ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE
SCHOOL OF PUBLIC HEALTH

The relationship between screen time and overweight/obesity among adolescents in Addis Ababa, Ethiopia: 2018

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

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Table of Contents

List of tables

List of figures

Acronyms

AAU	Addis Ababa University
ASAQ	Adolescent Sedentary Activity Questioners
BMI	Body Mass Index
BAZ	BMI for age
EDHS	Ethiopia demographic and health survey
FFQ	Food Frequency Questioners
GPAQ	Global Physical Activity Questionnaires
LMICs	Low- and Middle Income Countries
NCDs	Non Communicable Diseases
HBSC	Health Behavior in School-aged Children
MVPA	Moderate to Vigorous Physical Activity
PCA	Principal Component analysis
SB	Sedentary Behavior
TV	Television
TPA	Total Physical Activity
WHO	World Health Organization

Abstract

Background: Currently the prevalence of obesity and overweight increase worldwide and adolescent are one of the vulnerable group to be affected. Reduced physical activity and sedentary behavior including screen time have given attention as a potential risk for high prevalence of overweight/obesity. But in spite of this fact there is little information on the association between screen time and increase overweight/obesity in our setting

Objective: The study aimed at determining prevalence of time spent on screen above the recommendation and its relationship with overweight/obesity among secondary school adolescents in Addis Ababa, Ethiopia, in 2018.

Method: School based cross sectional study was conducted among adolescent in Addis Ababa, Ethiopia. Sample size was calculated using single population proportion formula and final sample size become 550. Data were collected by using interviewer administered questionnaires. Finally, Descriptive statistics, bivariate analysis and multivariable logistic regression analyses was performed by using SPSS software version 20 and P-value less than 0.05 was used to declare statistically significant association.

Result

The study found that the mean screen time in the study population was 4.1±2.2 hr. per a day. In which 290 (53.7%) of adolescents spent more than 2hr. on screen. And the prevalence of overweight and obesity were 12.3% and 1.85% respectively. Female sex AOR 1.90 (1.05-3.43), high socio-economic status AOR 2.86 (1.06-7.73), high screen time AOR 3.01 (1.53-5.90), eating habit while watching TV AOR 4.05 (1.83-9.03), physical activity AOR 0.27 (0.13-0.59) were found to have significant association with overweight/obesity.

Conclusion and recommendation

This study demonstrated a 53.7% prevalence of screen time above recommended amount and also a positive association between longer periods of screen time and overweight/obesity among adolescents in Addis Ababa. Therefore Parents and adolescents should be aware about this association and should be encourage to participate their children in other means of recreational activity.

1 Introduction

1.1 Background of the problem

World health organization define adolescent as an age group between 10-19Yrs. It is a transition period from childhood to adulthood. This period can be classified into three developmental stages: early adolescent from 10-14 Yrs. which a period of onset of puberty, middle adolescent from 15-17Yrs., a period of initiation of different psychological changes and late adolescent from 18-19Yrs., a period of initiation of most of social changes(1). There are more than 1.2 billon adolescent living worldwide and more than 90% lives in developing country(2). In Ethiopia more than 23,593,511 of population constitutes of adolescent (3).

Adolescent is the period of rapid growth and development. And even if it is assumed to be the healthiest period of human life, many health related problems that affect most of adult and older population are started to appear during childhood and adolescent period and among those problem obesity is one of the major problem. Currently, obesity becomes global problem. The 2013 lancet report shows that currently more than 2.1 billion of the world population are overweight or obese and more than 600 million are living in Africa despite an increase prevalence of under-nutrition, the prevalence of overweight and obesity is increasing. The report shows that the prevalence of overweight/obesity in developing country among adolescent is more than 13% (4).

Study conducted in Addis Ababa in 2014 showed that the prevalence of overweight and obesity among high school students was 9.7% and 4.2% respectively. The prevalence is higher among female (9.4% and 0.8) than males (5.4 and 1.1) (5-7).

Even though different genetic and environmental factor have been known to cause an increase in obesity, lifestyle factor such as unhealthy food, reduced physical activity and sedentary behavior including watching television are potential risk factor of obesity in adolescent(8). Screen time especially viewing television is currently the most common form of recreational activity among adolescent in urban setting. Through its adverse effect on total energy expenditure that is reduced resting energy expenditure compared to other, disruption of physical activity exposure to advertisement of unhealthy foods and increase calorie intake while watching TV are some of the possible mechanism that explain the relationship between screen time and overweight/obesity (9, 10).

Adolescent obesity has both short term and long term effect. Most of the time overweight/obese adolescent tend to be obese in their adulthood and become at risk of developing different kind of health problem such as cardiovascular disease, type 2diabetes mellitus, stroke, several types of cancer, osteoarthritis, Nonalcoholic Stoat Hepatitis (NASH) which can lead to cirrhosis, Social and psychological problems such as stigmatization and poor self-esteem also greatly affect overweight and obese adolescents (11).

Even if there is an increase in prevalence of overweight/obesity and screen time among adolescent which is the possible cause for the increase in prevalence of overweight/obesity, there is no adequate information on the prevalence of screen time and its association with overweight/obesity in our settings.

Since for public health programs and intervention designs to be more effective in decrement of overweight/obesity, common risk factor that does not given much emphasis previously like screen time should be understood and well-studied.

1.2 Statement of the problem

The prevalence of overweight and obesity increases at alarming rate worldwide and affect both developed as well as developing countries irrespective of their age, sex and socioeconomic status (12). The magnitude of overweight and obesity specifically in adolescent is increasing. In the past three decades, the prevalence of overweight/obese becomes double in children and quadrupled in adolescents, in which 23.8% of boys and 22.6% of girls in developed countries and from 8.1% to 12.9 boys and from 8.4% to 13.4% girls in developing countries were overweight/obese in 2013 (13, 14).

Research shows that more than 2/3rd of the world obese people live in developing country and this increment are likely to continue unlike developed country where the increment has slow down as of 2006 (14).

The prevalence of overweight/obesity is increasing in Africa and it is believed to be more than 600 million people of the world overweight/obese people live in this continent (4). The prevalence of overweight/obesity among adolescents in Africa is estimated to be around 20% (15).

Cross sectional study done in Addis Ababa among school adolescent found that the overall prevalence of overweight and obesity is 9.9% and 2.8% respectively. The study

also shows that the prevalence of overweight and obesity is high among female than male in which 7.7% and 3.2% for male and 12% and 2.5% for female respectively (16).

The main risk factor that believed to cause obesity is related to lifestyle factor like intake of high proportion of saturated fat, low access to healthy foods, marketing and advertising of unhealthy foods targeting children and adolescents(17). Physical inactivity and sedentary behavior like more time spent on TV, mobile and computer are also the important risk factor for the development of overweight and obesity in adolescents(17).

A study done in Saudi Arabia shows that among sedentary behavior TV viewing is the most important form of recreational activity among adolescent especially in urban area, with an increase in number of hours. Spend in TV associated with increase prevalence of overweight and obesity. The study also shows that higher number of television at home, watching TV more than 3 hr. per day in weekends and watching TV at night were associated with obesity and overweight among adolescent (18).

The cross sectional study done in Addis Ababa among adolescents' shows that 17.7% of adolescents spend less than 6 hours sitting, 56.2% spend 7-8 hours and 26.1% spend 9 hours or more. The study also shows that adolescent who sit more than 9 hours per day are 40 times at higher risk of overweight than those who sit 5-6 hours per day considering 4 and half hour school stay(19)

The health concerns of obesity arise worldwide as it has been found to be a major contributing factor to be a serious non communicable chronic diseases including cardiovascular disease, type 2 diabetes and hypertension (11).

In spite of an increase in prevalence of overweight/obesity and time spent of adolescent on screen which is the possible cause for the increase in prevalence of overweight/obesity, there is still a little information on the association between screen time and overweight/obesity in Ethiopia because, most of the study done shows only average daily sedentary time spent among adolescent and does not specifically show the type of sedentary behavior which are common in those groups. In addition the studies does not use the standardized validated questionnaires to measure those sedentary related behaviors.

Knowing this information is very important in developing country like Ethiopia where the usage and time spent on electronic media like television, computer and mobile in adolescent increases from time to time (20).

1.3 Rationale of the study

Currently, the prevalence of obesity is increasing from time to time and the major cause of this obesity is primarily related to unhealthy diet, inadequate physical activity and sedentary life(16). Because of this, the prevalence of different kind of non-communicable disease like diabetics mellitus hypertension and different kind of cancer related disease is increasing in the world especially in developing country like Ethiopia. And it is difficult to avert this life style related problems once they are occurred. There are different causes that believed to be the risk factor for overweight/obesity and many of this are tried to study previously but when it comes to screen time it is highlighted in many literature and does not give an emphasis unlike other risk factor. So the result of this study could be used to determining the magnitude and combined effects of screen time on overweight/obesity among adolescents. And also will direct and enables the government and health organizations to design appropriate and effective intervention strategies and implementation of different control and preventive mechanism of overweight/obesity. It also could give an insight for parents and adolescent on the probable effectiveness of limiting time spent on screen on decrement of overweight/obesity in adolescent. In addition, the findings from this study hope to be used as base-line information and help planners, programmers, and policy makers for intervention purpose and could also direct future research area for researcher.

2 Literature Review

2.1 Magnitude of overweight and obesity

Obesity become a global problem and it is estimated to be fifth leading cause of mortality worldwide and it is known to be the risk factor for different kind of disease life hypertension diabetics mellitus and certain kind of cancer (21, 22). Obesity has increased worldwide and estimated to affect more than 2.1 billion people worldwide (4).

It is also increase among children and adolescents too and there is nearly 50% increase in the prevalence of overweight/obesity in the last 3 decades (23). In which, 23.8% of boys and 22.6% of girls in developed countries and from 8.1% to 12.9% for boys and from 8.4% to 13.4% for girls in developing countries were overweight/obese in 2013. High rates of overweight and/or obesity were seen particularly in Middle, Eastern and North African countries and notably among girls (24).

Results from the 2013–2014 National Health and Nutrition Examination Survey (NHANES) done in USA estimated that 17.2% of U.S. children and adolescents aged 2–19 years are obese and another 16.2% are overweight (25).

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

The prevalence of overweight/obesity among urban school children and adolescent in Nigeria were 11.4%, 2.8% respectively and the prevalence is higher among female (3.7%) than males (1.8%) and more adolescents aged 10 to 18 years (13%) than children from 5 to 9 years old (9.4%) (27).

Systematic review which is done among sub-Saharan countries shows an increasing trend in prevalence of overweight/obesity in school age children. The review found that the prevalence of overweight and obesity were 10.6% and 2.5% respectively(28).

In Ethiopia study conducted in 2014 Addis Ababa, among 463 elementary school children aged 10 to 18 years found that the prevalence of overweight and obesity to be 9.9% and 2.8% respectively which was found to be high and even comparable with the global prevalence (29). Similarly a study in Addis Ababa Ethiopia in Arada sub city,

among high school adolescents aged 15-19 years also showed the prevalence of overweight and/or obesity to be 8.6% and 0.8%, respectively (30).

2.2 Lifestyle factors associated with overweight/obesity

2.2.1 Sedentary behavior, screen time and overweight/obesity

Sedentary behavior (SB) is any waking activity which is characterized by energy expenditure less than 1.5 metabolic equivalents performed at reclining or sitting position(31). SB is not the opposite of being active. For example some people may sit for 12 hr. a day and then physically active for about an hr. so this people classified as sedentary but they meet guidelines for 'sufficient physical activity'(32). SB is habitual in nature and occur in multiple context for example watching TV, sitting at work, during motorized transport or while doing household tasks(33). The most common sedentary behavior among adolescent is the time spent on screen called screen time, which include watching TV, playing e-games and using tablets and smartphones(32).

Irrespective of physical activity, sedentary behavior is associated with different mental and physical health risks (34). Spending more than 2 hours per day in front of screens impairs children's health, higher their blood pressure and cholesterol level and also affect their development and associated with low self-esteem, poor social behavior's, poor results at school, slower development of the brain and children who are sedentary for prolonged time are less physically fit (35). Prolonged TV viewing also believed to elevates the risk of overweight/obesity independent of meeting physical activity guidelines (36).

Compared with short TV viewing adolescent those in moderate(2-3Hrs.), long (3-5Hrs.) and prolonged (>5Hrs.) group had higher BMI (37). And it is also believed that spending time on screen more than four or more hours per day tend to have more than double prevalence of obesity compared to spending less than one hour daily (38).

In Ethiopia cross sectional study done among school adolescent shows that sedentary behavior was strongly associated with overweight/obesity. Adolescent who sit more than 9hr. per day are 40 times higher risk of obesity than those who sit 5-6 hours per day considering 4 and half hour school stay(19)

2.2.2 **Dietary Habits in adolescent**

World health organization (WHO) recommend healthy diet to all people particularly for adolescent, the organization also recommend to eat less food which is high in calorie, salt and fat. And encourage to take more fruit vegetable and dietary fiber.(39)

A survey on Health Behavior in School-aged Children (HBSC) which is conducted by WHO show that an unbalanced food which has poor nutrient quality and highly energy rich is basic and important predisposing factor for the current high prevalence and epidemics of overweight/obesity and different kind of non-communicable disease in adolescent worldwide. This survey also shows that healthy eating habit become less common as children move to adolescent and it is common in girls than boys, common in adolescent from wealthy family than those from poor family(39).

Adolescent are the most common age groups which commonly experience unhealthy eating habits. More than half of adolescent did not consume at least three regular meals per day. And skipping of this regular meal is associated with low diet quality mainly low vegetable and fruit and high intake of food which is rich in calorie, sodium and sugar (40). WHO report shows that the intake of fruit and vegetable among aged 15-29years, is between 296–348g which is lower than recommended daily allowance (400 g) (41).

Intake of fruit and vegetables is inversely associated with obesity. That is adolescent of normal weight consume more fruit and vegetables (6.2 ± 1.8 times/week) than overweight and obese adolescents (4.2 ± 1.1 times/week and 3.8 ± 1.2 times/week, respectively) (42).

In Ethiopia, a cross sectional study done among 463 primary school adolescent shows that buying and consumption of cake, chocolate, biscuit and ice cream have significantly strong association with overweight the study also reveal that, more than 90% of participant mention animal products as their preference food. And more than 90% of them do not mention fruit and vegetable as their preference(43).

2.3 Other factors associated with overweight/obesity

Prevalence of overweight/obesity is higher among female (of 14% and5.5%) than male (7% and 3%)(44). Study conducted in Ethiopia also shows that female participants have

higher prevalence of overweight and obesity (12% and 3.2%) than male (7.7% and 2.5%) (43).

Most of the study done in developed countries shows that overweight/obesity is associated with low socioeconomic status for example, a study done among school adolescent in USA shows that adolescents with low socioeconomic status has higher prevalence of overweight/obesity than those from high socioeconomic status (45).

In contrast study done in developing countries shows that high socio-economic status is associated with high prevalence of overweight/obesity(46). A cross sectional study conducted in Addis Ababa shows that school adolescents who attend private school has 6.8 times higher risk of overweight/obesity than school adolescents who attend governmental school. The study also reveal that those adolescents whose parent own car have 33 times higher risk of overweight than those who do not (5).

Having an overweight parents, having less than 3 siblings and with male being the head of the household was associated with high prevalence of overweight/obesity among adolescent (16).

2.4 Conceptual framework

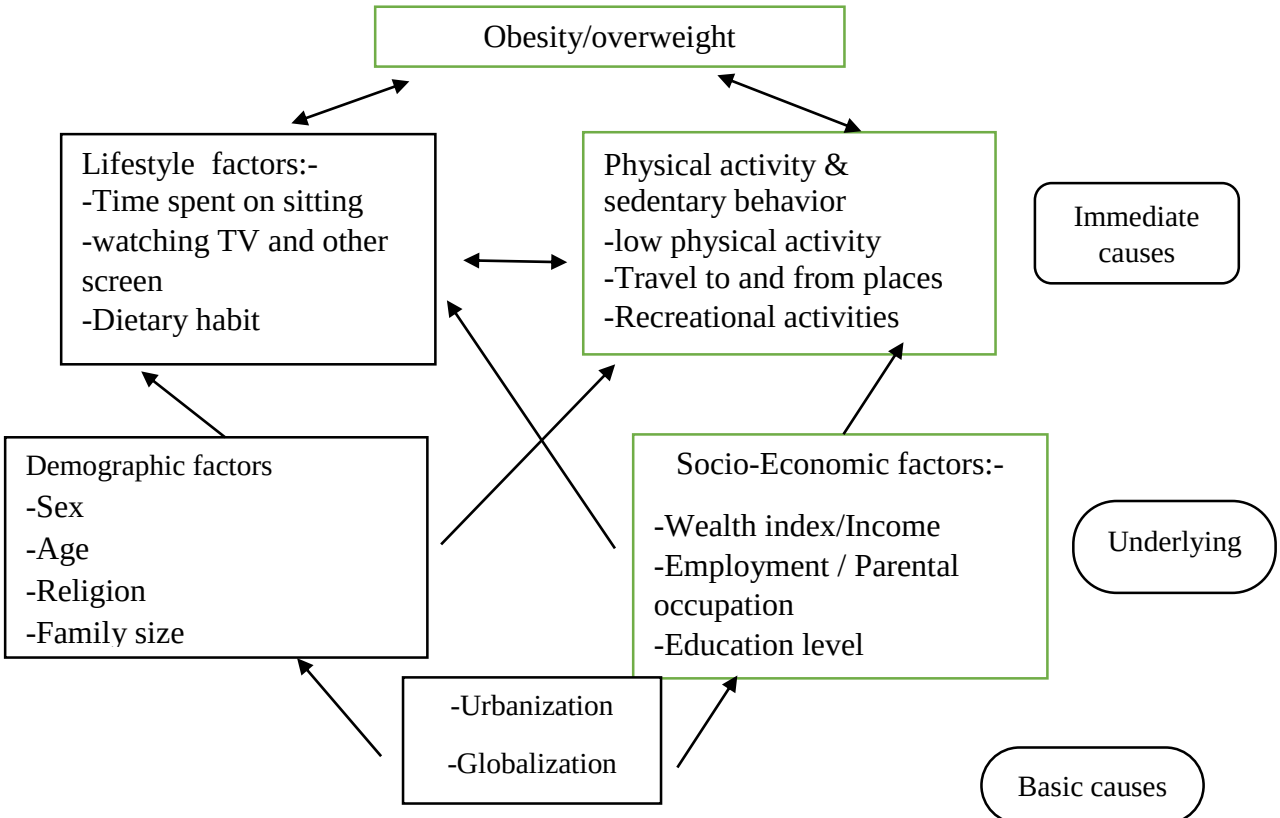

***Figure 1**, Conceptual frame work for predictors of obesity/overweight among adolescents adopted from different sources (47, 48).*

3 Research objectives

3.1 General objectives

- To determine prevalence of time spent on screen and its relationship with overweight/obesity among secondary school adolescents in Addis Ababa, Ethiopia, in 2017/18.

3.2 Specific objectives

- To determine the prevalence of daily time spent on screen among secondary school adolescents.
- To assess the relationship of screen time with overweight and obesity among secondary school adolescents.

4 Methodology

4.1 Study Area

The study was conducted in private and public school of Addis Ababa. Adds Ababa is the capital and largest city of Ethiopia it has a population 3.24 million with annual growth rate of 4.89 and located at $9^0$1'48" N and $38^0$44'24" E. with 2355m above sea level and landed in 527km^2. The city is home for various ethnicities who come from different region of Ethiopia. The city subdivided into 10 sub city and 116 woreda.

According to 2016 report of Addis Ababa City Administration Education Bureau (AACAEB), there are 2798 schools in all sub cities. Out of total school, 806 are primary, 93 secondary (9-10), 10 preparatory (11-12), 114 general secondary and preparatory (9-12). From those schools 287 are governmental, 736 are non-governmental (49). Study conducted in Addis Ababa in 2014 showed that the prevalence of overweight and obesity among high school students was 9.7 and 4.2 respectively. The prevalence is higher among female (9.4 and 0.8) than males (5.4 and 1.1) (5-7).

4.2 Study period

The study was conducted, from March 15 to April 30, 2018 in Addis Ababa, Ethiopia.

4.3 Study Design

School based cross sectional study was conducted among secondary school (9-12 grade) adolescents in Addis Ababa, Ethiopia.

4.4 Population

4.4.1 Target population

All adolescents living in Addis Ababa

4.4.2 Source population

All adolescents who are learning in governmental and non-governmental secondary schools (9-12 grade) of Addis Ababa during the study period.

4.4.3 Study population

Randomly selected adolescents from randomly selected governmental and non-governmental secondary schools during the study period.

4.4.4 Inclusion criteria

All adolescent who attend secondary schools, selected randomly and who are volunteered to participate in the study at the time of data collection.

4.4.5 Exclusion criteria

- Visible physical deformity like kyphosis and any other deformity because it is difficult to apply BMI measurement on this group.

4.5 Sample size determination

The sample size was calculated for each specific objective using the formula of sample size determination for single population proportion by Epi Info window version 7 statistical software

For the first and second objective

Using single population proportion formula

Sample size determination was as followed

$$n=\frac{Z^2_{\alpha/2}\,P(1-P)}{d^2}$$

Where, Z= the standard score corresponding 95% confidence level =1.96

P= 65.5% proportion of adolescents who spent > 2hr (recommended) on screen (46)

D= margin of sampling error 0.05

n= number of sample

n_{total}= total sample size after adding 10% non-response rate

N= Final number of sample size after considering design effect of 1.5

Using the above formula and contingency of 5% for non-respondent the final sample size was 381.Using design effect of 1.5 the sample will be **550**

For the second objective

Using double population proportion formula

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

- P_1= 23.2 proportion of overweight/obese adolescent who watch TV more than recommended (50).
- P_2= 8.9% proportion of overweight and obese adolescent who watch TV less than 3 hr.
- 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

Using the above formula and contingency of 10% for non-respondent the final sample size was 255. Using design effect of 1.5 the sample will be **383.**

Table 1: *Sample size calculation*

Specific objectives	Assumption									
	P		Z			D	n	n_{total}	N	Reference
Objective 1	0.472		1.96			0.05	383	421	550	(46)
Objective 2	P_1	P_2	α	β	Ratio	D	n	n_{Total}	N	(50)
(Double proportion)	23.2%	8.9%	0.05	20%	1:1	0.05	232	255	383	

Accordingly, the sample size calculated for the first objective yielded the largest sample size which is **550.** So that it will be the final sample size of this study.

4.6 Sampling procedures

Multi-stage random sampling technique was used to select study participant. 15 secondary school (10 non-governmental and 5 governmental) school was selected by simple random sampling technique. A sample of 550 student was distributed proportionally between governmental and non-governmental schools by considering the size of students in each school. 4 grade from each selected school (9-12) in which one section from each grade level was selected randomly. Finally, Study subject was selected from selected sections by systematic random sampling technique using student list. (Figure 2)

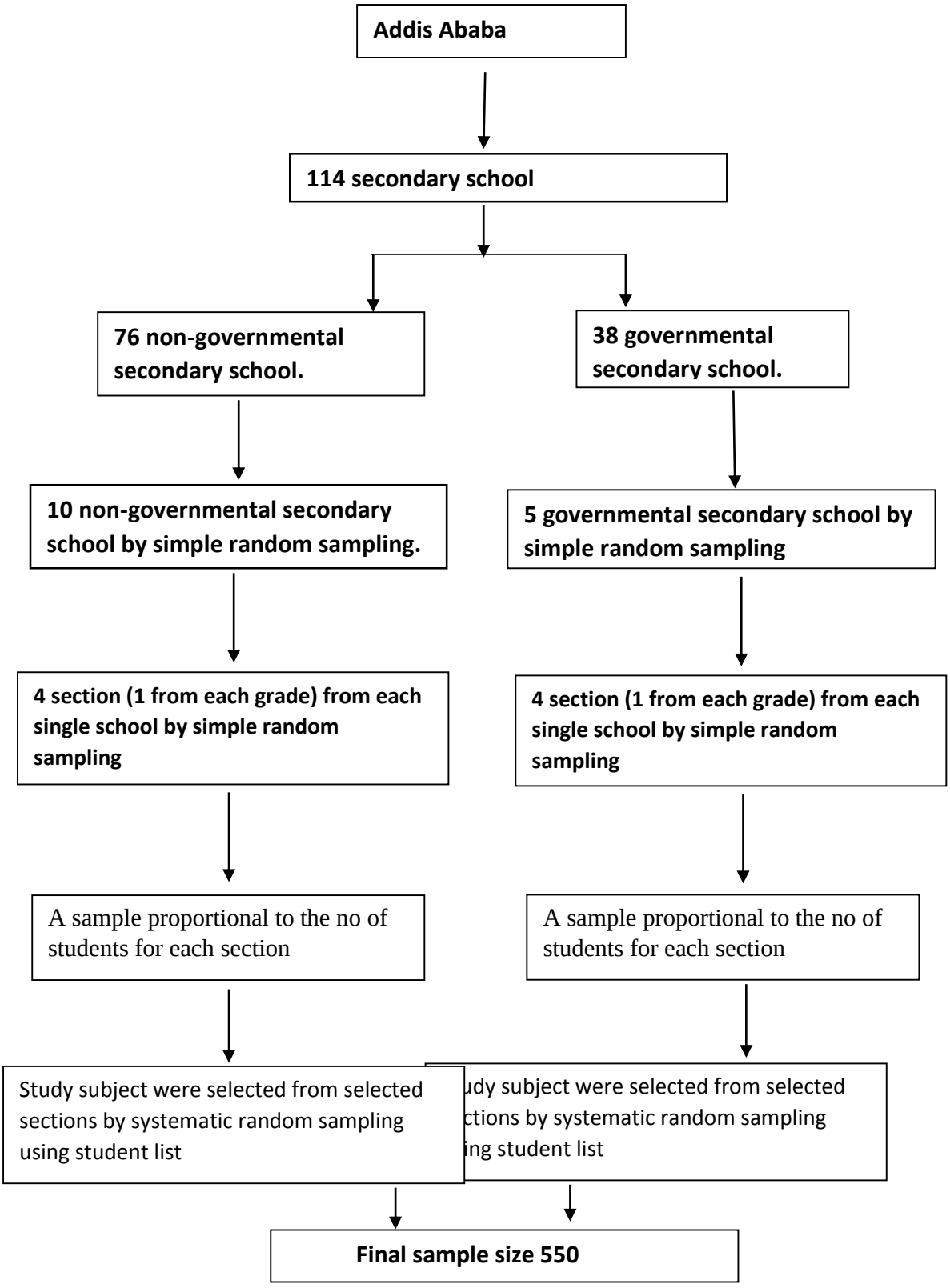

Figure 2 *Sampling Procedure*

4.7 Data collection tools and procedures

Interviewer –administered questioners was used to collect data. The questioner consists of information on demographic and socioeconomic characteristics which was adopted from Ethiopian demographic and health survey (EDHS), lifestyle-related behaviors was adopted from different literature, dietary intake was assessed by using food frequency questionnaires (FFQ) which is adopted from Helen Keller International FFQ and used previously in Ethiopia dietary practices of adolescents (51)**,** screen time among adolescents was assessed by questionnaires adopted from validated adolescent sedentary activity questionnaires (ASAQ) and physical activity questionnaires was adopted from global physical activity questionnaires (GPAQ). The questioner was first develop in English and translated in to local language (Amharic). To check consistency, the questioner was translated back to English by another language expert.

Height: Measurements of height was carried out using a wooden height measuring board with a sliding head bar/ stadiometer. The study subjects was asked to stand straight on leveled surface with shoes off, heels together, eyes looking straight ahead (Frankfurt plane), hands freely by the side, head, shoulder blades and buttocks are against the board/wall. The moving head piece of the stadiometer was lowered to rest flat on the top of the head and reading was noted to the nearest 0.1cm.

Weight: Measurement of weight was done by using a battery powered an electronic personal weighing balance to the nearest 0.1kg. It was calibrated against known weight regularly and error of the weighing scale was checked before taking the weight and corrected when required before each session. The same measurer was employed for a given anthropometric measurement to avoid variability.

All measurements was taken twice; when necessary, any discrepancies were resolved by a third measurement and measurement scales were handled carefully and was calibrated daily before data collection. The data collectors check whether the scales are at 0.00 reading before each measurement and all measurements were recorded in the questionnaire.

Three data collectors and 1 supervisor were recruited with minimum qualification of diploma in any health related fields. Training was given for supervisor and data collectors on sampling procedures, techniques of interview and data collection process

by principal investigator for three days and any doubt in the questioner were clarified. Demonstration of instrument was performed at school for each data collector.

4.8 Study Variable

4.8.1 Dependent variables

- Overweight and obesity

4.8.2 Independent variable

- Age
- Sex
- Family/Socio-demographic variables: family size, family monthly income, education level of head of the house hold
- Family size
- Type of school (governmental, non-governmental).
- Grade level
- Physical activity
- Home to school distance
- Number of TV
- Having Television in bed room
- Screen time
- Eating habit while watching TV and other screen
- Frequency of watching fast food and sugary diet advertisements
- Skipping meal
- Snacking habit
- Daily meal frequency
- Number of meals per day
- Different food items consumption frequency
- Sedentary behavior
- Sleeping hour
- Transportation

4.9 Data quality management

Data quality was assured before, during and after data collection process.

Before data collection: An objective based and standardized questionnaire and instrument was prepared. Training were given, Pre testing of questionnaire were undertaken.

During data collection: Completeness and logical consistency and correction was made in the field, accuracy of the instruments for the weight and height measurement checked. There was also a day to day supervision. Data coding, entry and cleaning was performed by the principal investigator

After data collection: the supervisor and the principal investigator together recheck the completeness and consistency. Non over lapping numerical code were assigned for each question and the coded data were entered and cleaned into Epi data software.

4.10 Data processing and analysis

Data was coded, manually checked, entered and cleaned by Epi data software version 3.1 and exported in to SPSS version 20 and statistical tests was be performed. Data was cleaned for outliers and corrected by transforming in to categorical variable if they were numeric or by omitting extreme values (highest and lowest value).

The WHO growth reference was used as a standard reference for classifying adolescents based on BMI for age using WHO Anthro plus software.

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 lowest, 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. 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 based on WHO

recommendation of physical activity for adolescents as High (TPA ≥ 60 minutes per day) Medium (30-59 minutes) and Low (< 30 minutes per day).

Descriptive statistical analysis were 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.

Binary logistic regression was done to investigate the association between explanatory variables and outcome variable. Variables with P-value < 0.2 on the bivariate regression analysis and important variables for the objective of the study based on literature review were entered to the multivariate model.

Finally multivariate logistic regression were used to statistically adjust the estimated effects of each variable in the model. Multicollinearity of the independent variables were also checked by variable of influence factor (VIF) and no variables had VIF of greater than two. Finally, adjusted odds ratio with 95% CI at p-value less than 0.05 were used to declare statistically significant association.

4.11 Operational definition

- Overweight BMI for age z- scores as being >+1SD
- Obese BMI for age z- scores as being >+2SD
- Screen time : time spent in electronic screen which include watching TV, playing e-games and using tablets, computer and smartphones
- Recommended screen time: the daily-recommended screen time is 2 hr.
- Sedentary behavior: any waking activity, which is characterized by energy expenditure less than 1.5 metabolic equivalents, performed at reclining or sitting position.

4.12 Ethical clearance

Ethical approval for this study was obtained from ethical Review Committee of Addis Ababa University, College of Health Sciences, school of public health. Support letter, written by the Committee for each selected school was given for each school principal and permission was requested. After getting permission from the schools, oral assent and written informed consent through an invitation letter obtained from each adolescent less than eighteen years of age and their parents /caregivers respectively. For those who are 18 years and above, only written informed consent were sought. Then after, the

eligible and volunteer students were included in the study. Section were selected and each respective class room teachers in selected class and PI give orientation to the study participant, each subject in selected classes were given a written assent form which include the aim of the study, procedure and benefit of the study. Selected students who were willing to participate in the study were included in the study. Privacy and confidentiality of the interviews and information gathered was assured. The names of the informants was not include in the questionnaire.

4.13 Dissemination of results

The final report of this study will be submitted to Addis Ababa University, college of health sciences school of public health. It will also be sent to Addis Ababa health bureau, and educational bureau. Great Efforts will also be made to disseminate the result through publication and presentation in scientific conferences.

5 Results

5.1 Descriptive statistics

5.1.1 Socio-demographic characteristics

Out of the sampled 550 adolescent students, a total of 540 participated in this study with a response rate of 98.2%. Mean (SD) of age of the respondents was 16.8 ± 1.27 yrs.in which 40.2% were between the age of 14-16yrs. and 59.8% of them from 17-19 years. There were 263 (48.7%) males and 277 (51.3%) female respondents and all are from grade 9-12.

Out of total respondent, 77.2% of were Orthodox Christian followed by protestant (10.6%) and Muslim (9.3%). 75.1% of the respondent's fathers and 58.6% mothers attended more than secondary school.

Table 2: *Socio-demographic characteristics of adolescents in Addis Ababa, 2018*

Variable	Frequency	Percent (%)
Sex		
Male	263	48.7
Female	277	51.3
Age		
14-16	217	40.2
17-19	323	59.8
Religion		
Orthodox	419	77.2
Catholic	10	1.9
Protestant	57	10.6
Muslim	50	9.3
School type		
Governmental	274	50.7
Non-governmental	266	49.3
Family size		
5 and below	353	65.4
6 and above	187	34.6
Father educational status		

No formal education	52	9.6
Primary school (1-8)	67	12.4
Secondary(9-12)	188	34.8
Above secondary (some college and above)	233	43.1
Mother educational status		**.**
No formal education	93	17.2
Primary school (1-8)	118	21.9
Secondary(9-12)	178	33.0
Above secondary (some college and above)	151	28.0
Mother occupation		**.**
government/private employee	195	36.1
merchant	84	15.6
day laborer	11	2.0
house wife	230	42.6
Other	20	3.7
Father occupation		**.**
government/private employee	347	64.3
Merchant	101	18.7
day laborer	9	1.7
Unemployed	25	4.6
Other	58	10.7
Socio economics index.		**.**
Lowest	120	22.2
Second lowest	98	18.1
Middle	105	19.4
High	109	20.2
Highest	108	20.0

5.1.2 Screen time

The study shows that the mean screen time in the study population was 4.1±2.2 hr. per a day. A total of 290 (53.7%) of the students reported to spend two hours or more on screen time activities per day, whereas a total of 23.1% reported to spend five hours or more on screen time activities per day. Boys reported 4.0± 2.2 hours of screen time activities per day, whereas the girl's reported to spend 4.3 ± 2.2 hours of screen time activities per day (Table 3).

Table 3 *prevalence of screen time among male and females adolescents in Addis Ababa, 2018*

Screen time (in hour)					
sex of adolescent	N	Minimum	Maximum	Mean	Std. Deviation
male	263	.15	10.00	3.56	2.2
female	277	.15	10.00	4.3	2.2

The study found that 30.6 % of participants spent 2-5 hr. on screen & 23.1% spent more than 5 hr. Among adolescents who participate in the study 204 (37.8%) have a usual habit of eating foods while watching TV and 271 (51.2%) watch food advertisement at least once in a day.

Table 4 *prevalence of screen related activity, number of TV, TV in sleeping room, watching fast food advertisement and eating habit while watching among adolescents in Addis Ababa, 2018*

Variable		Frequency	Percent
Screen time	≤ 2 hr.	250	46.3
	2-5 hr.	165	30.6
	>5 hr.	125	23.1
Habit of eating while watching TV	Usually	197	36.5
	Sometimes	178	33.0
	Never	165	30.6
Number of TV	≤ One	381	70.0
	>1	159	29.4
TV at sleeping room	Yes	95	17.6
	No	445	82.4
Food advertisement	Daily	271	50.2
	Not daily	269	49.8

Adolescents attending non-governmental school and Female adolescent spent more time on screen (table 5).

Table 5 *Screen time activity based on age and sex and school type among secondary school adolescents in Addis Ababa, 2018*

Variables		Screen time				P-value
		≤ 2 hr.		>2 hr.		
		Number	Percent	Number	Percent	
Age of respondent	14-16	107	49.3	110	50.1	0.25
	17-19	143	44.3	180	55.7	
Sex of respondent	Male	133	50.6	106	49.4	0.03
	Female	117	44.9	160	55.1	
school type	Governmental	149	54.4	125	45.6	P<0.001
	Non-governmental	101	38.0	165	62	
Grade	9-10	130	46.1	152	53.9	0.924
	11-12	120	46.5	138	52.5	

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 51.2minutes. Among participants with high screen time the median TPA was 42.9 minutes which was lower than adolescents with low screen time 63.0 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. 46.1% 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 32.6% and 21.3% respectively. Considering sedentary time per day, 25.6% of adolescents spent at least 8 hours per day.

Adolescents with high screen time spent less time on physical activity than those adolescents with low screen time. (Table 6)

Table 6 *Physical activity level and sedentary behavior of adolescents with screen time in 2018*

Variable		Physical activity						p-value
		Low		Moderate		High		
		Number	Percent	Number	Percent	Number	Percent	
Screen time	≤ 2hr.	130	56.3	73	45.1	47	32	P <0.0001
	>2 hr.	101	43.7	89	54.9	100	68	
Sedentary time Vs. screen time								.
variable		Screen time						**P-value**
		≤ 2 hr.				>2 hr.		
		Number		Percent		Number	Percent	
Time spent in sitting and reclining position	<8hr.	208		53.1		184	46.9	P<0.001
	≥8 hr.	42		28.4		106	71.6	

5.1.4 Nutritional status of adolescents with high and low screen time

Based on the WHO 2007 reference chart, the body mass index for age (BAZ) of the study population was slightly deviated to the left (thinness/severe thinness) (fig. 3). Females were more overweight / obese and males were more thin/severely thin than females (fig. 4).

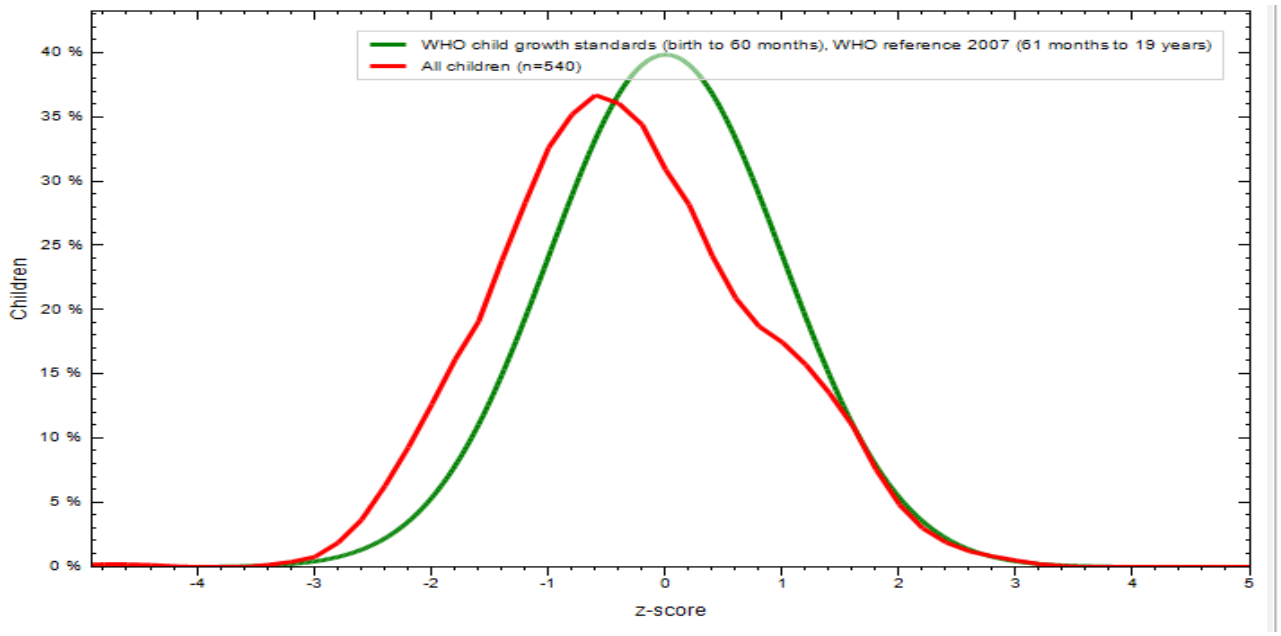

Figure 3 *Comparison of BMI for age Z-score (BAZ) of the study population with the 2007 WHO growth reference population*

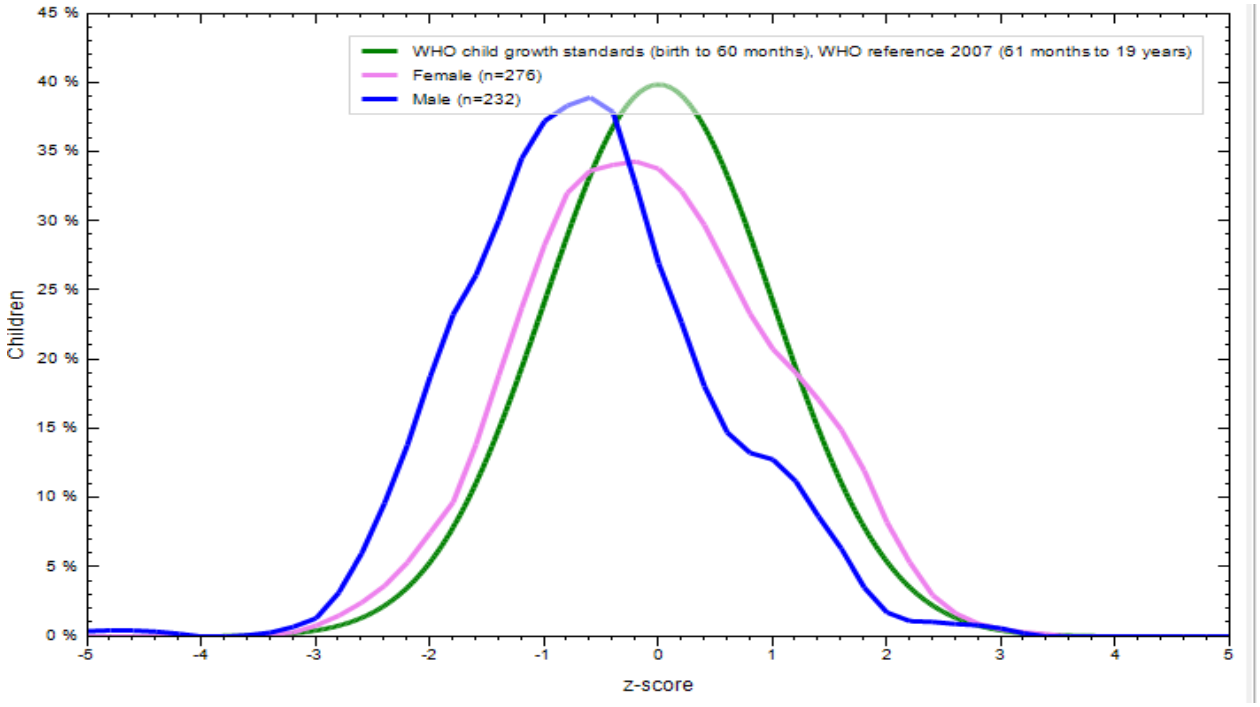

Figure 4 *Comparison of BMI for age Z-score (BAZ) of the study population classified by sex with the 2007 WHO growth reference*

The overall magnitude of overweight and obesity was 14.2% (12.3% and 1.85% for overweight and obese adolescent respectively) and it was higher in adolescents who spent >2 hr. on screen than those who spent <2 hr. (6% verses 21.4%) (fig.5).

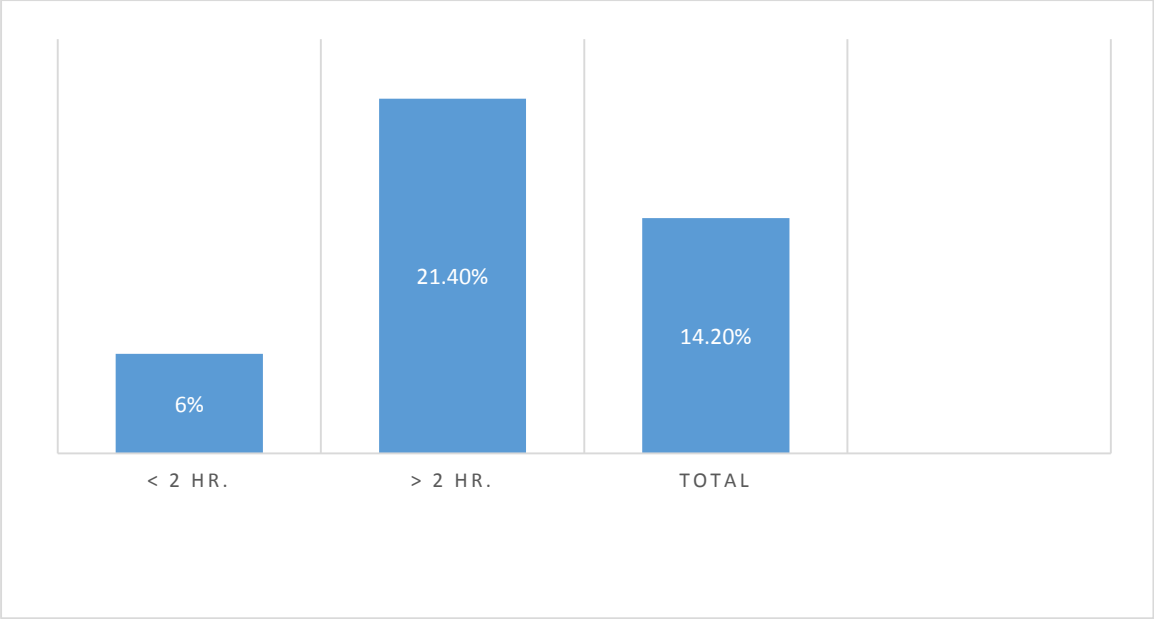

Figure 5 *Percentage of overweight/obesity among adolescents with low and high screen time in Addis Ababa, 2018*

The total prevalence of adolescents who spent greater than 2hr (above the recommended) on screen is 53.7% and it is 44.4%, 51.4% and 80.3% for underweight, normal and overweight/obese adolescents respectively (fig.6)

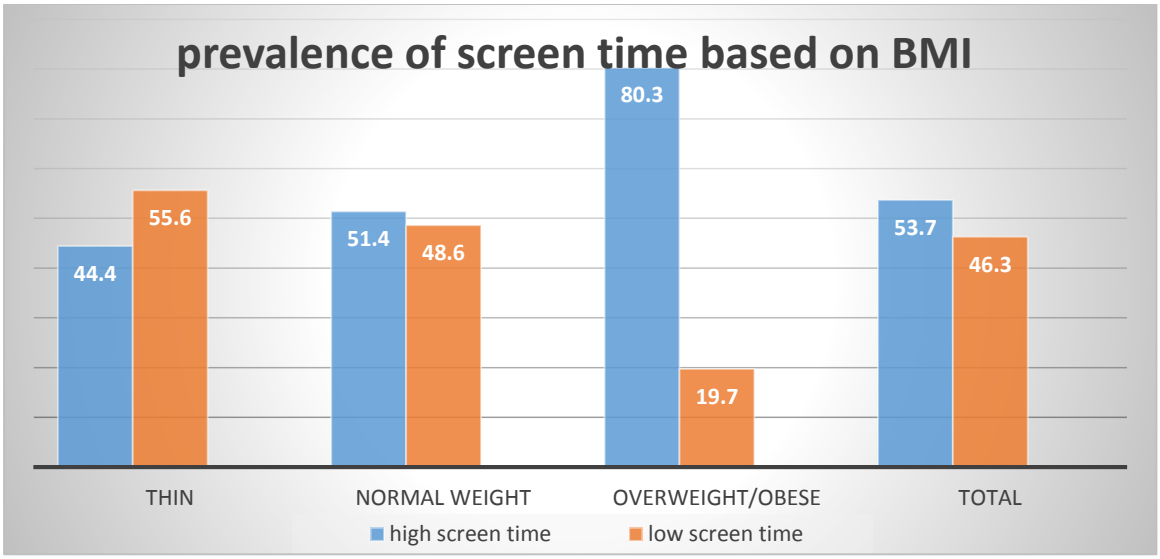

Figure 6 *percentage of screen time based on BMI among adolescents in Addis Ababa, 2018*

The prevalence of overweight is higher among adolescents who spent higher time on screen than those adolescents with low screen time (23.4%, 33.8% and 42.9% for low, moderate and high screen time respectively). Showing that as the time spent on screen increases, the magnitude of overweight and obesity also increase (fig. 7).

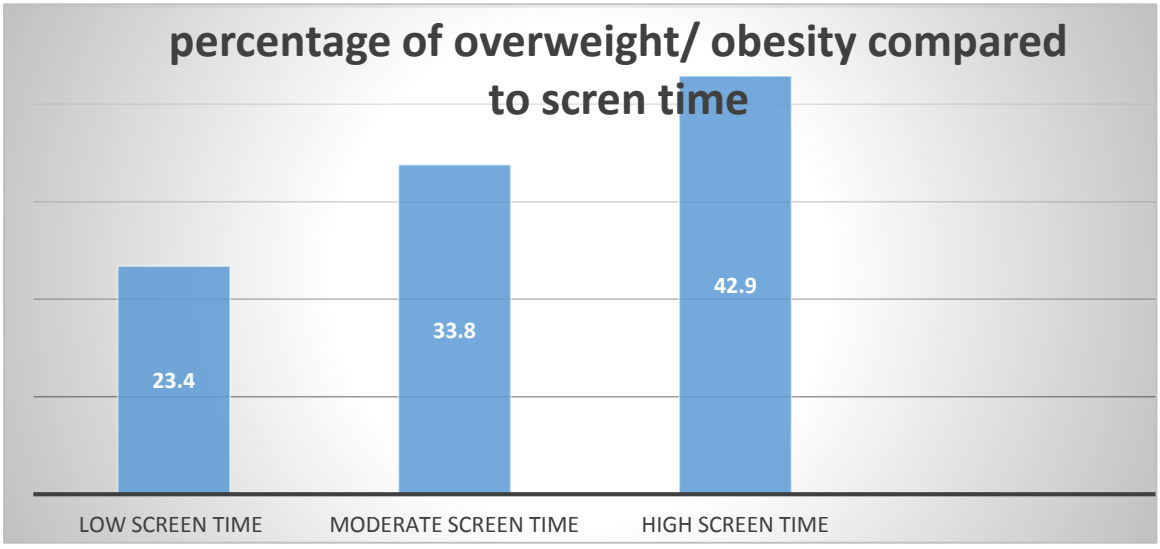

Figure 7 *Percentage of overweight and obesity compared to screen time activity among adolescents in Addis Ababa, 2018*

5.1.5 Food consumption frequency

As described below, based on food frequency questionnaire, 99.0% consumed cereal products at least once in a day and 8% consumed meat at least once per day and 54.1 % consume fast foods at least once in a day.

Table 7 *Different food item consumption frequency of adolescents in Addis Ababa, 2018*

Variable	Frequency	Percent (%)
Cereals		.
At least once in a day	536	99.3
Less than one in a day	4	0.7
Vegetables		**.**
At least once in a day	374	69.3
3-6 times in a week	93	17.2
1to 2 times in a week	37	6.9
non in the week	36	6.7
Fruits		**.**
At least once in a day	190	35.2
3-6 times in a week	160	29.6
1to 2 times in a week	135	25.0
non in the week	55	10.2
Meat		**.**
At least once in a day	43	8.0
3-6 times in a week	71	13.1
1to 2 times in a week	90	16.7
non in the week	336	62.2
Soft drinks		**.**
At least once in a day	120	22.2
3-6 times in a week	187	34.6
1to 2 times in a week	136	25.2
non in the week	97	18.0
Fast foods		**.**
At least once in a day	292	54.1

3-6 times in a week	152	28.1
1to 2 times in a week	62	11.5
non in the week	34	6.3
Dairy product .		
At least once in a day	61	11.3
3-6 times in a week	65	12
1to 2 times in a week	59	10.9
non in the week	355	65.7
Egg .		
At least once in a day	58	10.7
3-6 times in a week	79	14.6
1to 2 times in a week	85	15.7
non in the week	318	58.9
Legumes and nuts .		
At least once in a day	287	53.1
3-6 times in a week	200	37
1to 2 times in a week	33	6.1
non in the week	20	3.7

Meal habit & sleeping time

Concerning daily meal pattern 66.6% of the study participants had a habit of one or more meal skipping.50.9% of the participants did not consume breakfast daily followed by dinner and lunch (33.1% and 23.3% respectively). (Table8)

Table 8 *Meal pattern and sleeping time of adolescents in Addis Ababa, 2018*

Variables	**Frequency**	**Percent (%)**
Number of meal in a day		**.**
One	14	2.6
Two	87	16.1
three	264	48.9
Four	175	32.4
Breakfast		**.**
daily	265	49.1
Not daily	275	50.9
Lunch		**.**
daily	414	76.7
Not daily	126	23.3
Dinner		**.**
daily	361	66.9
Not daily	179	33.1
Meal skipping habit		**.**
Yes	360	66.7
No	180	33.3
Sleeping time		**.**
≤ 8	425	78.7
>8	115	21.3

5.2 Multivariate logistic regression analysis

After controlling for the confounder in the final model of multivariate regression, sex, socio-economic status, screen time, eating while watching TV, watching food advertisement, physical activity and eating fried were the variables that were significantly associated with overweight/obesity with P-value< 0.05. (Table 9)

Female adolescent had 1.9 times higher odds of being overweight/obese than male adolescents AOR (95% CI) =1.90 (1.05-3.43). In addition adolescent with highest socio-economic status had higher odds of overweight/obese AOR (95% CI) =2.86 (1.06-7.73)

Adolescents with high screen time had 3 times higher odds of being overweight / obese than those with low screen time, AOR (95% CI) = 3.01 (1.53-5.90).
The odds of being overweight/obese in those adolescents who have a habit of eating while watching TV was significantly higher than those who does not have a habit. AOR (95% CI) = 4.05 (1.83-9.03). Similarly, adolescents who watch food advertisement at least once in a day had 2.69 times higher odds of being overweight/obese with AOR (95% CI)=2.69(1.45-4.967).

Doing high physical activity was also associated with lower odds of being overweight/obesity with AOR (95% CI) = 0.27 (0.13-0.59)

Adolescents who does not eat fried in a week was associated with lower odds of overweight/obesity than those who consume greater than once in a day AOR (95% CI) = 0.223 (0.075-0.660)

Table 9*.Multivariate analysis showing association between screen time and overweight/obesity among adolescents in Addis Ababa, 2018*

Variables	**Overweight/obesity**				**COR (95% CI)**	**AOR (95% CI)**
	Yes		no			
	count	%	count	%		
Sex						**.**
Male	27	10.3	236	89.7	1	**1**
Female	50	18.1	227	81.9	1.93 (1.17-3.18)	**1.90 (1.05-3.43)***
Age						**.**
14-16	32	41.6	185	40	1	1
17-19	45	58.4	278	60	0.94 (0.57-1.53)	0.95 (0.53-1.70)

School type						**.**
governmental	30	39	244	52.7	1 1.75 (1.07-2.86)	1 1.81 (0.98-3.31)
Non-governmental	47	61	219	47.3		
No formal education	7	9.1	45	9.7	1	1
Primary education	13	16.9	54	11.7	1.548 (0.569-4.209)	1.62 (0.51-5.11)
Secondary education	26	33.8	162	35	1.032 (0.421-2.531)	0.86 (0.30-2.46)
Above secondary	31	40.3	202	43.6	0.987 (0.409-2.382)	0.72 (0.25-2.05)
Socio-economic status						**.**
Lowest	10	13	110	23.8	1 1.535 (0.633-3.720) 2.125 (0.927-4.873) 2.322 (1.028-5.245)* 2.348 (1.039-5.306)*	1 1.84 (0.68-4.95) 2.35 (0.90-6.16) 2.43 (0.94-7.62) **2.86 (1.06-7.73)***
Second lowest	12	15.6	86	18.6		
Middle	17	22.1	88	19		
Middle high	19	24.7	90	19.4		
Highest	19	24.7	89	19.2		
Screen time						**.**
≤2 hr.	15	6	235	94	1 4.26 (2.36-7.70)	**1** **3.01 (1.53-5.90)***
>2hr.	62	78.6	228	21.4		
. Eating while watching TV						**.**
Rarely	16	9.7	160	90.3	1 1.45 (0.74-2.84) 2.15 (1.15-4.03)	1 1.14 (0.34-3.77) **4.05 (1.83-9.03)***
Sometimes	24	13.5	154	86.5		
Usually	37	18.8	149	81.2		
. TV at sleeping room						**.**
No	67	15.1	378	84.9	1 0.66 (0.33-1.34)	1 093 (0.41-2.10)
Yes	10	10.5	85	89.5		
. Number of TV						**.**
1	48	62.3	330	71.7	1 1.53 (0.93-2.54)	1 1.09 (0.58-2.04)
>1	29	37.7	130	28.3		
. Watching food advertisement						**.**
Not daily	22	28.6	247	53.3	1 2.86 (1.69-4.84)	**1** **2.69 (1.45-4.967)***
Daily	55	71.4	216	46.7		
Total physical activity						**.**
Low	33	22.4	114	77.6	1	1

Moderate	23	14.2	139	85.8	0.57 (0.32-1.03)	0.83 (0.28-2.46)
High	21	9.1	210	90.9	0.35 (0.19-0.63)	**0.27 (0.13-0.59)***
Vegetables						**.**
≥one in a day	58	75.3	316	68.3	1	1
3 to 6 times in a day	10	13	83	17.9	0.656 (0.322-1.340)	0.49 (0.21-1.17)
1 to 2 times in a day	5	6.5	32	6.9	0.851 (0.318-2.276)	0.64 (0.20-2.05)
None in the week	4	5.2	32	6.9	0.681 (0.232-1.998)	0.87 (0.25-3.02)
Fruits						**.**
≥one in a day	23	29.9	167	36.1	1	1
3 to 6 times in a day	21	27.3	139	30	1.097 (0.583-2.066)	1.22 (0.59-2.52)
1 to 2 times in a day	19	24.7	116	25.1	1.189 (0.620-2.283)	1.73 (0.79-3.80)
None in the week	14	18.2	41	8.9	2.479 (1.175-5.233)*	2.34 (0.93-5.87)
Fried						**.**
≥one in a day	47	61	212	45.8	1	**1**
3 to 6 times in a day	16	20.8	148	32	0.488 (0.266-.893**)***	0.581 (0.287-1.176)
1 to 2 times in a day	9	11.7	40	8.6	1.015 (0.461-2.234	1.089 (0.432-2.744)
None in the week	5	6.5	63	13.2	0.358 (0.1370-.939)*	**0.223 (0.075-0.660)***
Meat						**.**
≥one in a day	7	9.1	36	7.8	1	1
3 to 6 times in a day	8	10.4	63	13.6	0.65 (0.22-1.95)	0.68 (0.19-2.38)
1 to 2 times in a day	17	22.1	73	15.8	1.19 (0.46-3.15)	1.32 (0.42-4.17)
None in the week	45	58.4	291	62.9	0.79 (0.33-1.89)	0.79 (0.27-2.29)

* = statistically significant

6 Discussion

The main aim of this study was to examine the prevalence of screen time and its association with overweight and obesity among adolescents in Addis Ababa. This study revealed that high prevalence of screen time activity above the recommended amount among adolescents in Addis Ababa. In the present study the prevalence of screen time >2hr. among adolescents was 53.7%. The prevalence is high among female than male, non- governmental than governmental school students and in those adolescent who have low daily physical activity level.

It was found that female adolescent were found to have higher odds of overweight and obesity than male adolescent which is consistence with other researches done in the study area (19, 50, 52, 53). This could be due to the fact that female adolescents had higher odds of participation in sedentary activity than male adolescents including screen time. It is also explained by behavioral differences between the two sexes in which males are more physically active than females and also those who watch a lot of televised sport may also participate in sport, which mitigating the effect of sedentary behavior on BMI (44). It can also be explained by biological difference and timing of puberty between the two sexes in which female adolescents are particularly vulnerable to increase in body weight than male one (44).

Adolescents in the highest wealth quintile were also had higher odds of being overweight/obesity than male adolescent and those in the lowest wealth quintiles. Which was consistent with the findings of other studies done in the country (46, 50). But this result contradict with the study done in developed countries (54-56) this could be due to the fact that different unhealthy foods which are rich in calorie but poor in their nutrient are affordable at low price than those healthy foods which makes easy to accesses for adolescents with low economic status and prone them to overweight/obese (55, 57).

The study also reveal that there is a high prevalence (53.7%) of screen time activity among adolescents above the recommended amount. This finding is higher than other findings done in the same area (53, 58, 59). This difference could be due to the difference in measurement in which the previous studies measure only one component of screen time (TV) and fail to assess and measure other form of screen activity whereas the present study assess and measure different form of screen related activity. And also

the present study used validated ASAQ while the previous literature measure by using single component (one questioner) to measure TV time. Another cross sectional study which is done among 37 countries shows that the prevalence of high screen time among adolescents vary from country to country (17% in China to 78% in Cote D'Ivoire) (44).

The present study found that screen time was significantly associated with overweight and obesity. There was also a dose response effect relationship between time spent on screen and overweight/obesity among adolescents in which there is 43% increase in prevalence of overweight for the additional 2 hr. increase in screen activity and a two fold increase in prevalence of overweight/obesity for the adolescents who watch screen for more than 5 hr. per day. This result is consistence with the finding of other literatures (54, 60-62)

Adolescents participate in high physical activity daily had a 0.27 odds of decreased in being an overweight/obesity than adolescents with low physical activity. This evidence is supported by other two researches(56, 62) but contradicted with research done in other area in which the study state that independence of physical activity level adolescents who have high screen time had higher odds of being overweight and obesity(54). This difference could be due to the different in measurement of physical activity in which the current research and the above two research uses the WHO recommended measurement of physical activity [at least 60 minute daily moderate to vigorous physical activity (MVPA)] obtained from GPAQ but the last literature uses question adapted from other sources.

The possible mechanism for the above association could be explained by the amount of time spent in screen related activity increase the adolescents' sedentary behavior and could also be the reason for displacement of physical activity. This decreased in physical activity led to a decreased in energy expenditure and positive energy balance in individual which result in weight gain and ultimately led to overweight and obesity (56, 62, 63).

Adolescent who watched food advertisement more than once a day had a 2.69 times higher odds of being overweight/obesity than adolescents who does not watch food advertisement in a daily base. Which is consistent with other research done in the study area (19, 52). And also with researches done in other country (64). The above association could be due to the reason that children and adolescent are an important

population group for the food industry either through direct purchase of foods “primary market” or through influencing family purchasing decision “influence market”. And the content of the media have a significant effect on their eating habits and their food preference through promotion of unhealthy food, commercials and other programs which encourage to eat more.(55, 57, 63, 64).

The study also found that those adolescents who were obese or overweight were found to have high prevalence of eating fast foods more than once in a day, which is consistent with other studies done in the study area (58) and also those adolescents who had a habit of eating while watching TV or other screen had a 4.05 times increased odds of being overweight and obesity than those adolescents who does not have such a habit. This evidence is supported by other literature done in the study area (52) and also by other literature done in other country (46).

The above association could be due to food preference of adolescents in which the commonest food which are prefer by adolescents during screen time is fast foods and soft drinks which are rich in calorie but poor in their nutrient content (64, 65). That causes increased in energy intake through snacking and usually there is a so called “mindless eating,” that is lack of attention to consumption of food due to external cues in the environment. Study shows that children and adolescent consume significantly more food when watching continuous film, TV programs or stay longer in other means of screen than when they weren't watching these programs (63).

The other thing is that adolescent who participate in screen time activity during meal time consume fewer fruits and vegetable and their food preference and consumption for fast food and soft drink is higher than those who did not participate in high screen activity which makes those adolescent who participate in high screen related activity associate with overweight than those adolescent who does not participate on those activity(63).

7 Limitation and strength of the study

7.1 Limitation of the study

This study has several limitations that should be taken in account while doing generalizability. First, due to nature of cross-sectional study we cannot infer causality from the findings. Second, there is a potential for recall and social desirability bias in the frequency of dietary habits, physical activity and sedentary behaviors. Also the food frequency questionnaire did not account for portion size. The study also does not provides information on the content of media use; therefore, we cannot ascertain which types of programs or food advertisements are associated with a higher weight status. Levels of screen time were obtained by reports of personal interview, which may affect the validity. Third, other factors which can affect excess body weight like genetic factor, health condition and drug use of participants were not addressed in this study. This study also does not assess the prevalence and association of screen time separately for overweight and obesity**.** And finally adolescents in early adolescent group were not included in this study.

7.2 Strength of the study

As a major strength, this research study tried to address a neglected but important public health issue of adolescents. And as of my knowledge the study is the first in its kind in the area of screen time and overweight/obesity due to this reason it can motivate different researcher to do more investigation on the area and can also serve as a reference for future investigators. And also instead of self-reported weight and height measurement, actual BMI-for-age was calculated after taking anthropometric measurement. Finally the combined form of screen related activity (TV, mobile, tablet and computer) among adolescent is assessed in this study and screen time, physical activity was assessed using a validated and reliable measurements.

8 Conclusion and recommendation

8.1 Conclusion

This study demonstrated a 53.7% prevalence of screen time above recommended amount and also a positive association between longer periods of screen time and overweight/obesity among adolescents in Addis Ababa with an apparent dose response effect. The association is strongest in adolescent females.

8.2 Recommendation

- Parents and adolescents should be aware about this association and should be encourage to participate their children in other means of recreational activity.
- Promotion of participation in physical activity to prevent weight gain and separately, to tackle the factors (mobile phones, TVs in bedrooms, non-participation in sport and excessive weight) that appear to be conducive to participation in sedentary behaviors such as screen time.
- Furthermore, youth centers and schools should encourage opportunities for low/no cost physical activities.

For researchers

- Studies accounting adolescents at early adolescents should be conducted
- Longitudinal studies will better show the direction and causality of association between screen time and overweight/obesity.
- Future studies are needed to determine whether reductions in TV/ video viewing and/or removing TV sets from children's bedrooms will contribute to prevention of adolescent overweight/ obesity

9 Reference

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10 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 Wubetsh Asnake, student of Addis Ababa University School of public health. She is conducting a research on "The relationship between screen time and overweight/obesity among adolescents in Addis Ababa, Ethiopia: 2017". 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 to participate in this study because you are currently attending in one of the selected 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 intake, dietary habit, physical activity and sedentary behavior that could be associated with overweight/obesity. The measurement and interview will take about 30 minutes.

The result of this study could be used to direct and enables the government and health organizations to design appropriate and effective intervention strategies and implementation of different control and preventive mechanism of overweight/obesity by determining the magnitude and combined effects of screen time and other lifestyle factor on overweight & obesity among adolescents. It also could give an insight for parents and adolescent on the probable effectiveness of limiting time spent on screen on decrement of overweight/obesity in adolescent. In addition, the findings from this study hope to be used as base-line information and help planners, programmers, and policy makers for intervention purpose and could also direct future research area for researcher. 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 ——————————————

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: Wubetsh Asnake Ayenew

Email: wubetshasnake33@gmail.com Cell phone: +251 910503364