 (0.56-2.26)
Having television in bed room					
No	151	16.3	773	83.7	1.00
Yes	66	18.8	286	81.3	1.18 (0.76-1.82)
Time spent on Television					
≤ 2.00 hours per day	138	16.8	686	83.3	1.00
> 2.00 hours per day	79	17.5	373	82.5	1.05 (0.73-1.52)
Frequency of watching fast food and sugary diet advertisements					
Never	11	17.2	53	82.8	1.00
Sometimes	111	18.1	502	81.9	1.06 (0.52-2.16)
Usually	54	17.9	248	82.1	1.05 (0.54-2.02)
Daily	41	13.8	256	86.2	0.77 (0.38-1.54)

5.3 Multivariate logistic regression analysis

Collinearity was checked for the independent variables that could possibly be collinear and the largest variance inflation factor was for the adequacy of space for physical activity and based on previous studies also availability of open space was found to have a casual effect on physical activity and in turn affected overweight/obesity but not direct relationship between open space and overweight/obesity.

So that, adequacy of space was not taken into the multivariate model rather tested for effect modification using causal way. Based on the causal way, adequacy of space in schools and total physical activity both independently had statistically significant association with overweight/obesity. Adequacy of space and physical activity were also significantly associated with each other. Finally when the association of the two independent variables and the outcome variable (overweight/obesity) was checked, the effect of open space disappeared which confirmed its role as an effect modifier.

Partial correlation test was conducted to see the indirect effect of adequacy of space on overweight/obesity holding the effect of physical activity. The partial correlation between overweight/obesity and adequacy of space while accounting for the effect (explanatory power) of physical activity was found to be statistically significant with partial correlation coefficient (r) = 0.06 and p value of 0.0341.

In the multivariate model, variables with P-value < 0.2 on the bivariate regression analysis and important variables for the objective of the study based on literature review were entered to the multivariate model and stepwise backward regression procedure was applied.

Female sex, sitting ≥ 8 hours per day, eating dinner irregularly, meat consumption > once a day were significantly associated with overweight/obesity in the bivariate analysis but their association disappeared in the multivariate model after being adjusted for other predictor variables.

In the final model of the multivariate regression, those in the middle wealth quintile, low total physical activity, using private cars as a means of transportation from home to school and school back to home than walking, consumption of milk, cheese or yoghurt > once a day, ≤ 3 meals per day and irregular breakfast consumption pattern were the variables that were significantly associated with overweight/obesity (table 16).

Concerning socioeconomic status those within the middle wealth quintile had 2.05 times higher odds of being overweight/obese than those within the lower wealth index, AOR (95% CI) = 2.05 (1.12-3.74).

While the effect of other predictor variables was controlled adolescents with low total physical activity level per day had 1.81 times higher odds of being overweight / obese than those with higher total physical activity, AOR (95% CI) = 1.81 (1.26-2.62). The odds of being overweight/obese in those who used private car as a means of transportation from home to school and from school back to home was significantly higher than those who walked through home to school and school to home. AOR (95% CI) = 1.95 (1.17-3.24).

Milk, cheese or yoghurt consumption > once a day was associated with lower odds of overweight/obesity than consumption ≤ once a day after adjusting for other predictors also. AOR (95% CI) = 0.50 (0.27-0.91). Consumption of ≤ 3 meals per day had 1.89 times higher odds of being overweight/obese than consuming > 3 meals per day, AOR (95% CI) = 1.89 (1.14-3.13). The odds of overweight/obesity among those eating breakfast irregularly was 1.97 higher than those who consume daily with AOR (95% CI) = 1.91 (1.14-3.19).

Table 18: Environmental and Individual level determinants of overweight/obesity among adolescents in private schools with & without adequate space for physical activity in Addis Ababa, 2016

Variable	Overweight/Obesity				COR (95% CI)	AOR (95% CI)
	Yes		No			
	n	%	n	%		
Socioeconomic status (Wealth index)						
Lowest	32	12.5	225	87.6	1.00	1.00
Second	38	14.5	224	85.5	1.19 (0.70-2.03)	1.13 (0.64-1.99)
Middle	61	24.7	186	75.3	2.30 (1.25-4.26)	2.35 (1.25-4.43)*
Fourth	43	16.9	212	83.1	1.43 (0.94-2.17)	1.29 (0.83-2.00)
Highest	43	16.9	212	83.1	1.43 (0.87-2.33)	1.44 (0.87-2.39)
Total Physical Activity per day						
High	98	14.2	592	85.8	1.00	1.00
Moderate	56	16.6	281	83.4	1.20 (0.84-1.73)	1.22 (0.80-1.86)
Low	63	25.3	186	74.7	2.05 (1.42-2.96)	1.81 (1.26-2.62)*
Milk, cheese or yoghurt						
≤ Once a day	206	17.7	955	82.3	1.00	1.00

> Once a day	11	9.6	104	90.4	0.49 (0.26-0.91)	0.46 (0.23-0.96)*
Meals per day						
> 3 meals	64	11.6	489	88.4	1.00	1.00
≤ 3 meals	153	21.2	570	78.8	2.03 (1.36-3.02)	1.72 (1.25-2.37)*
Breakfast consumption pattern						
Daily	128	13.9	793	86.1	1.00	1.00
Not daily	89	25.1	266	74.9	2.07 (1.35-3.18)	1.91 (1.26-2.88)*
Means of transportation - Both ways (from home to school & from school back to home) (n=1117)						
Walking	67	14.4	400	85.7	1.00	1.00
Public transportation	52	17.8	241	82.3	1.29 (0.73-2.29)	1.08 (0.62-1.89)
Contract taxi/school bus	36	15.5	197	84.6	1.09 (0.72-1.64)	1.12 (0.76-1.64)
Private car	31	25.0	93	75.0	1.99 (1.23-3.22)	1.91 (1.21-3.04)*

Adjusted for sex, sedentary time per day, school breaks, home to public physical activity facility distance, home to school distance, meat, oil and fat, fast food, legume and nut consumption, snack and dinner consumption pattern and snack frequency

* = statistically significant

6. Discussion

This study was aimed at comparing the magnitude of overweight/obesity among adolescents in private schools with and without adequate space for physical activity and exploring other environmental and individual level determinants. It was a comparative cross-sectional study. Inadequate space in schools, physical inactivity, traveling with private cars, middle socioeconomic status, skipping breakfast and ≤ 3 meals per day were factors significantly associated with overweight/obesity.

6.1 Sociodemographic factors

It was found that adolescents in the middle wealth quintile had higher odds of overweight/obesity than those in the lowest wealth quintiles. This was contradicting with the findings of other two studies in the same study area (36, 45). But this could be due to the fact that the current study was only in private schools unlike the previous two studies that were conducted in both private and governmental schools. There was also a study in Addis Ababa supporting the current result and found that being in the middle income family than those of lower income family were also positively associated with overweight/obesity (34).

6.2 Nutritional status and School environmental factors

The combined magnitude of overweight and obesity among schools without adequate space for physical activity was significantly higher than the magnitude among schools with adequate space for physical activity. This could be explained by the difference in the total physical activity level in both categories of schools. The median (inter quantile range) of TPA was 73.4 (73.6) versus 57.9 (60.0) minutes per day in schools with and without adequate space for physical activity respectively.

In the other way the combined magnitude of thinness and severe thinness was also higher in schools without adequate space for physical activity. The possible reason could be majority (54.1%) of adolescents in schools without physical activity were males (p-value = 0.04) in which thinness/severe thinness was also higher in magnitude.

The effect of adequacy of space on overweight/obesity was also statistically significant in the bivariate logistic regression analysis. Partial correlation test also yielded statistically significant correlation between overweight/obesity and adequacy of space accounting for the explanatory power of physical activity.

Similar results were found in a study conducted in 2 low income Africa American neighborhoods in New Orleans among inner city school children. The study evaluated the effect of providing a safe play space (school yards) on the physical activity level of inner-city schoolchildren. After 2 years the number of children who were physically active was 84% higher in the intervention neighborhood than the comparison neighborhood. The study also showed that children in the intervention school reported declines in watching television, watching movies and DVDs, and playing video games on weekdays relative to the children in the comparison school (46).

A playground redesign intervention study in England among 26 schools also revealed playground intervention was effective in increasing children's recess physical activity over time (47).

In a study conducted among 20 schools in Minnesota based on neighborhood environmental variables measured using Geographic Information Systems data, lower proportion of neighborhood park/recreation land was also associated with higher BMI z-score (40).

Though most studies reviewed show significant association between space and physical activity and space and BMI, there are still contradicting fndings. A study conducted in Massachusetts among urban students from KG up to 12th grade that open space was not found to be associated with BMI. It was shown that the open-space variable used in the study included a combination of greenspace land characteristics such as forest and parks plus an additional lower population density category that could be the possible explanation (39).

Concerning other school environmental determinants, availability of physical activity clubs in schools was not associated with overweight/obesity and it contradicts studies conducted in USA and South Africa which showed lower odds of overweight/obesity and an increased level of physical activity respectively among those who used sport clubs. This could possibly be because the actual usage of clubs was not assessed other than the availability which was the case in both studies. The other possible explanation could be the lesser variability of the data in which majority (89.7%) of the adolescents were in schools who had physical activity club (24, 48). This possible explanation could also apply to the rest of school environmental factors not to be associated with overweight/obesity.

6.3 Physical Activity and sedentary behavior

This study found that physical activity was significantly associated with overweight/obesity in the multivariate model and this finding was consistent in different studies. A 5 year cohort of students in Vietnam found that the prevalence of overweight significantly increased while time spent in moderate to vigorous physical activity decreased significantly (23). Other studies conducted in Saudi Arabia and Sri Lanka also showed that lower physical activity was associated with overweight/obesity (33, 35).

In the other way global school based data analysis study conducted in Ghana and Uganda showed no association between physical activity and overweight/obesity. It was reported that most of the study population were physically inactive and lesser variability in physical activity level could be the reason for the absence of association (19).

One study conducted in Addis Ababa also showed no association between physical activity and overweight/obesity. The possible explanation for the contradicting result with the current study could be the difference in their study population which was high school adolescents unlike the current study which included schools having both primary and secondary education and age 10-19 years. In the current study it was also showen that there is variability in physical activity level of adolescents age 10-14 and 15-19 years which was 68.6 versus 61.7 minutes per day of median TPA (36).

Conversely another study in Addis Ababa showed high Total Physical Activity level to be protective of overweight/obesity AOR (95%CI)=0.21(0.08,0.57) (45).

Sedentary behavior was associated with increased odds of overweight/obesity in the bivariate analysis till the association disappeared in the multivariate model while it was adjusted for other predictors. It could possibly be that the information was contained in low physical activity and partly by means of transportation from home to school. Other studies in Addis Ababa showed positive association between sedentary behavior and overweight/obesity (36, 45).

Traveling with private car from home to school and school back to home was found to have an increased odds being overweight/obese than walking and the finding was consistent with other studies. A community based study in Brazil on school children showed that those who

traveled by car to school had an increased odds of overweight than those who walked to school OR = 1.50, 95% CI=1.14–1.91 (49).

A study conducted in Addis Ababa also showed similar findings. Using car as a means of transportation from home to school and from school to home showed increased odds of being overweight/obese by two fold COR=2.2; 95% CI=1.4, 3.4 (36).

6.4 Dietary habit

Irregular breakfast consumption and having less than three meals per day was found to have increased odds of overweight/obesity. The finding was consistent with another study in the same study area in which the odds of being overweight/obese among those who consumed breakfast irregularly was found to be AOR = 2.3, 95% CI; 1.4-3.8 (36). Similar finding of irregular breakfast consumption was found to be associated with increased odds of overweight/obesity in other school based study in Addis Ababa (50).

Sex specific results were also found in two other studies conducted in China and India. In those studies irregular breakfast consumption is associated with increased odds of overweight/obesity for females only in the China's study and for males only in the Indian's study. But generally most studies found either sex specific or both sex association of skipping breakfast and overweight/obesity which was consistent with the current study (25, 34).

Concerning meals per day, having less than three meals was associated with increased odds of overweight/obesity AOR = 1.9, 95% CI; 1.12-3.28 (36) which was consistent with the current study. There was also a study with contradicting result in Addis Ababa which showed adolescents who consumed more than three meals per day had 4 times higher odds to be overweight/obese than those with less than three meals per day [AOR (95%CI) = 4.0 (1.26, 12.95) (45).

The result of meals per day could be seen together with consistent findings of the association of breakfast skipping and overweight/obesity. Breakfast Skippers may tend to consume less than three meals per day especially in Ethiopian context where snacking habit is not much developed and skipping meal could be associated with binge eating and slowed metabolic rate so that contributing to wait gain (51). But more frequent meals could also be associated with large portion sizes. In the other way there may also be dietary habit change after being

overweight /obese putting the need to explain the temporal relationship. So that further investigation may be needed to confirm.

Consumption of milk, cheese or yoghurt was found to be associated with decreased odds of overweight/obesity. Those who had milk, cheese or yoghurt ≥ once a day had decreased odds of being overweight/obese. This result is contradicting with the finding in a similar school based study in Addis Ababa which found that those who consumed milk ≥ once a day had increased odds of being overweight/obesity, AOR = 2.64 95% CI (1.14-6.13) (36).

In the other way, supporting results of the current study, obese adolescents were found to have less frequent consumption of milk than non-obese ones in a study conducted in Saudi (33). A cohort of males of 12 years follow-up yielded consistent finding with the current study confirming high intake of milk and other diary fat was associated with a lower risk of central obesity and rather a low intake of dairy fat intake was associated with a higher risk of central obesity (52).

Another systematic review and meta-analysis of prospective cohorts also supported the protective effect of diary in which children in the highest intake group were 38% less likely to have childhood overweight/obesity (OR)= 0.62; 95% CI: 0.49, 0.80) (53).

6.5 Home environmental factors

Concerning home environment, home to school distance was not associated with overweight/obesity which was a contradicting finding with a study in Brazil which showed an increased odds of overweight/obesity among those who lived near to their schools (≤ 5 km) (OR = 1.64, 95% CI 1.06–2.39). This could be due to the data were self-reports, it might not been proximal to the actual measurement (49).

6.6 Limitations and strength of the study

Limitations of the study

- It could give a better result if more schools were recruited in the study to account for variability of school environmental factors
- Not including government and public schools and schools with only primary or secondary education
- Temporal relationship could not be identified if there was lifestyle change after being overweight/obese

Strength of the study

- Trying to address a growing public health importance concern of the nation
- Including all age groups of adolescents

6.7 Conclusions and recommendations

Conclusions

- The findings of the study gave insight on the effect of inadequate space in schools as an important contributor to physical inactivity and a higher burden of overweight/obesity.
- Low physical activity and traveling with private car were also found to be significant factors associated with overweight/obesity among private school adolescents.

Recommendations

For private school regulatory bodies (Urban development office)

- The relevant officials need to consider having adequate space as one of the key criteria in licensing private schools along with other academic requirements.
- There should also be an ongoing monitoring of the implementation of existing guidelines regarding space in schools.

For school officials

- Schools should be designed in a way that promotes active living such as providing adequate space for physical activity
- Should work on enhancing students' physical activity, promoting walking to school

For the general public

- Adolescents should be promoted to increase their physical activity level and walk to school rather than using private car.

For researchers

- Further research incorporating large number of schools accounting for variability between and within schools is needed
- Studies that could assess individual daily experiences, teachers' value towards overweight/obesity and psychosocial concerns of adolescents related to overweight/obesity

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8. Annexes

Annex 1: Informed Consent and/or Ascent Form (English version)

Addis Ababa University, School of public health

Subject Information Sheet

Hello,

My name is ———————————— I am here on behalf of Tsedey Moges, student of Addis Ababa University School of public health. She is conducting a research on "The effect of school environment on overweight/obesity among private school adolescents in Addis Ababa". She received permission from Addis Ababa university school of public health and the respected sub city education bureau to conduct this study.

You are selected by three stage random sampling technique to participate in this study because you are currently attending in one of the selected private school for the study purpose. Your participation is purely based on your willingness .You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment.

If you agree to participate in the study, your weight and height will be measured using standard measuring instruments. Only light closes will be wearing during weight measurement and height will be measured with bare foot. You will also be interviewed about your dietary habit, physical activity and sedentary behavior and your school and home environmental factors that could be associated with overweight/obesity. The measurement and interview will take about 30 minutes.

The study could provide base line data for policy makers and relevant stakeholders for designing and implementing effective overweight/obesity prevention and control programs and strategies. It could also give insight on the need of allocation of a reasonable space for physical activity in schools. The information that you provide will be kept confidential by using only code numbers and locking the data. Your name will not be written on the questionnaire. No one will have access to the non-coded data except the principal investigator and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

Informed Consent and/or Ascent Form

Based on the understanding of the above information, are you willing to participate in this study? A) Yes

B) No

If yes, I will continue and

If no I will skip to next participant after writing the reasons of refusal _____

_____

Respondent (For both under and above 18 years old)

Signature _____Date_____

Respondents Parent (for those under 18 years old)

Signature _____Date_____

Name of the person obtaining parental permission _____

Interviewer

Name_____ Signature_____

Questionnaires ID number_____

Date of interview_____ Starting time_____ Completed_____

Result of interview

A) Completed

B) Not completed

C) Partially completed

D) Refused

Checked by Supervisor: Name _____Signature_____

For further explanation use the Principal Investigator's Address;

Name: Tsedey Moges Yemiru

Email: tsedeymoges@gmail.com

Cell phone: +251 912 02 14 19

Instruction: circle all the possible answers of the respondent from the choice provided.

Annex 2: Survey Questionnaire (English Version)

Questionnaire ID Number _____

Addis Ababa University School of Public Health

Survey Questionnaire to assess individual and environmental determinants of adolescent overweight/obesity

Survey Questionnaire (English Version)

Respondent's first name	
Name of School	
Date of interview	_____/DD/_____/MM/_____/YR/
Time started	_____/Hr./_____/Mins./
Time ended	_____/Hr./_____/Mins./
Interviewer	Name _____ signature _____
Checked by Supervisor	Name _____ Signature _____

Addis Ababa University School of Public Health

Survey Questionnaire to assess individual and environmental determinants of adolescent overweight/obesity

Part1. Background information

No.	Questions	Responses	Skip
101	Age of respondent		
102	Sex of respondent	1. Male 2. Female	
103	What is your religion?	1. Orthodox 2. Catholic 3. Protestant 3. Muslim 4. Other (Specify) _____	
104	How much is your household family size including you?		
105	What is your father's educational Status?	1. Illiterate (can't read and write) 2. Can read and write 3. Primary school (grade 1-8) 4. Secondary school (grade 9-12) 5. Some college or technical school 6. College graduate or above 7. I don't know 8. Father is not alive	
106	What is your mother's educational status?	1. Illiterate (can't read and write) 2. Can read and write 3. Primary school (grade 1-8) 4. Secondary school (grade 9-12) 5. Some college or technical school 6. College graduate or above 7. I don't know 8. Mother is not alive	

107	With whom do you live?	1. With both of my parents 2. With my mother only 3. With my father only 4. With brothers/sisters 5. With grandparents 6. With cousins 7. With mother/father and a stepfather or stepmother 8. With my friends 9. Others (specify) _____	
108	Which grade are you now?		
109	What was your last year's rank in the class		
110	What was your last year's average grade/grade in the E.G.S.L.C.E.? (for those above grade 10)		

Part2. Household socio-economic status (Wealth Index)

The next questions ask about your household assets, services and housing conditions				
No.	**Questions**	**Responses**		**Skip**
1. Household assets & services – In answering the questions below please think of assets & services available in your household				
201	Television	1. Yes	2. No	
202	Radio/tape recorder	1. Yes	2. No	
203	Mobile telephone	1. Yes	2. No	
204	Non-mobile/fixed telephone	1. Yes	2. No	
205	Electric stove	1. Yes	2. No	
206	Refrigerator	1. Yes	2. No	
207	Laundry machine	1. Yes	2. No	
208	Sofa	1. Yes	2. No	
209	Bicycle/motorcycle	1. Yes	2. No	
210	Car	1. Yes	2. No	

211	Domestic servant	1. Yes 2. No	
2. Housing Condition – please answer the following questions thinking about the housing condition of your household			
212	Home ownership	1. Private 2. Government 3. Rent 4. Other (specify) ———————	
213	Number of rooms		
214	Number of individuals per sleeping room		
215	Roofing material	1. Natural material 2. Corrugated iron 3. Tiles 4. Other (specify) ———————	
216	Flooring material	1. Mud 2. Parquet/polished wood 3. Cement 4. Ceramic tiles 5. Carpet 6. Other (specify) ———————	

Part3. Dietary information (Food frequency questionnaire)

The next questions ask about diet that you usually eat. As you answer these questions, please think of the foods u consumed last month									
No.	**Food items**	**Frequency of consumption**							**Skip**
		More than twice a day	Once a day	2-4 times per week	once a week	1-3 times per month	Less than once a month	Never	
301	Bread and cereals								
302	Vegetables								
303	Fruits								
304	Milk, cheese and yoghurt								
305	Meat								
306	Egg								
307	Legumes, nuts and seeds (E.g. beans, peas, lentils, nuts)								
308	Sugar and sweet foods (E.g. sugar, honey, chocolates, candies, cookies and cakes)								
309	Sugar drinks like sweetened juice and soft drinks								
310	Oil and fat (E.g. oil, fat or butter added to foods used for cooking)								
311	Fast foods (E.g. Chips, sandwiches, doughnuts, pasty, burger, pizza, fried foods and ice cream)								

Part4. Eating and Health habits

The next questions ask about your dietary and health habits within the last one year			
No	**Questions**	**Responses**	**Skip**
401	How many times do you normally eat per day?		
402	How often do you eat Breakfast?	1. Daily 2. Usually 2. Sometimes 4. Never	
403	How often do you eat Lunch?	1. Daily 2. Usually 3. Sometimes 4. Never	
404	How often do you eat Snack?	1. Daily 2. Usually 3. Sometimes 4. Never	
405	How many times do you eat Snack in a day?		
406	How often do you eat Dinner?	1. Daily 2. Usually 3. Sometimes 4. Never	
407	How many hours do you spent sleeping in a day?		
408	Which one do you usually use to travel from home to school	1. Walking 2. Bicycle 3. public transport (taxi, bus, train) 4. contract taxi/school bus 5. private car	
409	Which one do you usually use to travel from school back to home?	1. Walking 2. Bicycle 3. public transport (taxi, bus, train)	

		4. contract taxi/school bus 5. private car	

Part5. Physical activity questionnaire

Physical Activity			
Next I am going to ask you about the time you spend doing different types of physical activities in a typical week. Please answer these questions even if you do not consider yourself to be a physically 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.			
In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate. 'Moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.			
Questions		**Responses**	**Skip**
1. Regular exercise at school Physical education class/home/public PA facilities and home works			
1.1 Vigorous-intensity physical activities			
501	Does your regular exercise or home works involve vigorous-intensity activity that causes large increases in breathing or heart rate like carrying or lifting heavy loads, aerobics, push-up/pull-up and jumping rope for at least 10 minutes continuously?	1. Yes 2. No	If No, go to 504
502	In a typical week, on how many days do you do vigorous-intensity activities as part of your regular exercise/home works?	Number of days —— —————	
503 (1-2)	How much time do you spend doing vigorous-intensity activities on a typical day?	Hours———— minutes————	
1.2 Moderate-intensity physical activities			
504	Does your regular exercise/home works	1. Yes	If No, go

	involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking or carrying light loads for at least 10 minutes continuously?	2. No	to 507
505	In a typical week, on how many days do you do moderate-intensity activities as part of your regular exercise/home works?	Number of days———	
506 (1-2)	How much time do you spend doing moderate-intensity activities on a typical day?	Hours——— minutes——	
2. Travel to and from places			
The next questions exclude the regular exercises at school/home/public PA facilities and home works that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example from home to school, to place of worship…			
507	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	1. Yes 2. No	If No, go to 510
508	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days _____	
509 (1-2)	How much time do you spend walking or bicycling for travel on a typical day?	Hours——— minutes—--	
3. Recreational activities			
The next questions exclude the regular exercise, home works and transport activities that you have already mentioned. Now I would like to ask you about recreational (leisure time) activities, during school breaks or at home).			
3.1 Vigorous-intensity physical activities			
	Do you do any vigorous-intensity sports or	1. Yes	If No, go

510	recreational activities that cause large increases in breathing or heart rate? E.g. running, playing football or basketball and aerobic dancing for at least 10 minutes continuously?	2. No	to 513
511	In a typical week, on how many days do you do vigorous-intensity sports or recreational (leisure time) activities?	Number of days———	
512 (1-2)	How much time do you spend doing vigorous-intensity sports or recreational activities on a typical day?	Hours———— minutes———	
3.2 Moderate-intensity physical activities			
513	Do you do any moderate-intensity sports or leisure time activities that cause a small increase in breathing or heart rate such as swimming and playing volleyball for at least 10 minutes continuously?	1. Yes 2. No	If No, go to 516
514	In a typical week, on how many days do you do moderate-intensity sports, or recreational (leisure time) activities?	Number of days———	
515 (1-2)	How much time do you spend doing moderate-intensity sports or recreational (leisure time) activities on a typical day?	Hours——— minutes——	
4. Sedentary behavior			
The following question is about sitting or reclining at home, in classes or during leisure time [sitting at a desk, sitting with friends, travelling in car, bus, train, playing cards or watching television] but do not include time spent sleeping.			
516 (1-2)	How much time do you usually spend sitting or reclining on a typical day?	Hours———— minutes———	

Part6. Home environment profile

Below are questions about your home environment.			
No	**Questions**	**Responses**	**Skip**
601	How much time do you need to go from home to school (walking distance)?		
602	How much time should you travel to get public physical activity facilities from home (walking distance)?		
603	Do you have Television in your bed room	1. Yes 2. No	
604	How much time do you spent watching Television programs in a day		
605	How often do you watch fast food and sugary diet advertisements?	1. Daily 2. Usually 3. Sometimes 2. Never	

Part7. Anthropometric measurements

No	**Anthropometry**	**Reading**

701	Height (in centimeter)	
702	Weight (in kilogram)	

Thank you

Part 8. School environment profile (to be filled by interviewing school administrator and observation by the principal investigator)

Name of School	
Date of interview	_____/DD/_____/MM/_____/YR/
Time started	_____/Hr./_____/Mins./
Time ended	_____/Hr./_____/Mins./
Interviewer & Observer	Name _____ signature _____

Below are questions about your school environment			
S. No.	**Questions**	**Responses**	**Skip**
801	For how much time is outdoor physical education classes given per week in the school?		
802	How much is recess period in your school?		
803	Is there a physical activity club in the school?	1. Yes 2. No	
804	Is there a cafeteria in the school?	1. Yes 2. No	If no go to 808
805	Does the school cafeteria serve fast foods such as chips, burger, pizza, sandwiches, pasty, ice cream, doughnuts and fried foods?	1. Yes 2. No	
806	Does the school cafeteria serve sweets/sugary diets such as cakes, chocolates and candies?	1. Yes 2. No	

807	Does the school cafeteria serve sugar drinks like Coca-Cola and Sweetened juices?	1. Yes 2. No	
808	Within how much distance are fast food vendors available around the school (In Km or walking distance)?		

Thank you

Annex 3፡ Informed Consent and/or Ascent form (Amharic version)

አዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ፋኩልቲ የህብረተሰብ ጤና አጠባበቅ ትምህርት ክፍል

የተጠያቂው / መላሾች የመረጃ ቅፅ

ጤና ይስጥልን እንደምን ነዎት

ስሜ———————————————— **ይባላል፡፡ የመጣሁት በአዲስ አበባ ዩኒቨርስቲ የህብረተሰብ ጤና አጠባበቅ ትምህርት ክፍል ተማሪ የሆነችውን ፀደይ ሞገስን ወክዬ ነው፡፡ የትምህርት ቤት አካባቢያዊ ሁኔታ የጉርምስና ወቅት ከመጠን ያለፈ ውፍረት ላይ የሚያስከትለውን ተፅእኖ ለማወቅ በአዲስ አበባ በሚገኙ የግል ት/ቤቶች ላይ ጥናት እያደረገች ሲሆን ከአዲስ አበባ ዩኒቨርሲቲ ፣ አ/አ ት/ት ቢሮና ከተመረጡት ትምህርት ቤቶችም ፍቃድ አግኝታለች፡፡**

እርስዎ በዚህ ጥናት ላይ እንዲሳተፉ የተመረጡት በዘፈቀደ/በአጋጣሚ የናሙና አወሳሰድ ስልት መሰረት ለዚህ ጥናት አላማ ከተመረጡት ት/ት ቤቶች በአንዱ ውስጥ ስለሚማሩ ነው፡፡ የእርስዎ ተሳትፎ ሙሉ በሙሉ በእርስዎ ሙሉ ፍቃደኝነት ላይ የተመሰረተ ነው፡፡ በጥናቱ ላይ ያለመሳተፍ ሙሉ መብት አለዎት፡፡ ለመሳተፍ ፈቃደኛ ከሆኑ በኋላም በፈለጉት ጊዜ ማቆም ወይም ማቋረጥ ይችላሉ፡፡ በጥናቱ ባለመሳተፎ የሚደርስቦት ምንም አይነት ችግር አይኖርም፡፡

በጥናቱ ለመሳተፍ ከተስማሙ ክብደትዎና ቁመትዎን ደረጃቸውን በጠበቁ መሳሪያዎች እንለካለን፡፡ ክብደት በሚለካበት ጊዜ ቀለል ያሉ ልብሶች እንዲሁም ቁመት በሚለካበት ጊዜ ደግሞ በባዶ እግር ይሆናል፡፡ በተጨማሪም የተወሰኑ ጥያቄዎችን እንጠይቆታለን፡፡ በዚህ መጠይቅ ስለ አመጋገብ ልምድ ፤ አካላዊ እንቅስቃሴና በመቀመጥ የሚያሳልፉትን ጊዜ እንዲሁም ከመጠን ያለፈ ውፍረት ጋር የተገናኘ የት/ቤትና የቤት አካባቢያዊ ሁኔታዎች የተመለከቱ ጥያቄዎች እጠይቅዎታለሁ፡፡ በመጠይቁ ጊዜ ጥሩ ስሜት ካልተሰማዎት በማንኛውም ጊዜ አቋርጠው መሄድ ይችላሉ፡፡ መጠይቁና ልኬቱ 30 ደቂቃ ይህል ይፈጃል፡፡ ይህ ጥናት ፖሊሲ አውጪዎችና የሚመለከታቸው አከላት ከመጠን ያለፈ ውፍረትና ተያያዥ ችግሮቹን የመከላከያና መቆጣጠርያ መንገዶችን እንዲቀርፁና እንዲተገብሩ እንደ መነሻ ይሆናል የሚል ፅኑ እምነት አለን፡፡

በመጨረሻም ከእርስዎ የምንሰበስበው መረጃ ከስምዎ ጋር አይያያዝም፡፡ ስምዎት እንደማይጠቀስና ለማንም አካል አልፎ እንደማይሰጥ ልናረጋግጥ እንወዳለን፡፡ የዚህ ጥናት ውጤት ግን ተጠርዞ እና ተዘጋጅቶ ለሚመለከታቸው የጤና ድርጅቶ ወይም ለሌሎች አካላት ሊሰጥ ይችላል፡፡

የስምምነት መጠየቂያ/ማረጋገጫ ቅፅ

ከላይ በሰጠሦት መረጃ መሰረት በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ነሦት?

1. አዎ
2. አይደለሁም

ፍቃደኛ ካልሆኑ ምክኒያቱን ዕፈው ወደሚቀጥለው ተሳታፊ እለፍ———————————

———————————————————————————————————

የተሳታፊ ፊርማ (ከ 18 አመት በታችም በላይም ላሉ ልጆች)

ፊርማ———————————ቀን———————————

የተሳታፊ ቤተሰብ ፊርማ (ከ 18 አመት በታች ለሆኑ ልጆች)

ፊርማ——————————— ቀን———————————

የቤተሰብ ፍቃድ ያገኘው ልጅ ስም———————————

የመረጃ ሰብሳቢ

ስም———————————————ፊርማ———————

የመጠይቁ ቁጥር———————————

መጠይቁ የተካሄደበት ቀን————————የተጀመረበት ሰአት————ያለቀበት ሰአት———

የቃለ መጠይቁ ውጤት

1. ሙሉ በሙሉ የተሞላ
2. በከፊል የተሞላ
3. ምንም ያልተሞላ

በተቆጣጣሪዎች ተረጋግጧል፡ ስም———————————ፊርማ———————

ለተጨማሪ ማብራሪያ የዋና አጥኚውን አድራሻ ይጠቀሙ

ስም፡ ፀደይ ሞገስ

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ማሳሰቢያ፡ ተሳታፊዎች የሚሰጡትን መልስ ከተሰጡት አማራጮች ውስጥ ለይተው ያክብቡ

Annex 4:Survey questionnaires (Amharic version)

የመጠይቁ መለያ ቁጥር——————

በአዲስ አበባ ዩኒቨርስቲ ህክምና ሣይንስ ፋኩልቲ የህብረተሰብ ጤና አጠባበቅ ትምህርት ክፍል <u>በጉርምስና ወቅት ከመጠን ያለፈ ውፍረት ሊያመጡ የሚችሉ ግላዊና አካባቢያዊ ምክንያቶችን በተመለከተ የተዘጋጀ የጥናታዊ ፅሁፍ መረጃ መሰብሰቢያ መጠይቅ</u>

የት/ቤቱ ስም	
የተጠያቂው መለያ ቁጥር (ክፍልና ቁጥር)	
መጠይቁ የተሞላበት ቀን	_____/ቀን/ _____/ወር/ _____/ዓ.ም/
የተጀመረበት ሰአት	_____/ሰአት/ _____/ደቂቃ/
ያለቀበት ሰአት	_____/ሰአት/ _____/ደቂቃ/
ጠያቂ	ስም _____ ፊርማ _____
በተቆጣጣሪው ተረጋግጦአል	ስም _____ ፊርማ _____

ክፍል1. <u>**መሰረታዊ መረጃን የተመለከቱ ጥያቄዎች**</u>

ተ.ቁ	ጥያቄ	መልስ	ወደሚቀጥለው ጥያቄ ይሂዱ
101	ዕድሜህ/ሽ ስንት ነው?		
102	ፆታ	1. ወንድ 2. ሴት	
103	ሐይማኖትህ/ሽ ምንድነው?	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ካቶሊክ 5. ሌላ ካለ ይጠቀስ——————	
104	በምትኖርበት/ሪበት ቤት ውስጥ		

	አንተን/ቺን ጨምሮ የቤተሰብ ብዛት ስንት ነው?		
105	የወላጅ አባት የትምህርት ደረጃ?	1. ያልተማረ (ማንበብና መፃፍ የማይችል) 2. ማንበብና መፃፍ የሚችል 3. የመጀመሪያ ደረጃ (ከ1ኛ-8ኛ ክፍል) 4. ሁለተኛ ደረጃ (ከ9ኛ-12ኛ) 5. የተወሰነ የኮሌጅ ወይም ቴክኒክና ሙያ ት/ት ያለው 6. ኮሌጅ ያጠናቀ ወይም ከዛ በላይ 7. አላውቅም 8. አባቴ በህይወት የለም	
106	የወላጅ እናት የትምህርት ደረጃ ?	1. ያልተማረች (ማንበብና መፃፍ የማትችል) 2. ማንበብና መፃፍ የምትችል 3. የመጀመሪያ ደረጃ (ከ1ኛ-8ኛ ክፍል) 4. ሁለተኛ ደረጃ (ከ9ኛ-12ኛ ክፍል) 5. የተወሰነ የኮሌጅ ወይም የቴክኒክና ሙያ ት/ት ያላት 6. ኮሌጅ ያጠናቀቀች ወይም ከዛ በላይ 7. አላውቅም 8. እናቴ በህይወት የለችም	
107	ከማን ጋር ነው የምትኖረው/ሪው?	1. ከእናትና ከ አባቴ ጋር 2. ከእናቴ ጋር ብቻ 3. ከአባቴ ጋር ብቻ 4. ከእህቶቼ/ወንድሞቼ ጋር 5. ከአያቶቼ ጋር 6. ከአክስቴ/አጎቴ ልጆች ጋር 7. ከእናቴና ከእንጀራ አባቴ ወይም ከአባቴ እና ከእንጀራ እናቴ 8. ከጓደኞቼ ጋር 9. ሌላ ካለ ይገለፅ ————————	
108	ስንተኛ ክፍል ነህ/ሽ?		
109	በባለፈው አመት ከክፍል ስንተኛ		

	ደረጃ ወጣህ/ሽ?		
110	የባለፈው አመት አማካይ ውጤትህ/ሽ ስንት ነው? (ከ10ኛ ክፍል በላይ ለሆኑ የ10ኛ ክፍል የማትሪክ ውጤት ይገለፅ)		

ክፍል 2. <u>የቤተሰብን የሀብት ደረጃ የተመለከቱ ጥያቄዎች</u>

የሚቀጥሉት ጥያቄዎች የሚኖሩበት ቤት ውስጥ ስለሚገኙ ንብረቶችና የቤት አሰራር ሁኔታ ይመለከታል				
ተ.ቁ	**ጥያቄ**	**መልስ**		**ወደሚቀጥለው ጥያቄ ይሂዱ**
1. **የቤት ንብረት እና አገልግሎቶች** ፡- እባክዎ የሚቀጥሉትን ጥያቄዎች ቤትዎ ውስጥ ስለሚገኙ ንብረቶችና አገልግሎቶች እያሰቡ ይመልሱ				
201	ቴሌቪዥን	1. አለ	2. የለም	
202	ራዲዮ/ቴፕ	1. አለ	2. የለም	
203	ሞባይል/ተንቀሳቃሽ ስልክ	1. አለ	2. የለም	
204	የቤት (የመስመር) ስልክ	1. አለ	2. የለም	
205	የኤሌክትሪክ ምድጃ (ስቶቭ)	1. አለ	2. የለም	
206	ማቀዝቀዣ (ፍሪጅ)	1. አለ	2. የለም	
207	የልብስ ማጠቢያ ማሽን	1. አለ	2. የለም	
208	ሶፋ	1. አለ	2. የለም	
209	ብስክሌት/ሞተር ብስክሌት	1. አለ	2. የለም	
210	መኪና	1. አለ	2. የለም	
211	የቤት ሰራተኛ	1. አለ	2. የለም	
2. የቤት አሰራር ሁኔታ፡- እባክዎ የሚቀጥሉትን ጥያቄዎች ስለሚኖሩበት ቤት አሰራርና ሁኔታ እያሰቡ ይመልሱ				
212	የሚኖሩበት ቤት ባለቤትነቱ የማን ነው?	1. የግል 2. የመንግስት (የቀበሌ) 3. ከግለሰብ ኪራይ 4. ሌላ ካለ ይገለፅ ————————		

		—	
213	የሚኖሩበት ቤት ስንት ክፍል አለው?		
214	በቤትዎ ውስጥ በአንድ የመኝታ ክፍል ስንት ሰው ይጠቀማል?		
215	የሚኖሩበት ቤት ጣሪያው ምንድነው?	1. የተፈጥሮ ቁስ (ለምሳሌ ሳር ወይም እንጨት) 2. ቆርቆሮ 3. ግንብ 4. ሽክላ 5. ሌላ ካለ ይገለፅ ————————————	
216	የሚኖሩበት ቤት ወለል ምንድነው?	1. አፈር 2. ጣውላ 3. ሲሚንቶ 4. ሴራሚክ (ሽክላ) 5. ስጋጃ (ምንጣፍ) 6. ሌላ ካለ ይገለፅ ————————————	

ክፍል 3. <u>የአመጋገብ ሁኔታን የተመለከቱ ጥያቄዎች</u>

ከዚህ ቀጥሎ ያሉት ጥያቄዎች በተለምዶ አዘውትረው ሰለሚመገቡአቸው ምግቦች የተመለከቱ ናቸው። እባክዎ ጥያቄዎቹን ሲመልሱ **ባለፈው አንድ ወር ውስጥ** አዘውትረው የተመገቡአቸውን ምግቦች ያስቡ።

ተ.ቁ	የምግብ አይነቶች	የተመገቡበት ጊዜ ብዛት (ድግግሞሽ)							ወደሚቀጥለው ጥያቄ ይሂዱ
		በቀን ከ 2 ጊዜ በላይ	በቀን 1 ጊዜ	በሳምንት ከ 2-4 ጊዜ	በሳምንት 1 ጊዜ	በወር ከ 1-3 ጊዜ	በወር ከ1 ጊዜ በታች	በልቼ አላውቅም	
301	ዳቦ፣እንጀራ፣ ሩዝ፣ ፓስታ ወይም ሌሎች የእህል / ጥራጥሬ ውጤቶችን በምን								

	ያህል ጊዜ ይበላሉ?								
302	አትክልት በምን ያህል ጊዜ ይበላሉ?								
303	ፍራፍሬ በምን ያህል ጊዜ ይበላሉ?								
304	ወተት፣አይብ ወይም እርጎ በምን ያህል ጊዜ ይበላሉ?								
305	ስጋ በምን ያህል ጊዜ ይበላሉ?								
306	እንቁላል በምን ያህል ጊዜ ይበላሉ?								
307	ባቄላ ፣ አተር፣ምስር ወይም ለውዝ በምን ያህል ጊዜ ይበላሉ?								
308	ስኳር አዘል እና ጣፋጭ ምግቦች እንደ ኬክ፣አይስ ክሬም ቸኮሌት፣ከረሜላ፣ኩኪስ በምን ያህል ጊዜ ይበላሉ?								
309	ስኳር አዘል እና ጣፋጭ መጠጦችን ለምሳሌ ለስላሳ መጠጦችን እንደ ኮካ ኮላና የታሸጉ የፍራፍሬ ጭማቂዎችን በምን ያህል ጊዜ ይጠጣሉ?								
310	ጮማ ወይም ቅባት የበዛበት ምግብ በምን ያህል ጊዜ ይበላሉ?								
311	ፈጣን ምግቦች (እንደ በርገር፣ ቺፕስ፣ ፒዛ፣ ሳንድዊች፣ ፓስቲ፣ ዶናት፣ አይስ ክሬም ወይም የተጠበሱ ምግቦች) በምን ያህል ጊዜ ይበላሉ?								

ክፍል 4. <u>የአመጋገብ እና የጤና ልምዶችን የተመለከቱ ጥያቄዎች</u>

የሚቀጥሉትን ጥያቄዎች ሲመልሱ እባክዎ **ባለፈው አንድ አመት ውስጥ** በአብዛኛው ስለነበርዎት የአመጋገብና የጤና ሁኔታ ያስቡ።			
ተ.ቁ	**ጥያቄ**	**መልስ**	**ወደመሚቀጥለው ጥያቄ ይሂዱ**
401	በተለምዶ በቀን ውስጥ ምን ያህል ጊዜ ምግብ ይበላሉ?		
402	በተለምዶ ቁርስ በምን ያህል ጊዜ ይበላሉ?	1. በየቀኑ (ሁልጊዜ) 2. አብዛኛውን ጊዜ 3. አንዳንድ ጊዜ 4. በልቼ አላውቅም	
403	በተለምዶ ምሳ በምን ያህል ጊዜ ይበላሉ?	1. በየቀኑ (ሁልጊዜ) 2. አብዛኛውን ጊዜ 3. አንዳንድ ጊዜ 4. በልቼ አላውቅም	
404	በተለምዶ መክሰስ በምን ያህል ጊዜ ይበላሉ?	1. በየቀኑ (ሁልጊዜ) 2. አብዛኛውን ጊዜ 3. አንዳንድ ጊዜ 4. በልቼ አላውቅም	
405	በተለምዶ በቀን ውስጥ መክሰስ ስንት ጊዜ ይበላሉ?	1. ከ አንድ ጊዜ በታች 2. አንድ ጊዜ 3. ሁለት ጊዜ 4. ሶስት ጊዜ 5. ከሶስቱ በላይ	
406	በተለምዶ እራት በምን ያህል ጊዜ ይበላሉ?	1. በየቀኑ (ሁልጊዜ) 2. አብዛኛውን ጊዜ 3. አንዳንድ ጊዜ 4. በልቼ አላውቅም	
407	በተለምዶ በቀን ውስጥ ምን ያህል ሰአት በእንቅልፍ ያሳልፋሉ?		

408	በአብዛኛው ከቤት ወደ ትምህርት ቤት ለመሄድ የሚጠቀሙት የሚንቀሳቀሱ አይነት ምንድነው?	1. የእግር ጉዞ 2. ብስክሌት 3. የህዝብ መጓጓዣ (ታክሲ፣አውቶቢስ፣ባቡር) 4. ኮንትራት ታክሲ / የት/ቤት አውቶቢስ 5. የግል መኪና	
409	በአብዛኛው ከት/ቤት ወደ ቤት ለመመለስ የሚተቀሙት የሚንቀሳቀሱ አይነት?	1. የእግር ጉዞ 2. ብስክሌት 3. የህዝብ መጓጓዣ (ታክሲ፣አውቶቢስ፣ባቡር) 4. ኮንትራት ታክሲ/የት/ቤት አውቶቢስ 5. የግል መኪና	

ክፍል 5. <u>የአካላዊ እንቅስቃሴ መጠይቅ</u>

በመቀጠል <u>**ባለፈው አንድ ሳምንት ውስጥ**</u> ስላደረጉአቸው የተለያዩ አካላዊ እንቅስቃሴዎች እጠይቆታለሁ። እባክዎን ራስዎን አካላዊ እንቅስቃሴ የሚያደርግ ሰው አድርገው ባይቆጥሩም ሁሉንም ተግባራት በመመልከት ጥያቄዎቹን ይመልሱ። እነዚህም በት/ቤት ፣ በቤት ውስጥ ስራዎች ወይም ከቦታ ወደ ቦታ ለመሄድ የሚያደርጉአቸውን መደበኛ እንቅስቃሴዎች እና በዕረፍት ጊዜዎ ውስጥ ለመዝናኛ ወይም ለስፖርት የሚሰሯቸውን እንቅስቃሴዎች ያጠቃልላሉ።			
ጥያቄዎቹን በሚመልሱበት ወቅት **ጠንካራ የአካላዊ እንቅስቃሴዎች** ማለት ከባድ ጥረት የሚጠይቁ ትንፋሽዎና የልብ ምትዎ ላይ ከፍተኛ ጭማሪ የሚያመጡ ማለትም ቶሎ ቶሎ መተንፈስ ወይም ፈጣን የልብ ምት ሊያስከትሉ የሚችሉ እንቅስቃሴዎች ናቸው። **መካከለኛ የአካላዊ እንቅስቃሴዎች** ደግሞ መካከለኛ ጥረት የሚጠይቁ ትንፋሽና የልብ ምት ላይ መጠነኛ ጥማሪ ሊያመጡ የሚችሉ አካላዊ እንቅስቃሴዎች ናቸው።			
ተ.ቁ.	**ጥያቄ**	**መልስ**	**ወደሚቀጥለው ጥያቄ ይሂዱ**
1	**በትምህርት ቤት የስፖርት ሰአት /በቤት /በህዝብ የስፖርት ማዘውተሪያ ስፍራዎች የሚደረጉ መደበኛ እንቅስቃሴዎች እና የቤት ውስጥ ስራዎች**		
1.1	**ጠንካራ አካላዊ እንቅስቃሴዎች**		

501	መደበኛ አካላዊ እንቅስቃሴህ/ሽ ወይም የቤት ስራዎችህ/ሽ ከፍተኛ የትንፋሽ ወይም የልብ ምት መጨመር የሚያመጡ ጠንካራ አካላዊ ተግባራትን ያካተተ ነበር? ለምሳሌ፡ ከባድ እቃ ማንሳት ወይም ለ 10 ደቂቃ ኤሮቢክስ ፣ ፑሽ አፕ/ፑል አፕ ፣ ገመድ መዝለል	1. አዎ 2. አይደለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 504 ይሂዱ
502	በሳምንት ውስጥ እነዚህን ጠንካራ አካላዊ እንቅስቃሴዎች ለምን ያህል ጊዜ ሰርተው ነበር?	በሳምንት ———— ቀናት	
503 (1-2)	ከእነዛ ቀናት በአንዱ በእነዚህ ጠንካራ አካላዊ እንቅስቃሴዎች ምን ያህል ጊዜ በጠቅላላው አጥፍተው ነበር?	ሰአት———— ደቂቃ————	
1.2	**መካከለኛ አካላዊ እንቅስቃሴዎች**		
504	በቤት ወይም በት/ቤት የሚያደርጉት መደበኛ እንቅስቃሴ ወይም የቤት ውስጥ ስራዎች መጠነኛ የትንፋሽና የልብ ምት መጨመር የሚያስከትሉ መካከለኛ አካላዊ ተግባራትን ይጨምራል? ለምሳሌ ቢያንስ ለ 10 ደቂቃ ፈጠን ያለ እርምጃ ወይም ቀለል ያሉ እቃዎችን መሸከም	1. አዎ 2. አይደለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 507 ይሂዱ
505	በሳምንት ውስጥ እነዚህን መካከለኛ አካላዊ እንቅስቃሴዎች ለምን ያህል ጊዜ ሰርተው ነበር?	————ቀናት በሳምንት	
506 (1-2)	ከእነዛ ቀናት በአንዱ በእነዚህ መካከለኛ አካላዊ እንቅስቃሴዎች ላይ በጠቅላላው ምን ያህል ጊዜ አጥፍተው ነበር?	ሰዓት ———— ደቂቃ ————	
2	**ከቦታ ቦታ መጓጓዝ**		
	ቀጥሎ ያሉት ጥያቄዎች ከላይ የጠቀሷቸውን በቤት/በት/ቤት ወይም በህዝብ የስፖርት ስፍራዎች ያደረጉትን መደበኛ እንቅስቃሴዎች አያካትትም። አሁን ደግሞ በተለምዶ ከቦታ ቦታ የሚጓጓዙባቸውን መንገዶች እጠይቆታለሁ። ለምሳሌ ከቤት ወደ ት/ቤት ፣ ከት/ቤት ወደ ቤት ፣ ወደ አምልኮ ቦታ.....		
507	ከቦታ ቦታ ለመጓጓዝ በእግር ወይም ሳይክል በተከታታይ ለ 10 ደቂቃ ያህል ተጠቅመዋል?	1. አዎ 2. አልተጠቀምኩም	መልሱ አልተጠቀምኩ ም ከሆነ ወደ

			ጥያቄ ቁጥር 510 ይሂዱ
508	በሳምንት ውስጥ ከቦታ ቦታ ለመንገዝ ስንት ቀን በእግር ወይም በሳይክል ለተከታታይ 10 ደቂቃ ተጉዘዋል?	በሳምንት ———— ቀን	
509 (1-2)	ከነዚህ ቀናት በአንዱ በእግር ወይም በሳይክል በመንገዝ ምን ያህል ሰአት አጥፍተዋል?	ሰአት ደቂቃ————	
3	**የመዝናኛ እንቅስቃሴዎች**		
	ቀጥሎ ያሉት ጥያቄዎች ከላይ የጠቀሷቸውን በቤት/ በት/ቤት ወይም በህዝብ የስፖርት ስፍራዎች ያደረጉትን መደበኛ እንቅስቃሴዎች እና የመንገዣ ሁኔታ አያካትትም። አሁን ደግሞ የመዝናኛ ተግባራትን ለምሳሌ በትርፍ ጊዜዎ ፣ በት/ት ቤት የእረፍት ሰአት ወይም በቤት ውስጥ ስለሚያደርጓቸው የመዝናኛ እንቅስቃሴዎች እጠይቆታለሁ።		
3.1	**ጠንካራ አካላዊ እንቅስቃሴዎች**		
510	እንደ መዝናኛ/ የትርፍ ጊዜ እንቅስቃሴዎች ከፍተኛ የትንፋሽ ወይም የልብ ምት መጨመር የሚያመጡ ጠንካራ አካላዊ ተግባራትን ቢያንስ ለ ለተከታታይ 10 ደቂቃ ያደርጋሉ? ለምሳሌ፡ ኤሮቢክ ዳንስ ፣ የቅርጫት ኳስ ፣ የእግር ኳስ ጨዋታ ወይም ሩጫ	1. አዎ 2. አይደለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ ቁጥር 513 ይሂዱ
511	በሳምንቱ ለምን ያህል ቀናት ጠንካራ አካላዊ እንቅስቃሴዎችን ወይም የመዝናኛ/ የትርፍ ጊዜ እንቅስቃሴዎችን አድርገዋል?	በሳምንት ———— ቀናት	
512	ከነዚህ ቀናት በአንዱ ጠንካራ አካላዊ እንቅስቃሴዎችን ወይም የመዝናኛ/ የትርፍ ጊዜ እንቅስቃሴዎችን ለምን ያህል ሰአት አድርገዋል?	ሰአት———— ደቂቃ ————	
3.2	**መካከለኛ አካላዊ እንቅስቃሴዎች**		
513	እንደ መዝናኛ እንቅስቃሴዎች አካል መጠነኛ የትንፋሽ ወይም የልብ ምት መጨመር የሚያመጡ መካከለኛ አካላዊ ተግባራትን ቢያንስ ለ ለተከታታይ 10 ደቂቃ አድርገዋል? ለምሳሌ፡ ዋና ፣ የእጅ ኳስ ጨዋታ	1. አዎ 2. አላደርግም	መልሱ አላደርግም ከሆነ ወደ ጥያቄ ቁጥር 516 ይሂዱ

514	በሳምንቱ ለምን ያህል ቀናት መካከለኛ አካላዊ ተግባራትን ወይም የመዝናኛ/የትርፍ ጊዜ እንቅስቃሴዎችን አድርገዋል?	በሳምንት ———— ቀናት	
515	ከነዚህ ቀናት በአንዱ መከከለኛ አካላዊ ተግባራትን ወይም የመዝናኛ/ የትርፍ ጊዜ እንቅስቃሴዎችን ለምን ያህል ሰአት አድርገዋል?	ሰአት ——————— ደቂቃ ————————	
4	**ከእንቅስቃሴ ውጪ የሚያሳልፉት ጊዜ**		
	የሚቀጥለው ጥያቄ በቤት፣በት/ቤት ወይም በትርፍ ጊዜዎ በመቀመጥ ወይም ጋደም ብለው ያሳለፉትን ጊዜ ይመለከታል። (በዴስክ ላይ፣ በመኪና ውስጥ ፣ ከጓደኞችዎ ጋር ወይም ቴሌቭዥን ለመመልከት ተቀምጠው ወይም ጋደም ብለው ያሳለፉትን ጊዜ ይጨምራል። ነገር ግን በእንቅልፍ ያሳለፉትን ጊዜ አያካትትም።		
516 (1-2)	ከሳምንቱ አንዱን ቀን በጠቅላላው ምን ያህል ጊዜ ተቀምጠው ወይም ጋደም ብለው አሳልፈዋል?	ሰአት _____ ደቂቃ _____	

ክፍል 6 የመኖሪያ ቤት አካባቢያዊ ሁኔታን የተመለከቱ ጥያቄዎች

ከዚህ ቀጥሎ ያሉት ጥያቄዎች ስለሚኖሩበት ቤት አካባቢያዊ ሁኔታ የተመለከቱ ናቸው			
ተ.ቁ.	**ጥያቄ**	**መልስ**	**ወደሚቀጥለው ጥያቄ ይሂዱ**
601	ከቤትዎ እስከ ት/ቤትዎ ለመሄድ በእግር ምን ያህል ደቂቃ/ሰአት ይፈጅቦታል?		
602	የህዝብ የስፖርት ማዘውተሪያ ስፍራዎችን ለማግኘት ከቤትዎ በእግር ምን ያህል ደቂቃ/ሰአት መጓዝ ይኖርቦታል?		
603	በመኝታ ክፍሎ ውስጥ ቴሌቪዥን አለ?	1. አለ 2. የለም	
604	በቀን ውስጥ የቴሌቪዥን ፕሮግራሞችን በመመልከት ምን ያህል ደቂቃ/ሰአት ያሳልፋሉ?		
605	የፈጣንና ጣፋጭ ምግብ ማስታወቂያዎችን በምን ያህል ጊዜ ይመለከታሉ? (ለምሳሌ፡- የበርገር ፣ ፒዛ እና ቼኮሌት የመሳሰሉ ማስታወቂያዎች)	1. በየቀኑ (ሁል ጊዜ) 2. አብዛኛውን ጊዜ 3. አንዳንድ ጊዜ	

		4. አይቹ አላውቅም	

ክፍል 7 የሰውነት መጠን ልኬት

ተ.ቁ	የሰውነት መጠን ልኬት	ንባብ
701	ቁመት (በሴንቲ ሜትር)	
702	ክብደት (በኪሎ ግራም)	

ስለትብብርዎ በጣም እናመሰግናለን

ክፍል 8 የት/ቤት አካባቢያዊ ሁኔታን የተመለከቱ ጥያቄዎች

(የት/ቤቱን አስተዳደር በመጠየቅና በዋና አጥኚው ምልከታ የሚሞላ)

የት/ቤቱ ስም	
የተጠያቂው የስራ ሀላፊነት	
መጠይቁ የተሞላበት ቀን	_____/ቀን/_____/ወር/_____/ዓ.ም/
የተጀመረበት ሰአት	_____ /ሰአት/_____/ደቂቃ/
ያለቀበት ሰአት	_____/ሰአት/_____/ደቂቃ/
ጠያቂ/ተመልካች	ስም _____ ፊርማ _____

ከዚህ በታች ያሉት ጥያቄዎች ስለ ት/ቤትዎ አካባቢያዊ ሁኔታ የተመለከቱ ናቸው			
ተ.ቁ	ጥያቄ	መልስ	ወደሚቀጥለው ጥያቄ እለፍ
801	በት/ቤቱ የሰውነት ማጎልመሻ ት/ት በሳምንት ለምን ያህል ጊዜ ይሰጣል?		
802	በት/ቤት ውስጥ የእረፍት ሰአት ምን ያህል ነው?		
803	በት/ቤታችሁ ውስጥ የሰውነት ማጎልመሻ ክለብ አለ?	1. አለ 2. የለም	

804	በት/ቤታችሁ ውስጥ ካፊቴሪያ አለ?	1. አለ 2. የለም	መልሱ የለም ከሆነ ወደ ጥያቄ ቁጥር 808 ይሂዱ
805	የት/ቤታችሁ ካፊቴሪያ ፈጣን ምግቦችን ያቀርባል? (ለምሳሌ እንደ ቺፕስ፣ በርገር፣ ፒዛ፣ የተጠበሰ የዶሮ ስጋ ፣ ፓስቲ ፣ ሳንድዊች ፣ ዶናት እና አይስ ክሬም)	1. ያቀርባል 2. አያቀርብም	
806	የት/ቤታችሁ ካፊቴሪያ ስኳር አዘል ወይም ጣፋጭ ምግቦችን ያቀርባል? (ለምሳሌ እንደ ኬክ፣ ቼኮሌት ፣ ከረሜላ)	1. ያቀርባል 2. አያቀርብም	
807	የት/ቤታችሁ ካፊቴሪያ ስኳር አዘል ወይም ጣፋጭ መጠጦችን ያቀርባል? (ለምሳሌ ለስላሳ መጠጦችን እንደ ኮካ ኮላ ፣ የታሸጉ የፍራፍሬ ጭማቂዎች)	1. ያቀርባል 2. አያቀርብም	
808	የፈጣን ምግብ ሻጮች ከት/ቤታችሁ በምን ያህል ርቀት ላይ ይገኛሉ? (በኪ. ሜትር/ በእርምጃ)		

ስለትብብርዎ በጣም እናመሰግናለን

Principal investigator's curriculum vitae

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2. **Educational Background**
   - ☞ BSc Degree in Public Health Officer from Hawassa University, Ethiopia: Sept 2006 – July 2010.
3. **Work Experience**
   - ☞ Sept 2010 – March 2013: in adult and under five OPD in Weliso woreda Health center South West Shoa Zone, Oromia Region, Ethiopia.
   - ☞ April 2013 up to now: as health facilities and professionals' license provision and regulatory officer in Kirkos Sub city Food, Medicine and Health Care Administration and Control Office, Addis Ababa, Ethiopia.
4. **Additional Training**
   - ☞ Training of Trainers on the Management of Severe Acute Malnutrition.
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 Sept 2002 – July 2004: Masters Degree in Public Health from Addis Ababa University, Ethiopia.

 Sept 1994 – July 2000: Doctor of Medicine from University of Gondar, Ethiopia.

Professional Experience

 Jan 2006 - Present: Assistant Professor in the School of Public Health, Addis Ababa University.

 Current responsibilities: teaching public health nutrition to undergraduate medical students as well as graduate students in Public Health: Advising students of health Informatics and MPH on various public health issues: Conducting a research project for PhD training on "The role of Phone-based applications and Client centered communication in improving maternity services".

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