ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR FOOD SECURITY STUDIES

EFFECTS OF DIETARY DIVERSITY AND EATING BEHAVIOURS ON ADOLESCENT GIRL'S NUTRITIONAL STATUS IN GOVERNMENT SCHOOLS, AKAKI KALITY SUBCITY, ADDIS ABABA, ETHIOPIA

BY:

SOLOMON GIRMA YIRDAW

DECEMBER, 2020

ADDIS ABABA, ETHIOPIA

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ABEBE HAILE (Ph.D.)

A THESIS SUBMITTED TO THE COLLEGE OF DEVELOPMENT STUDIES CENTER FOR FOOD SECURITY STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN FOOD SECURITY AND DEVELOPMENT STUDIES

DECEMBER, 2020

ADDIS ABABA, ETHIOPIA

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other University and that all the sources and materials used for the thesis have been properly acknowledged.

Declared By: Solomon Girma Yirdaw

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Addis Ababa University

School of Graduate Studies

As an advisor of the thesis, I certify that I have read and evaluated the thesis prepared by **Solomon Girma Yirdaw** entitled 'Effect of Dietary Diversity and Eating Behaviours on Adolescent Girl's Nutritional Status in Government Schools, Akaki Kality Subcity, Addis Ababa, Ethiopia' and recommended for open defense as fulfilling the requirement for the degree of **Master of Science in Food Security and Development**.

Dr Abebe Haile	_____	_____
Name, Advisor	Signature	Date

As members of the Examining Board of this thesis open defense, we certify that we have read and evaluated the thesis prepared by **Solomon Girma Yirdaw** entitled 'Effect of Dietary Diversity and Eating Behaviours on Adolescent Girl's Nutritional Status in Government Schools, Akaki Kality Subcity, Addis Ababa, Ethiopia' and recommend that it is acceptable as a thesis required for the degree of Masters of Science in Food Security and development.

Signed by the examining committee

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Final approval and acceptance of this thesis is contingent upon the candidate's submission of the the final copy of the thesis, incorporating all the comments by Examining Board, to the Council of Graduate Studies (CGS) through the Center Academic Committee (CAC) of the center.

_____

Chairperson of the center of graduate program coordinator

DEDICATION

I dedicated this thesis to Almighty Lord for his blessing in my life and my beloved family for their encouragement.

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STATEMENT OF THE AUTHOR

I have a Bachler of Science degree in public health and a Master of Public Health in Epidemiology specialty. This thesis is for my second master's degree program.

First, I declare that this thesis is my work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for a Master of Science degree at Addis Ababa University and is deposited at the University Library to be made available to borrowers under the rules of the Library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

AAU:	Addis Ababa University
AOR:	Adjusted Odds Ratio
BLUE:	Best Linear Unbiased Estimates
BMI:	Body Mass Index
BSc:	Bachelor of Science
CDDS:	Child Dietary Diversity Score
CI:	Confidence Interval
CSA:	Central Statistics Agency
DDS:	Dietary Diversity Scores
EDHS:	Ethiopian Demographic and Household Survey
FANTA:	Food and Nutrition Technical Assistance
FAO:	Food and Agriculture Organization of the United Nations
FMoH:	Federal Ministry of Health
FGD:	Focus Group Discussion
HDDS:	Household Dietary Diversity Score
IDDS:	Individual Dietary Diversity Score
KAP:	Knowledge, Attitude, and Practice
LMIC:	Low and Middle-Income Countries
MDD:	Minimum Dietary Diversity
MUAC:	Mid Upper Arm Circumference
OLS:	Ordinary Least Squares
TV:	Television
UNICEF:	United Nations Children's Fund
USAID:	U.S. Agency for International Development
VIF:	Variance Inflation Factor
WASH:	Water Sanitation Hygiene
WDDS:	Women’s Dietary Diversity Score
WFP:	World Food Programme
WHO:	World Health Organization

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Adolescence is a period of rapid growth and maturation in human development that demands extra nutrients and energy to support growth. Focusing on adolescent's nutrition, especially girls, provides a unique opportunity to break the intergenerational cycles of malnutrition. However, there is little information about adolescent eating behaviours, dietary diversification and nutritional status of adolescent girls, especially urban and school based. This study aimed to assess the effects of dietary diversity and eating behaviors on schoolgirls nutritional status in government schools in Akaki Kality sub-city, Addis Ababa, Ethiopia. A total of 384 adolescent girls between the ages of 10 to 19 years who were registered and attended in the selected 12 government primary and secondary schools in the year 2019/2020 were selected through probabilistic two-stage sampling technique. The study used both quantitative and qualitative research methods. Descriptive, bivariate, and econometric analysis (Ordered and multinomial logistic regression) computed by STATA V14. Statistical significance was considered at $p < 0.05$ and the strength of statistical association was assessed by odds ratio with 95% confidence intervals. Qualitative data collected through focus discussion group discussion using a semi-structured questionnaire. Mean age of schoolgirls was 15.67 years (± 1.596). Overall stunting and thinness of schoolgirls were 15.0% (60/384) and 14.1% (54/384) respectively and about 5.2%(20/384) schoolgirls were overweight and almost half of schoolgirls had low dietary diversity score with their mean (±SD) dietary diversity score of 3.61 (± 1.33). The risk factors for stunting were schoolgirls who used to drink sugary fluids [OR: 18, 95% CI (2.49- 130.89)], schoolgirls who often feel hungry in the week [OR: 5.2, 95% CI (1.95- 14.05)], schoolgirls whose family lower income status [OR: 4.97, 95% CI (2.46- 10.06)], and schoolgirls whose lower BMI/age [OR: 1.53, 95% CI (1.27- 1.84)]. Similarly, the risk factors for thinness were schoolgirls who used to drink sugary fluids [OR: 13.84, 95% CI (1.74-109.97)], schoolgirls whose family lower income status [OR: 2.29, 95% CI (1.33-3.92)], schoolgirls who used to practice daily eat on late [OR: 9.77, 95% CI (4.60- 20.72)] and irregular and who never perform enough healthy exercise [OR: 1.95, 95% CI (1.07- 3.55)]. This study provided important indicator for the nutritional status of "tomorrow's mothers'' therefore; Akaki Kality subcity education office should maintain the school feeding programme to mitigate poor nutrition outcome following erratic feeding and meal skipping behaviours. Family should keep attention and watch schoolgirls eating behaviours, weight, and health status since this is the second opportunity to create feature generation through healthy growing feature mothers.

Keywords: *Adolescent Girls, Stunting, Thinness, Dietary Diversity, Feel Hungry, Meal Skip, Erratic Feeding*

CHAPTER ONE: INTRODUCTION

1.1. Background

The World Health Organization (WHO) defines adolescents as young people aged 10–19 years (WHO, 2003). Adolescence is the only time following infancy when the rate of physical growth increases. For this to happen, there is a greater need for calories and nutrients. Thus, it is a time of increased nutritional requirements (UNICEF, 2011). Poor nutrition can have lasting effects on an adolescent's cognitive development, resulting in decreased learning ability, poor concentration, and impaired school performance (Abahussain, 2011 & Shelomenseff and Andreoni, 2000).

Stunting in adolescents is the collective effect of poor nutrition, mainly during the first two years of life (Shrimpton *et al.* 2001) whereas body mass index (BMI) is associated to an individual's food consumption pattern. Undernutrition in adults more truly reflects the nutritional status of a community (Shetty & James, 1994).

Different lifestyle factors and unhealthy eating habits developed during adolescence can lead to serious diseases later in life. Healthy eating behavior during adolescence is an essential precondition for physical growth, psychosocial development, and cognitive performance. (French *et al.*2003). Lifestyle changes including food habits are often more obvious among urban adolescents as they are typically the 'early adopters' unsettled among other things to their attraction for innovation and high exposure to commercial marketing in cities (Hélène Delisle *et al.* 2001). Adolescents are mostly open to new ideas and they show interest and many habits acquired during adolescence will last a lifetime (Dennison & Shepherd, 1995).

In Ethiopia, children and adolescent comprises 48% of the population and about 25 percent is girls (CSA, 2007) but studies among this age group were not enough. Studies revealed that under nutrition was common problem among adolescent girls, of which, a study in the rural community of Tigray indicated that 25.5% and 58.3% of adolescent girls were stunted and thin, respectively (Mulugeta *et al.* 2010), 37.8% were thinness, 2.0% overweight and 0.4% had obesity (Gebremariam *et al.* 2015). Similarly, in Jimma, 53.2% were underweight (Huruy *et al.* 2013), Hawassa, 12.9% were overweighed and 2.7% had obesity (Teshome et al. 2012).

Malnutrition affects a large portion of the adolescent and youth population in Ethiopia. According to Ethiopian demographic and household survey 2016 report, the proportion of non-pregnant adolescent girls aged 15 to 19 years with acute malnutrition, thinness (BMI <18.5) was 36 percent. Adolescents (age 15 to 19) are more likely to be thin (36 percent) than older women and 2.4 percent of the girls' group were reported to be overweight or obese. (CSA, 2012).

This thesis focused on government owned school whereby a large majority of students enrolled and analyzed the effect of dietary diversity and eating behaviors on adolescent girl nutritional status.

1.2. Statement of the problem

For several years, the health of adolescents and nutrition have not been given a major public health concern and there were no sufficient published literatures. Many of the global societies considers they were believed to be lesser susceptible to disease and suffer from fewer life-threatening conditions than those children and elderly people. Besides, adolescent nutrition receives very little attention and difficult to quantify accurately in this age group due to rapid change in growth and development and lack of consensus over which definition to use (Alderman et.al. 2003).

Ethiopia, as the LMICs, nutritional problem is one of the major public health concerns for all phases of human life. Moreover, in Ethiopia under nutrition is a main public-health catastrophe due to most people addicted non-diversified diet (Afework *et al.* 2009). But there is little evidence about the nutritional status of adolescents in Ethiopia. Furthermore, adolescent nutrition is distress from lack of documented evidence, low policymaker interest and little attention of program experience in the study setting (Aurino, 2017).

Commonly observed practices in the study area on eating patterns and dietary diversification are erratic in adolescents and might predispose them to some nutritional problems. Adolescents are frequently considered as healthy and strong but, previous global literature indicated that numerous adolescents were underweight and stunted in height (Aurino, 2017). In spite of this, previous literature in Ethiopia also showed that still gave more consideration on vulnerable people dietary intake such as: infant, pregnant and lactating women but, limited evidence for adolescents (Afework *et al.* 2009). Dietary diversity and nutritional status of adolescents in

Ethiopia is significant problem. Understanding adolescent's eating behaviours and dietary diversity is important to reduce under-nutrition among adolescents and gives specific intervention.

Schools considered an entry point and believed contribute to correct adolescents knowledge, attitude, and practices on nutrition, dietary diversification, and healthy eating behaviors however from practical observations in the study area which does not happen at all and even there is no as such health clubs and no responsible person in the school which might miss adolescents from second window of opportunity for catching the growth.

Looking closely dietary diversity and eating behaviors of adolescent, especially girls, provides a unique opportunity to break the intergenerational cycles of malnutrition. Therefore, this study aimed to assess adolescent girls eating behaviours and dietary diversification and its association with their nutritional status in Akaki Kality subcity, Addis Ababa, Ethiopia.

1.3. Objectives of the study

1.3.1. General objective

The overall objective of the study was to assess adolescent girls eating behaviours and dietary diversification and its association on nutritional status in government schools: Akaki Kality subcity, Addis Ababa Ethiopia, 2020.

1.3.2. Specific objectives

The specific objectives of the study were to:

1) Identify adolescent girls eating behaviors in the study area.
2) Assess the dietary diversity of adolescent girls in the study area.
3) identify adolescent girl nutrition status using BMI for Age and Height for Age
4) Assess the association between adolescent eating behaviors and dietary diversification on their nutrition status by using the econometrics model.

1.4. Research questions

The following pertinent research questions were addressed in this study.

1) What are the eating behaviors of adolescent girls?
2) What is the dietary diversity status of adolescent girls?
3) What is the nutritional status of adolescent girls?

1.5. Research hypothesis

Ho: There is no nutritional status difference among schoolgirls in the study areas

1.6. Significance of the study

In Ethiopia, about 25% are an adolescent (age 10-19 years) (CSA, 2017) and malnutrition is very common among these age groups. Adolescent girls are particularly vulnerable to malnutrition because they are growing faster than at any time after first 1000 days of life. Adolescent nutrition is important to the health of girls and in turn is relevant to maternal nutrition which contributes reduction of neonatal deaths and child under nutrition. Despite the facts, these age group was neglected in Ethiopian National Nutrition Program phase one which was implemented five year back from 2016 showed that adolescent nutrition were the big missing areas of life cycle approach and then; government recognized the importance of adolescent nutrition and embedded in National Nutrition Program phase two which was implemented from 2016 to 2020 and therefore; adolescent nutrition boldly highlighted in this strategic document under strategic objective one and strategic objective four which is focusing on ‘’integrate adolescent nutrition services into youth centers and related community-based programs, promote adolescent dietary diversity, promote diversified and nutritious foods for adolescents and ensure that key influential groups and individuals are aware of the importance of adolescent nutrition and the consequences of malnutrition during adolescence’’.

Therefore; this study is highly contributing on gathering adolescent nutrition status, their eating behaviours and dietary diversification from the study areas which will provide evidence on the prevailing efforts for designing of appropriate adolescent-specific nutrition interventions implementation protocols, and guidelines.

1.7. Scope and limitation of the study

1.7.1. Scope of the study

This thesis analyzed the effect of dietary diversity and eating behaviors on adolescent girl nutritional status in government schools and the study focused on adolescent girls only. Therefore, the scope of the study was school-based, urban setting with age and gender-specific. Besides, this thesis analyzed the combined effects of Adolescent eating behaviors and dietary diversification. Moreover, methodologically this thesis employed univariate, bivariate, ordered, and multinomial logistic regression analysis and modeling with STATA and SPSS statistical package application

1.7.2. Limitation of the study

Generalization may not be possible at the national level as it was focused on urban-based schools and has a methodological limitation with a cross-sectional survey. Fasting seasons during data collection was another limitation which might mislead the facts on dietary diversification variables; however, maximum precaution was taken during data collection process to reduce such problem.

1.8. Organization of the thesis

This thesis was organized into five chapters. Chapter one introduced and set out the background information, statement of the problem, research objectives, research questions, significance, scope and limitation, and organization of the study. Chapter two stated a review of related literature (theoretical and empirical evidence). Chapter three explained to introduce a description of the study area, research methods, and materials such as location, the demographic and socio-economic profile of the study area; research design, sampling size determination and approach; types and sources of data; sampling techniques, and data collection tools; techniques of data collection and ethical consideration. Chapter four described result reports and related discussions. Chapter five summarize the finding and suggested relevant recommendations.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1. Theoretical framework on eating behaviours

Scholars stated that to understand the food choice behaviors of adolescents, theories and models have paramount important and relevant which could potentially have implications for attempts at dietary change (Shepherd & Raats, 2006) and the achievement of eating habits and behaviors is a complex process that involves many factors across different backgrounds (Story *et al.* 2008).

One of the traditional approaches in health promotion and information has been to focus on cognitive mechanisms in the individual as the most important sources of individual behavior. Knowledge, Attitude, and Practice (KAP) model has been key in the health promotion approach and emphasizes that to change behavior, knowledge is essential and when people obtain new knowledge, their attitudes will change, followed by a change in their behavior. Therefore, when we talk about the dietary habits of adolescence, Knowledge, Attitude, and Practice (KAP) may promote to explain the background of food choices and why there are differences between different groups of adolescents.

Knowledge of healthy nutrition has demonstrated to be associated with healthy dietary habits and then further likely to assume that this kind of knowledge is affecting the attitudes. On the contrary, when people know unhealthy food consumption may lead to disease, while healthy food may enhance their health, they will build a positive attitude leads to towards healthy nutrition and further, they will begin to eat healthily. Ecological models of health behavior in general focus on individual influences such as physical activity and sedentary activity, as well as on social such as family meals and environmental factors (such as access to food) is another theory. These factors have either positively or negatively affected individual behavior (Sallis & Owen, 1996).

Scholar Story and her colleagues have also recommended an ecological model to be used when guiding the food choice interventions that take place in adolescence. The model also highlights factors at different levels that influence the health and nutrition of adolescents and their environments (Story *et al.* 2008).

The story stated further that individual-level factors include cognitions, behavior, biological and demographic factors whereas environmental factors include the immediate social environment such as family, friends and peer networks, and other factors such as school, fast-food outlets, and social and cultural norms are related to the physical environment.

Food production and marketing, mass media and advertising in addition to food distribution systems, policies, and laws that regulate food-related issues, such as pricing are factors that are also explained by scholar story which related to macro-level environments and other factors also described that related to social norms, agriculture policies, and economic price structures. Although these macro-systems or societal influences play a more distal and indirect role in determining eating behaviors, they are considered as one of the multiple factors that have been identified as important for young people's food choices.

2.2. Empirical literature review

2.2.1. Schoolgirls eating behaviours

Adolescence is a time of growing freedom including increased prospects to make decisions about what and when to eat. However, being influenced by a multitude of factors and changing of lifestyle may affect their dietary choices and eating behaviors, thus making them fail to stick to healthy eating practices (Taylor *et al.* 2000).

Practicing healthy eating behaviors is one of the most critical factors to meet the nutritional needs of adolescents and proper eating behaviors that are learned in early life are kept in adulthood thus reducing the risk for major chronic disease. Physical and psychological changes occurring during this period usually significantly influence their dietary behaviors (Nzefa Dapi *et al.* 2005).

The behavior affecting food and drink choices appears to change as the children become adolescents and few adolescents meet the official recommendations for nutrition. The consumption of fruits and vegetables often declines when entering adolescence, while the consumption of unhealthy food types increases (Rasmussen *et al.* 2006). This has been confirmed in studies examining consumption of for instance soft drink (Ranjit *et al.* 2010) and fast food (Larson *et al*. 2009). Bauer *et al*. 2008 carried out a longitudinal study with the first

measurement in lower secondary school, and a follow-up in secondary school, showing that the fast-food consumption had increased significantly for both genders.

One of the studies on Norwegian adolescents showed that soft drink consumption among students in primary and lower secondary schools found that 10th graders had the highest consumption of soft drinks weekly, also compared to students in 9th grade (Bere *et al.* 2008). On fast food, consumption found that the frequency of visiting fast-food restaurants was higher among students in grades 9-12 than in grades 7-8 (French *et al.* 2001).

Nutrition and physical growth are naturally related and thus optimal nutrition is an essential for achieving full growth potential. During adolescence, healthy eating behavior is a fundamental prerequisite for physical growth, psychosocial development, and cognitive performance, as well as prevention of diet-related chronic diseases such as cardiovascular diseases, cancer, and osteoporosis in adulthood. There exists a direct relationship between dietary habits during childhood years and growth, development as well as the prevalence of disease throughout the life cycle. The eating habits of adolescents are affected by various physical and psychosocial factors. Even though high nutrient requirements, adolescents usually have lower intake probably due to poverty and poor nutritional knowledge (Wilna et al. 2015).

David *et al.* 2008 defined nutrition education as is the process through which people enhance the knowledge, attitude, and skills that are vital for developing good dietary habits. Children spend one-third of the day at school, thus offering a practical environment for education about healthy food choices is necessary (Foster *et al.* 2008). Perez-Rodrigo and Aranceta, 2001 argued that schools have the potential to reach out to children at a critical age when eating habits are still forming and pave a way for healthy behavior and dietary habits to adulthood. The study by Neira and De-Onis suggested that schools can positively influence the lives of most children and offer various opportunities for teaching children about healthy diets and physical activity. (Neira and De-Onis, 2006).

In-School Adolescent Girls' Nutrition Knowledge, Attitude and Practice (KAP) Survey in Somali, Gambella, SNNP and Oromia Regions, Ethiopia by UNICEF found that about 28 percent of adolescent girls consumed less than three meals in the previous day and nearly 10 percent did not consume any meal at all. The food item most consumed by adolescent girls is

cereal. Meat and fish consumption were reported low in all regions. On average, fish and organ meat was consumed by only 25 percent of adolescents. One of the regions in Ethiopia, Somali, 85 percent had not heard about balanced diets, which could be explained by the absence of nutrition education in the Somali region. (FMoH/UNICEF, 2016).

Adolescents regularly decided to skip meals and healthy eating is commonly a low priority for adolescent (Neumark-Sztainer, 2004). A school-based cross-sectional study, Onyiriuka *et al.* 2013, discovered that meal skipping, consumption of fast foods along with soft drinks, low consumption of fruits and vegetables were the main eating habits presented and breakfast was most frequently skipped, and dinner least frequently skipped. Data collected from 25 female adolescents aged 14 to 16 years attending urban public schools in Cape Town, South Africa, found that eating habits such as skipping breakfast and consuming unhealthy tuck shop foods were largely connected with socioeconomic status. (Stupar *et al*. 2007).

Dietary changes are even more prominent among urban adolescents since they are more exposed to brand marketing and advertising campaigns that target urban areas (Williams, 2013). In Cameroon, it was noticed that the diets of rural adolescents contained of more traditional foods, while the diets of urban adolescents comprised of more junk foods (Nzefa Dapi *et al.* 2005).

Scholar pentz 2009, stated that he frequency of exercise commonly reduced as adolescents grow older. The walking distances get shorter, and car driving increases and also national surveys in Norway indicated that the activity level of the average Norwegian adolescent was below the current recommendations of at least 30 minutes of physical activity a day (Wold *et al.* 2014).

Natalie *et al.* 2009, found that individuals who exercised regularly tended to eat health diets than not and individuals who skipped breakfast were less physically active than ate breakfast regularly. Soft drink consumption affected to reduce physical activities, participation in school physical education classes and planned sports activity. Consumption of the fruit juice revealed positive associations with physical activity measures and healthy food consumption (Ranjit *et al.* 2010). According to Benavides vaello 2005, socio-environmental factors, family, peers, and media, are believed to influence an individual's food habits and food choices. Peers and friends can also play a role in influencing each other's food selection and behavior or types of foods to consume (Elmo, 2009). Basset *et al.* 2007, said peer pressure acceptance and conformity

accelerate as adolescents assume independence in purchasing food away from home. Peer approval and identity compel teenagers to conform to the standard approved and acceptable to peers (Mirosław *et al.* 2011).

A study in Nepalese school children showed that fast foods (ready to eat snacks, chips, etc.) were favored by more than two-thirds of adolescents. Advertising, probably television and magazines, influenced preferences in 80% of Nepalese adolescents (Sharma, 1998). Owusu *et al.* 2007, in a study on measuring the nutritional intake of adolescents in Ghana, West Africa demonstrated that the food choices made by adolescents while snacking usually are high in candy, soda, and fried foods rather than fruits, vegetables, and salads. Muthoni 2012, showed that an increase in the frequency of consumption of snacks among students from high socioeconomic class families than those of a lower class.

Overweight and obesity are attributed to increased consumption of energy-dense, nutrient-poor foods with high levels of sugar and saturated fats combined with reduced physical activity (WHO, 2003). Onyiriuka *et al.* 2013, in assessing the eating habits among Nigerian urban secondary school girls also reported that poor dietary practices such as meal skipping were associated with weight gain at a later age.

2.2.2. Schoolgirls dietary diversity

Studies on nutritional status and its associated factors among school adolescent girls in Adama City, Central Ethiopia showed that an average dietary diversity score (DDS) was 4.2 (SD 2.01). The proportion of adolescents with minimum dietary diversity was 41.2%. Among the participants, all (100 %) of them consumed grains or other starchy roots and tubers (staples), followed by dark green vegetables (80.0%), other fruits and vegetables (79.3%) and legumes (66.7%). (Roba et al. 2016).

The dietary diversity of adolescents was revealed to be associated with gender (Tefera *et al.* 2008 & Dessalegn *et al.* 2016). Compared to girls, boys ate more diversified foods, which could be due to cultural influences and having less opportunity to get food outside of the home, as the girls mostly stay at home. High income and higher dietary diversity were associated, and intake of animal source foods and highest level of education was associated which achieved by the household and was also higher in urban areas (Tefera *et al.* 2008 & Zaida *et al.* 2014).

Food consumption in the adolescent stage of life is influenced by many factors including media, financial feasibility, gaining new body image, and many more. Adolescent years are a time when the adolescent tries to establish their own identity yet desperately seeks to be socially accepted by peers (Anyika *et al.* 2009). Adolescence is a nutritionally vulnerable developmental stage because of the growth rate accelerates. Adolescent eating behavior in terms of nutrient intake and food consumption may vary across different ethnic and socio-demographic sub-populations.

According to Benavides-Vaello 2005, socio-environmental factors, family, peers, and media, are believed to influence an individual's food habits and food choices. Peers and friends can also play a role in influencing each other's food selection and behavior or types of foods to consume (Elmo, 2009). Basset *et al.* 2007 said peer pressure acceptance and conformity accelerate as adolescents assume independence in purchasing food away from home. Peer approval and identity compel teenagers to conform to the standard approved and acceptable to peers (Mirosław *et al.* 2011).

The prevalence of adequate dietary diversity among adolescent girls was 14.5 (95% CI 12.9, 16.2) and food insecurity is one of the predisposing factors for low dietary diversity and working to enhance household's food security status is recommended to boost dietary diversification of adolescent's girls (Amare *et al.* 2019). A study comparing rural and urban diets of adolescents found that legumes and milk were consumed more frequently in rural adolescents and fruits were consumed more frequently in urban adolescents (Tezera *et al.*2015). About unhealthy foods, a study showed an increase of 35 percent in sugar consumption over 8 years (Aurino *et al.* 2016). Consumption of sugary soft drinks was reported by 22.7 percent of adolescents 13 to17 years (Tefera *et al.* 2013).

An intervention study assessed changes in dietary diversity of school adolescents with education programs supported with backyard gardening and found an increase in dietary diversity and intake of animal source foods in the intervention group (Dessalegn *et al.* 2016).

2.2.3. Schoolgirls nutritional status

Malnutrition affects a large portion of the adolescent and youth population in Ethiopia. The EDHS 2016 revealed that the proportion of non-pregnant adolescent girls aged 15 to 19 years

with acute malnutrition/thinness (BMI <18.5) was 36 percent. Adolescents (ages 15 to 19) are more likely to be thin (36 percent) than older women (21 to 29 percent in 20 to 49-year-olds) (CSA, 2016).

In a cross-sectional study conducted among 425 Ethiopian adolescents, the prevalence of underweight was significantly associated with the number of daily meals, parental level of education, source of food, and the number of cattle owned (Alemayehu *et al.* 2010).

Under nutrition or thinness (BMI for age z score <-2) was observed among 21.3% respondents, while 3.3 % of them were overweight and 1.0% had obesity and 15.6% of the adolescents were stunted (have short stature for their age). (Roba *et al.* 2016).

Studies in Addis Ababa, the prevalence of stunting, underweight and overweight/obese in all school adolescents was 7.2% (95% CI: 5.8, 9.0), 6.2% (95% CI: 4.9, 8.0) and 8.5% (95% CI: 6.9, 10.4), respectively. Adolescents in government schools were significantly more likely to be undernourished [stunting; 51(10.0%) versus 23(4.5%) and underweight; 36(7.0%) versus 28(5.5%)] compared to their counterparts in private schools (P-value <0.05). Adolescents in private schools were overweight/obese compared to those in government schools [65(12.7%) versus 22(4.3%); OR=3.2 (95% CI: 1.9, 5.3)]. (Yoseph *et al.* 2014).

Studies on Adolescents students aged 10-19 in Ambo in Ethiopia, age, number of meals, parental education level, source of food, and number of cattle owned were associated with being underweight. (Mesert *et al.* 2010).

Studies on the nutritional status of school-going adolescent girls in Awash town Afar region revealed that 22.9% and 8.82% of school adolescent girls were stunted and thin, respectively, and a dietary diversity score of < 4 food groups [AOR = 1.8, 95% CI (1.14–4.38)] and low food consumption [AOR = 3, 95% CI (1.15–7.90)] were some of the potential predictors of thinness (Molla *et al.* 2020).

Studies found many different factors associated with malnutrition in adolescents with thinness were dietary factors such as meal frequency, meal skipping, and poor dietary diversity (Ahmed & Tomas, 2015). Factors most frequently mentioned in association with stunting were lack of handwashing, latrines, and poor sources of drinking water (Tilahun *et al.* 2015 and Abdulkadir

et al. 2016). Living in rural areas, poor education of parents, food insecurity, big family size, and poverty were associated with both stunting and thinness (Huruy *et al.* 2013 and Abdulkadir *et al.* 2016).

Acute malnutrition in adolescents ranging from 8.9 percent (Bemnet *et al.* 2013) up to 34.8 percent (Netsanet *et al.* 2009). Chronic malnutrition rates ranged from 7 percent (Gebreyohannes *et al.* 2014) to 32.8 percent (Mekasha & Zerfu, 2009). Overweight and obesity, studies found associations with physical activity, wealth, consumption frequency of meat and fast food, as well as time watching television or using a computer. Studies in Hawassa city found that there was a statistically significant association between sex, total physical activity, socio-economic index, consumption frequency of meat, fruit, fast food, and time spent watching television using a computer with overweight and obesity prevalence ($p<0.05$) (Tesfalem *al.* 2013).

Adolescents who had high workload were 2.6 times [AOR = 2.6; 95% CI: 1.2, 3.1] more likely to be associated with thinness compared with those adolescents who did not have a high workload (Jikamo & Samuel, 2019).

2.3. Conceptual framework of the study

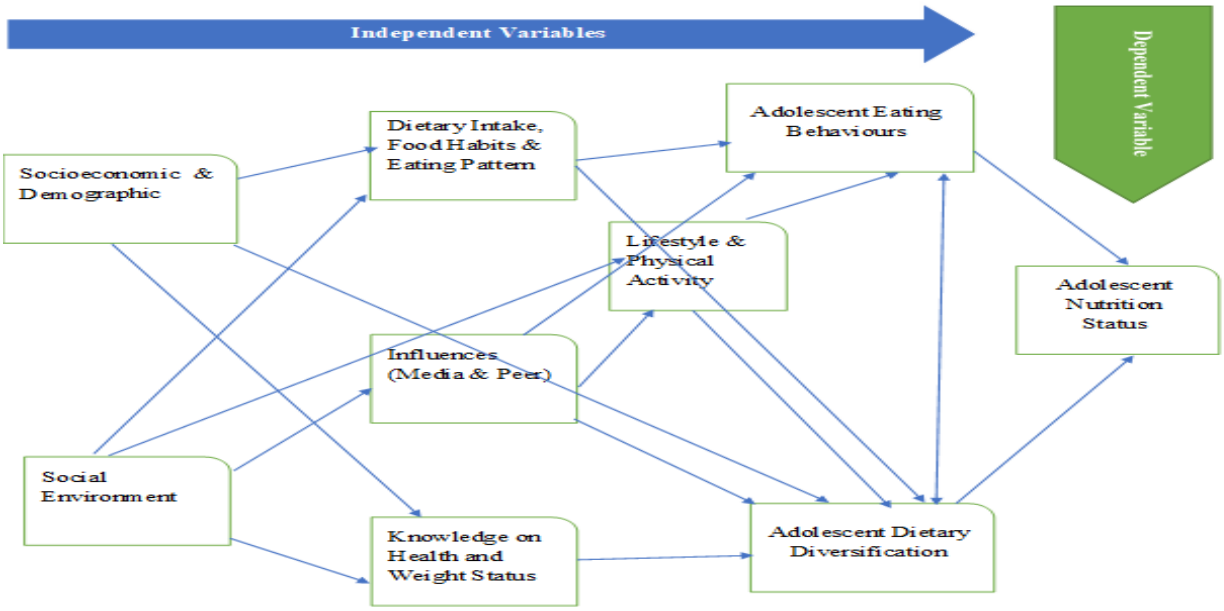

Figure 1: Conceptual framework on eating behaviors and dietary diversification influences on adolescent nutrition status. Source: The researcher modified from story, 2008

CHAPTER THREE: DESCRIPTION OF THE STUDY AREA, METHODS, AND MATERIALS

3.1. Description of the study area

Akaki-Kality is one of the ten sub-cities of Addis Ababa and is divided into 11 woredas located in the South-Eastern part of Addis Ababa, is 20 km far from the city's center and covers a total area of about 6,143.4 hectares and covers a total area of 156 km2. The sub-city shares boundary with *Bole* Sub-city in the North, *Kirkos* and *Nifas-Silk-Lafto* Sub cities in the North West and *Finfinnee-Zuria, a special zone* of Oromia regional state in the South. Since its establishment, the old town (Akaki) has been the hub of industries of Addis Ababa and the nation in general. As per the 2007 census, the total population of Akaki Kality Sub-city is 187,678 which is 6.62% of the entire population of Addis Ababa. The total population of 91,766 are male and 95,912 are female. According to the Central Statistics Authority (CSA) projections of July 2013, the population of the Akaki Kality Sub-city is estimated to reach 205,385 out of which 100,513 are male and 104,872 are female. The Sub-city has a population density of 1,653.7 per square kilometer.

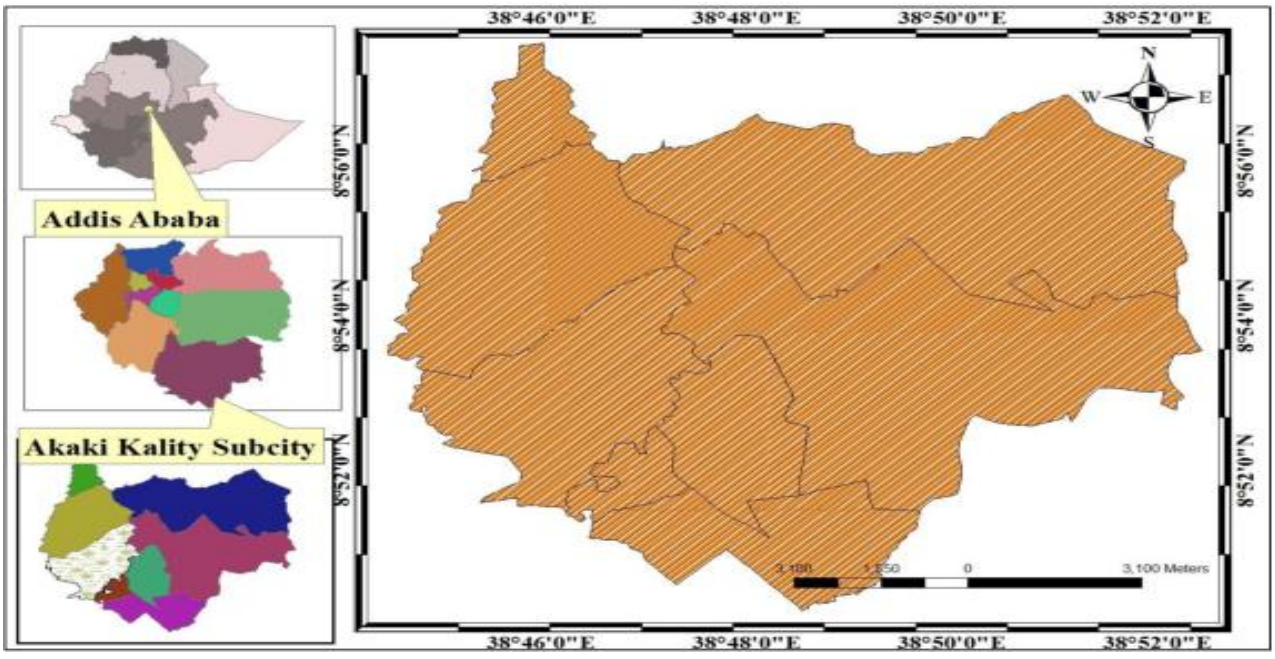

Figure 2: Map of the study area. Source: CSA, 2014.

According to the subcity food security office, majority of the community are food insecure and most of the communities are benefited in urban PSNP. Different private and government factories employment is the main source of income of the community in the subcity.

According to the subcity education office, there are 78 primary and 15 secondary schools of these, 23 primary and 9 secondary schools are belonging to the government. A total number of 100,533 students were enrolled during the study conducted from 0 to 12 grades and of these 63, 336 of the students were learning in the government schools and 23,434 were adolescents of these 12, 620 were girls adolescents. The study was conducted in selected 12 government schools. A total of 384 adolescent girls were selected proportionally from all schools across the woreda. The main criterion for sub-sampling was female students with the age group 10 to 19 years.

Table 1: Number of population and population density of Akaki Kality Sub City by woredas

Woreda	Area of the woreda/Av. Hectare	Number of populations	Population Density (population/Av. hectare)
1	603.9	25,460	42
2	1,323.6	13,972	10
3	236.0	17,567	74
4	1,325.6	21,149	16
5	735.5	22,540	31
6	309.5	27,080	87
7	780.3	22,540	29
8	596.2	21,149	35
9	2,847.6	5,119	2
10	1,279.5	1,951	1
11	2,310.0	9,151	1
Total	12,347.7	187,678	29.82

Source: CSA, 2007

3.2. Study period

The study was conducted from January to February 2020.

3.3. Study design

The study used a school-based cross-sectional study design that employed both qualitative and quantitative data collection methods to assess eating behaviors and dietary diversity status of adolescent girls and its association on nutrition status in the study area. Akaki Kality subcity was chosen with purposive sampling methods.

3.3.1. Quantitative approach

Quantitative approach was used to quantify and see the relationship among variables. School based cross-sectional study to collect data on socio-economic demographic (both schoolgirls and their family) characteristics, dietary intake, food habits, social environment and perceptions of health, physical activity, lifestyle & media influences, and adolescent eating behaviors influencing nutritional status used to determine the nutritional status of schoolgirls.

3.3.2. Qualitative approach

Qualitative approach was used to gain a deep understanding about eating behaviours and dietary diversification and its contribution to the practice and perceptions. Semi-structured interviews and focus group discussions were carried out to gather qualitative type of data.

3.4. Sample size determination

3.4.1. Sample size determination- quantitative

Cochran formula were used to determine the sample size. Cochran's formula is appropriate in situations with large populations to determine an adequate sample size which can estimate results for the whole population with good precision. The more heterogeneous population, the larger the sample size required to obtain a given level of precision (Cochran, 1963).

$$n_0 = \frac{z^2 pq}{e^2} \qquad n = \frac{\left((z_{\alpha/2})^2 * P(1-P)\right)}{(d^2)},$$

Where;

n/n_0 is the desired sample size,

z is the selected critical value of desired confidence level or is the statistic corresponding to the level of confidence, the standard normal deviate at 95% confidence level (1.96)

p is the estimated proportion of an attribute that is present in the population or is expected prevalence (that can be obtained from the same studies or a pilot study conducted by the researchers).

q is 1-p

d/e is the desired level of precision/is precision (corresponding to effect size). The level of statistical significance set.

The researcher took 51% prevalence from similar studies on undernutrition among adolescents' girls in schools in Addis Ababa (Yoseph et al. 2014) with a 95% confidence interval, 80% power, and 5% marginal error, and nonresponsive rate of 10%. At a 95% confidence interval, the z is 1.96.

$\frac{(1.96)^2\,(0.51)\,(1-0.51)}{(0.05)^2}$	**384**

Cochran pointed out that if the population is finite, then the sample size can be reduced slightly. This is because a very large population provides proportionally more information than that of a smaller population. Finite population correction formula was done to calculate the final sample size and to produce a sample size that was proportional to the population. According to the information obtained from the subcity administration office, the total number of adolescent girls' population was 12,620.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$ Where;

$\mathbf{n_0}$ is the sample size derived from the equation above and ***N*** is the population size/ adolescent girls' population.

$\frac{384}{1 + \frac{(384-1)}{12{,}620}}$	**373**

A sample size of 373 was calculated for the study. Because of the confined school environment and well-organized preparation in the data collection in collaboration with the school management, the researcher took 3% (rather than 10%) for the possibility of non- response, therefore finally 3% is added to the final sample to make 384.

The two-stage sampling technique was used to select a sample of an adolescent girl. At the first stage, six primary and six secondary schools were randomly selected from 23 primary and 9 secondary government-owned schools based on the proportional allocation of adolescents. In the second stage, one adolescent girl was randomly selected from each school.

The first respondent was selected randomly through balloting from among the first school lists of students and thereafter systematic sampling was used. To find the sampling interval in the respective school, total lists of adolescent girls in the respective school registers obtained and proportionate weighting was divided by the required sample size in that school which was allocated proportionally from the total 12 schools in the subcity against the final sample (i.e. 384 was distributed proportionally across the 12 schools in the subcity to determine the number of participants to be recruited from each school/class). This was done daily during the weekdays/school days for three weeks until the target sample size meet.

3.4.2. Sample size determination- qualitative

Purposively selected ten focus group discussions (FGDs) from targeted government schools were included. Semi-structured open-ended (FGD) guide was used to triangulate responses obtained by the structured questionnaire on the adolescent eating behaviours and dietary diversification practices and perceptions from targeted government schools. Non-probabilistic purposive sampling technique was used. Each FGD consisted of eight schoolgirls who were volunteers from ten government schools and not participated in a quantitative study.

3.5. Data sources

To carry out this research, different techniques were used to gather primary as well as secondary data. The researcher had collected primary data to get firsthand information from schoolgirls including socio-economic demographic (both schoolgirls and their family) characteristics, social environment factors, dietary intake, food habits, food pattern, influences, knowledge on health

and weight status, lifestyle, physical activity, dietary diversity and adolescent eating behaviors influencing nutritional status through structured questionnaires and semi-structured focus group discussions. Both qualitative and quantitative types of data were gathered through the different data collecting instruments. The secondary data sources used for the study were unpublished documents, research, articles, and reports related to the study and also data was collected from statistical reports and standards such as EDHS, WHO, FAO, MoH official websites.

3.5.1. Source population

All adolescent girls who were attended in the selected government primary and secondary schools in the year 2019/2020 in Akaki Kality subcity.

3.5.2. Study population

A total of 384 adolescent girls between the ages of 10 to 19 years who registered and attended in the selected 12 government primary and secondary schools in the year 2019/2020 in Akaki Kality subcity and who were finally sampled through probabilistic two-stage sampling technique and selected proportionally.

3.6. Eligibility criteria

3.6.1. Inclusion criteria

All adolescent girls aged 10 to 19 years who registered and attended in the selected government primary and secondary schools and enrolled in the academic year 2019/2020 and who showed a willingness to participate in the study by signing an informed consent form were part of the study.

3.6.2. Exclusion criteria

The exclusion criteria were adolescent girls with obvious physical deformities for anthropometric measurements and/ or who were seriously ill to be interviewed and who were not willing to participate. Students who were aged less than 10 years old or above 19 years old were excluded.

3.7. Sampling techniques and procedures

3.7.1. Sampling techniques and procedures- quantitative

The study applied a probability sampling method in quantitative research technique that was based on randomization and allowed the determination of what population segment went into the sample. Among schools in the subcity owned with government, all the primary and secondary schools where adolescent girls were enrolled included in the sampling frame. Then, 12 schools were selected randomly. Therefore, the sample size assigned to the respective school proportionally to the size of the school students and therefore; a two-stage simple random sampling procedure was used in the selection of representative samples to avoid bias and a proportional sampling frame prepared from identified government school based on the school size recruited from each class by taking school rosters as a sampling frame.

3.7.2. Sampling techniques and procedures- qualitative

A total of ten focus group discussion (FGD) were conducted in the targeted schools and all participants were selected purposively (non-probability sampling method). Informed consent was obtained prior to each FGD. On each of schools from 14 to 19 years adolescent girls who were registered and enrolled in selected schools were participated in focus group discussion. Participants were then approached face-to-face by the data collectors.

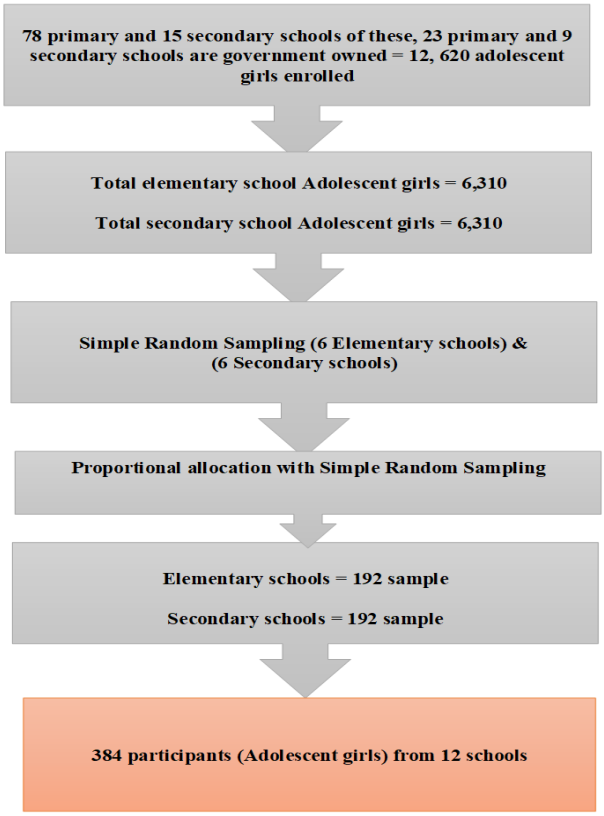

Figure 3: Schematic representation of two-stage sampling procedure, adolescent girls, Akaki Kality Subcity, Addis Ababa, Ethiopia, 2020.

3.8. Selection and training of research assistants

One team leader who has strong experience in coordinating data collection, three teams with the composition of one data collector, two anthropometric measurers (who were nurses), and one research assistants per team were recruited to assist in the study. The researcher in collaboration with the team leader provided three days of training, two days of theories, and the third day was used for practical experience. They were trained on the objectives of the research and data collection procedures. They were taken through the questionnaire, by reading through question by question by the researcher to ensure familiarization and clarity of the responses. Any questions and clarifications were done. They were also taken through the taking of Weight, Height, BMI, and MUAC using the actual tapes and weight scale which were to be used for the study. Interview techniques and confidentiality were also discussed during the training. Several methods of training were used during the training such as demonstrations where the researcher demonstrated how to take the Weight, Height, BMI, and MUAC measurements.

3.9. Study variables

3.9.1. Response variable

The nutritional status of schoolgirls was explained with height for age and BMI for age status.

3.9.2. Study variables

Dependent variables of the study were nutritional status, eating behaviors and dietary diversification of schoolgirls.

Independent variables used in the study were socioeconomic and demographic factors, social environment factors, dietary intake, food habits, food pattern, influences, knowledge on health and weight status, lifestyle, and physical activity.

3.10. Data collection tool

3.10.1. Quantitative data collection tool

3.10.1.1. Structured questionnaires

Section one: Socio-economic demographic (both schoolgirls and their family) characteristics, social environment factors, dietary intake, food habits, food pattern, influences, knowledge on health and weight status, lifestyle, physical activity, dietary diversity and adolescent eating behaviors were used to collect the quantitative data and anthropometry measurement also conducted.

Section two: An individual dietary diversity questionnaire recommended by FANTA (Swindale and Bilinsky, 2006) was adopted and modified to collect data on dietary diversity. The questionnaire was divided into 24-hour recall dietary diversity which was used as it minimizes recall bias and it fits to the recall period used in many other studies (Kennedy et al. 2007).

Moreover, a seven-day food frequency was also noted to their household dietary diversity and regular access to food. Therefore, a seven-day food frequency was used to determine frequency of accessing to different food stuffs.

3.10.1.2. Measurement

Standard Mid Upper Arm Circumference (MUAC) adult tapes, standard tape meters, and weight scale were used to take measurements to assess their nutritional status. Nutritional status of study participants was assessed based on the anthropometric measurements used to assess the physical development of adolescent girls. Height was measured once with a portable Height Scale to the nearest 0.1 cm. The body weight was measured using the platform (digital scale) weighing Scale (770 alpha; SECA, Hamburg, Germany) to the nearest 0.1 kg that has the capacity to measure 0-140 kg.

3.10.2. Qualitative data collection tool

To understand eating behavior and dietary diversity of schoolgirls, what effects schoolgirls observing, what they recommend and perceived on the community contribution for the solution on what they observed problems FGD were conducted using an FGD guide that was developed in English and translated into Amharic, the language that schoolgirls speak.

3.11. Data quality control

To ensure validity, the proposal had clear research questions and conceptual framework, and standard instruments were designed in line with the research questions and conceptual framework. The English version of the structured questionnaire was translated into the local language "Amharic" and again back translated to English by another translator to check for consistency and accuracy. To ensure the validity of the initial and back translation of the questionnaire, a discussion was conducted with the data collector team to review, edit, and double-check the questionnaire. Also, two volunteers, female teenagers were involved in parallel in discussing the layout, the wording, and the understanding of questions.

Data collectors and supervisors were trained for three days on the standardization of the anthropometric tools and on the purpose of the study, data collection tools, and procedure, how to interview, maintaining confidentiality and privacy.

The questionnaire was administered in 38 respondents (10%) of the total sample before the actual survey out of the study setting to ensure clarity, ordering, consistency, and acceptance of

the questionnaire. This allowed modifications to the questionnaires by correcting mistakes and inclusion of foods that have been missed out or elimination of foods that are not applicable in the community. Ambiguous questions were corrected to ensure clarity and to elicit the required information therefore enhancing reliability.

All anthropometric tools were tested to ensure that each tool produces the same measure of a standard object. The scales were checked by placing items of known weight on them after every 10 measurements and regularly checked and adjusted to zero after each measurement.

To improve the quality of the data, data collectors were closely supervised, and each completed questionnaire was checked to ascertain that all questions were properly filled and corrected. On each day after data collection, questionnaires will be reviewed for accuracy. Quality of the data maintained through-checked its completeness, cleaned the missing values by running frequencies, and some of the variables re-coded into the same variable.

3.12. Data collection procedures and techniques

Both quantitative and qualitative data collection methods were employed to obtain detailed and reliable data for the analysis.

3.12.1. Quantitative data collection

Data were collected using two types of measurements: Administration of the standard questionnaire through face to face interview and anthropometric measurements. The objectives of the study and methods for data collection were explained in each consent form and were explained to all students in class at the time of data collection. All data collection occurred during normal class times with participants in their usual room seating arrangement. Based on the pretesting of the questionnaire before data collection, 30-35 minutes was calculated as the time needed to complete the questionnaire. The time needed for an introduction to the study and an explanation of the instructions on how to complete the questionnaire was about 20 minutes and the remaining time needed for anthropometric measures was 15 minutes.

Firstly, students were provided with a questionnaire on their socioeconomic and demographic factors, social environment factors, dietary intake, food habits, food pattern, influences,

knowledge on health and weight status, lifestyle, and physical activity, and dietary diversity. Afterward, the data collector team completed anthropometric measurements. Data were collected daily during the five working days i.e. Monday to Friday.

Data was collected using an interviewer who administered a structured questionnaire and taking anthropometric measurements (weight, height) of the study subjects. The questionnaire was adapted from previous studies after a thorough review of different studies. Stadiometers with a sliding headpiece attached to a digital weight scale were used to measure height and weight, respectively. Most of the students were not familiar with such studies and questionnaires, and the fact that this was not an exam was stressed to enhance the possibility that they were relaxed in responding to the questionnaires (The tool is fully detailed in appendix).

3.12.1.1. Anthropometry measurements

Measured by trained data collectors (BSC nurse) by using mid-upper arm circumference, weight, and height of the study participants.

Body weight measurement: The body weight was measured using the platform (digital scale) weighing Scale (770 alpha; SECA, Hamburg, Germany) to the nearest 0.1 kg that has the capacity to measure 0-140 kg. Scales were always placed on a flat surface, re-zeroed, and checked with known weights each time they were moved. Weight was measured without shoes, in light school uniform (weighing ≈ 0.5 kg), and with empty pockets. Each student stood on in the center of the scale with weight equally distributed over both feet, then the scale was read to the nearest 0.1 kg. From the ratio of weight to height square, the Body Mass Index (BMI) was determined where BMI = Weight (kg) /Height^2(m).

Height measurement: Each subject was asked to remove her shoes, stand with her legs straight, feet flat with heels together, arms at the side with shoulders relaxed, her spine and all her back surfaces against the measuring surface, head straight and finally taking a deep breath before the measurement was taken. The same procedure was done for all participants using the same plastic tape, as stadiometers were unavailable in some public schools. Height was measured in centimeters using a simple builder's plastic tape measure. Height was measured in bare feet with a stadiometer to the last 0.1 cm. To check the reliability of the present measuring method, pilot

measurements for height were carried on the research team using two methods for height measurements, the tape measure and measurement using a single standard stadiometer for the height that was used in a nutrition clinic at Kality health center in Kality. Then, both results were compared to confirm the reliability of the tape measure.

Weight and height were measured by two different measurers and with any variation the final validations were made by supervisors immediately on site.

MUAC measurements were taken using a standard MUAC tape and this was used to determine nutritional status. MUAC of the left arm was taken to the nearest 0.1 cm with no clothing on the arm and this was done twice for each respondent to ensure accuracy. The left arm was used as it shows malnutrition while the right arm which is frequently used will show lean muscle mass because of work.

Reference for BMI and HAS: BMI and HAS distribution was compared with 2007 WHO reference for BMI for children and adolescents (5-19 years) (Mercedes de Onis *et al.* 2007). Finally, the nutrition-related outcomes with adolescent girls were assessed based on anthropometric measurements such as stunting, thinness, and overweight/obesity. Body mass for age z-score was used to classify level of malnutrition in the study subjects and those who have less than -2 z score were categorized as thin, between >-2 and <+1 as normal weight, overweight between +1 and <+2 and above +2 were categorized as obese. Having height for age z-score less than -2 was categorized as stunted (WHO, 2007).

3.12.1.2. Dietary diversity score

A Dietary Diversity Score (DDS) is constructed by counting the intake of nine food groups over 24 hours based on the definition that it is the sum of food groups consumed over the reference period. Household dietary food diversification score (DDS) is a 24-hour dietary recall (24HR) method used to collect information on all foods (from all sources) and beverages, except water, consumed by schoolgirls. The proposed numbers of food groups included in the HDDS was based on the food groups proposed by FANTA (Swindale and Bilinsky, 2006). It asked the respondents to recall all the drinks and food eaten the previous day in chronological order starting with the food eaten in the morning through the day up to the time the respondents went

to sleep. Probing was done to ensure no foods or drinks were omitted. Also, the respondents were asked to provide information on whether they ate outside the home. Each food group was counted only once resulting in a possible score of 0 to 9 (WHO, 2008). The data collectors took care not to include atypical days (local feasts or celebrations) in the recall. In this study, dietary diversity assessed using a food frequency questionnaire containing food items that were commonly consumed in the study setting.

3.12.2. Qualitative data collection

The FGD were conducted using an FGD guide that was developed in English and translated into Amharic, the language that schoolgirls speak in the qualitative study. Note was taken for qualitative data in FGD with the permission of discussants. Very general open-ended questions were employed to reduce predetermined responses and to allow discussants to think aloud and to express their experiences. Questions in the FGD guides were arranged in a way that facilitates dialogue.

Before conducting the FGD, students were informed about the study and asked for an appointment for FGD. Each FGD took about thirty minutes. The FGD were conducted in natural settings, where the students wanted to have the discussion. The discussion focused on more general issues related to schoolgirls understanding about the eating behavior and dietary diversity, what effects are schoolgirls observing, what they recommend and perceived on the community contribution for the solution on what they observed problems. A total of 10 focus groups discussions in ten schools (one per school) which comprised of eight schoolgirls were conducted. An experienced two female moderators were assigned to a focus group who facilitates the discussion amongst the group members who were supported on probe the participants by asking the correct questions that were help them to collect a sizable amount of information related to the research.

3.13. Techniques of data processing and analysis

After data collection, the data was cleaned, coded, entered SPSS (IBM Version 20), and then imported to Stata (Version 14) statistical packages for further analysis. Variables are inspected

for missing values, zeros, and negative values. The study had used both descriptive statistics and econometric technique for analyzing the quantitative data.

3.13.1. Quantitative data analysis

3.13.1.1. Descriptive analysis

Frequency, percentage, mean, and standard deviations were computed to present the data and describe the characteristics of the respondents. Bivariate analysis was undertaken to assess the association between all independent variables and the outcome variable.

Means and standard deviations were calculated for continuous variables while frequency and percentage used to describe dietary practices of the adolescents for meal frequency, meal skipping and snacking habits, food patterns, knowledge and behaviors, and media-related variables and participants' concerns of media influences on food choice.

Cross-tabulation, chi-square, and pairwise significant correlation tests were applied for individual variables both for dietary diversity, eating behaviors, height for age, and BMI for age status of adolescent girls, within the independent variables to see the multicollinearities and with dependent variables to see the strong correlation. Statistical significant variables with $r > 0.5$ among independent variables were excluded to prevent multicollinearity whereas for the cross-tabulation between the dependent and independent variables, r value of > 0.5 with statistical significant value of ($p<0.05$) has been taken in the model by expecting that the variable would be a strong predictor for the dependent variable.

Chi-square and Pearson correlation was employed to identify the association between independent and outcome (dependent) variables and used to estimate the influence of independent variables to the nutritional status. Chi-square analyses were performed to detect significant relationships between BMI z-scores and height for age z-scores among all participants according to factors affecting adolescents' behaviors and dietary diversity on nutritional status.

The level of stunting (height for age z-scores), which was an indicator of chronic malnutrition, and thinness (BMI for age z-scores), which was another indicator of malnutrition, were

calculated using WHO Athro-Plus software (Tefera Belachew *et al.* 2011). Frequencies, as well as proportions, were calculated to describe the nutritional status of the girls, those below − 2 standard deviations of the NCHS median reference for height-for-age and BMI-for-Age were defined as stunting (EDHS, 2011).

Dietary diversity analysis: The 24-hour diet recall data with Adolescent/Women Dietary diversity score were used to calculate individual dietary diversity. Foods were categorized into nine groups as recommended by the FANTA. Simple counting of food groups was done to arrive at individual food scores, which ranged from 1 to 9 (with 1 being the lowest score), as recommended by the FAO (FAO, 2013). The score was categorized in to three levels as consumption of foods [0-3] categorized as low dietary diversity groups, [4-6] categorized as medium dietary diversity and [7-9] categorized as high dietary diversity in 24 hours before the interview.

3.13.1.2. Econometrics analysis and model

The econometric technique used in the study was logistic regression model to determine the likelihood/ probability of being malnourished (stunted and thin) and have poor eating behaviors.

The probabilistic analysis ordered logistic regression and a multinomial logistic regression model was used to assess dietary diversity and eating behaviors association on schoolgirls nutritional status. Based on the factors established in the Chi-square test, logistic regression was employed to find out some possible risk factors of nutritional status among schoolgirls. The level of statistical significance using the logistic regression and Chi-squared test was set at P-value < 0.05. All variables having a p-value of <0.05 in the analysis were candidates for the order logistic regression model. In the analysis, variables with p-value <0.05 were taken as significant predictors for stunting and thinness at a 95% confidence interval. In the analysis, new variables were generated in the STATA through combing two variables these are adolescents think that they eat healthy food (think health food) and adolescent health status (AdselfHealth) called adolescent eating behaviors (naming AEB). Category one was assigned as an adolescent who has good eating behaviors whereas category 4 was poor. Multinomial logistic regression was used to check for robustness and predictor for adolescent eating behaviors.

Model Specification

The final model was based on the nutrition status of schoolgirls which was explained by height for age and BMI for age status of schoolgirls and both variables were analyzed separately as dependent variables. Ordered logistic regression was used to assess the effect of dietary diversity and eating behaviors on adolescent girl's nutritional status. Both significant variables with height for age and BMI for age status from bivariate correlation analysis and strong significant predictor variables from dietary diversity and eating behaviors regression model were used in the final nutrition status of the adolescent girls' model.

Post estimations test was checked for normality, homoscedasticity, and multicollinearity. Autocorrelation was not checked as the study was cross-sectional and not important test. A test of multicollinearity had been conducted to determine the correlation of the independent variables. As stated in Mendenhall and Sincich (2003), multicollinearity refers to the extent to which an independent variable could be explained by other independent variables in the analysis. If it is too high, this can have harmful effect on regression. Multicollinearity occurs when two or more predictors in the model are correlated and provide redundant information about the response. It is a situation where the variables are too highly correlated. The Variance Inflation Factor (VIF) shows how the variance of an estimator is inflated by the presence of multicollinearity. Heteroscedasticity refers to the absence of constant variance of each disturbance term conditional on the chosen value of the explanatory variables. If present in the data the estimates would not be the Best Linear Unbiased Estimates (BLUE) (Gujarati, 2007). The Breusch-Pagan test evaluates the null hypothesis of constant variance in the data.

The normality test on the OLS Model was checked with the error term, qnorm error term, and kdensity, normal testing applied to see the normality, and all showed that normality. Multicollinearity was examined using variance inflation factor (VIF) and correlation coefficients. The values of Mean VIF for explanatory variables were checked. The data were tested for heteroscedasticity using the Breusch-Pagan test (Wooldridge, 2009). The final model tested with link test and Akaike's information criterion and Bayesian information criterion and checked the model has powerful predictor variables and with what percentage the variation of the model explained by the independent variables in the model.

3.13.2. Qualitative data analysis

Qualitative data generated through focus group discussions were transcribed, described, and summarized. Thematic analysis was deployed to analyze the qualitative data. Prior to the actual data analysis, the FGD data were translated into English by the principal investigator. To get familiarized, the data was read, and relevant points were highlighted to be coded. Then, the lists of codes were sorted into themes. The themes were reviewed again whether they support the collected data. Finally, the themes and sub themes were defined and the data that fit under each theme was written up in direct quote or being paraphrased, and then the result was supported by qualitative data to supplement the quantitative finding for its consistency.

3.14. Definition of terms and variables

- Adolescents/**schoolgirls:** Individuals in the age group of 10–19 years
- **Malnutrition** refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients.
- **Thinness:** BMI-for-age < − 2 Z scores of the 2007 WHO reference
- **Stunting:** Height-for-age < − 2 Z scores of the 2007 WHO reference
- **Z-scores** were calculated using WHO Anthroplus (2007) software. The prevalence of undernutrition for adolescents was determined by calculating height-for-age (HAZ) and age/sex-specific BMI as recommended by WHO using standard deviation classification.
- **Dietary diversity:** The 24-hour diet recall data were used to calculate individual dietary diversity. The frequency of consumption of different foods based on 24-hour recall was collected using a semi-quantitative questionnaire. To calculate individual dietary diversity, food scores were measured using the 24-hour diet recall method (FS24hr). Foods were categorized into nine groups as recommended by FANTA. Simple counting of food groups was done to arrive at individual food scores, which ranged from 1 to 9 (with 1 being the lowest score), as recommended by the FAO (2012).

- **Food intake pattern:** Food intake pattern was assessed using a one-time, 24-hour diet recall method. Data were collected continuously over a period to capture food intake pattern over one day from morning to night.

- **Eating patterns:** Information was collected on meal patterns, which were known to be generally practiced by adolescents in different parts around the world e.g. skipping meals, snack consumption, breakfast eating habits, eating out, and fast-food consumption.

- **Dieting practices:** To assess the prevalence of dieting practices and attempts to change weight among the participants, girls were asked to reply to various surveys including; girls' dieting and weight control behaviors (prescribed by a "health professional" or from "other sources, e.g. media"), their success or failure in their attempts to change weight.

- **Food frequency:** A seven-day food frequency questionnaire of major foods and beverages consumed by adolescents. Food frequency scores were also calculated using food frequency (FSFFQ) measurements, i.e. the frequency of consumption (daily, twice or three times a week) by individual for the different food groups for a reference period of the preceding one week.

- **Socio-economic factors** in the study were defined by proxy indicators such as occupation and income.

- **Health status:** The interview included questions about the girls' awareness of their current and previous health status, medical problems, and the use of vitamin/mineral supplements

- **Adolescents' knowledge:** Compound measures were derived from questions on participants' perceptions and satisfaction on food, figure, eating, and health in addition to nutrition

knowledge, values, and sources, which could have an impact on their eating behaviors e.g. effectiveness of mass media and advertising.

- **Physical activities:** The main purpose of collecting information on physical activities was to allow an investigation of relationships between physical activity levels and the nutritional status of adolescents. Information was self-completed and based on participants' observation and evaluation of their activity levels. Activities included those done at different times in the day either at school, after school, at home, or in girls' free times.

3.15. Ethical consideration

Ethical approval was obtained from the research and ethics review committee at Addis Ababa University. A support letter was also obtained from the University and ethical clearance received from the subcity health office. The permission letter from the Akaki Kality subcity education to collect data from schools was taken personally by the main investigator to each principal teacher in school one week before gathering data. This was to obtain permission to arrange suitable times to conduct the study. The classes were contacted before data collection. After permission was obtained from school administration, each student's consent was obtained the day before the data collection through informed consent the research objective for unit headteachers and classroom explanation. To ensure privacy, names, and other means of identity was not used during the data collection. Confidentiality of all the information was maintained. The researcher ensured that all information obtained will be kept in strict confidence and will be used only for the study. This thesis was reported with proper referencing and without conflict of interest.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1. Quantitative section

4.1.1. Socioeconomic and demographic characteristics of schoolgirls

The study was conducted in twelve schools from nine woredas in Akaki Kality subcity, Addis Ababa. Both schools and woredas were selected with simple random lottery methods. Intermediate/primary cycle and secondary cycle school schoolgirls were proportionally represented and participated from each school. A total of 384 schoolgirls were surveyed with a 100% response rate. The result showed that the mean age of the study population was 15.67 years (± 1.596) and all of them were unmarried. Similarly, Sarkar *et al.* 2015; found the mean age (years) of experience from rural adolescent schoolgirls of West Bengal as 13.33 ± 1.09. In this study, 91(24%) were aged 10–14 years (early adolescence) and 293(76%) were in the age category of 15–19 years (late adolescence). This was inconsistent with Sarkar et al where 87.3% belonged to early adolescence (10-14 years) and 12.7% to late adolescence (15-19 years) age group. This was due to exclusion of different class students in later studies, while all school students from 10 to 19 years were included in a school-based setting in the present study. Socio-demographic characteristics of the study population have been shown in see table 2.

The average family size of the study groups was 5.31(± 2.053) and the largest family size was 14. A large majority of the schoolgirls, 246(64.1%), and 330(85.9%) under the study were living with their father and mother, and both parents were alive, respectively. Among the study participants, 112(58.33%) intermediate cycle schoolgirls and 134(69.79 %) secondary cycle schoolgirls do live with their mother and father. This finding supported with other scholars, Onyiriuka *et al.* 2013, found that the majority (84.7%) of the respondents lived with their parents.

One hundred thirty-six (35.4%) schoolgirls replied that their family monthly income is ranged between 1,210 to 8,970 ETB. About 351(91.4%) schoolgirls reported that they do not have a family car whereas 368(95.8%) said they do have a television in the family. A total of 181(94.27%) intermediate cycle schoolgirls and 170(88.54%) secondary cycle schoolgirls do not have a family car whereas 180(93.75%) intermediate cycle schoolgirls and 188(97.92%) secondary cycle schoolgirls do have family television.

A total of 163(42.4%) schoolgirls family occupation type was government employee other than a teacher, and 115(29.9%) and 144(37.5%) schoolgirls responded that their family education status was basic education and high school, respectively. Parents for 61(31.77%) intermediate cycle schoolgirls could read and write whereas 117(60.94%) secondary cycle schoolgirls were high school.

Table 2: Socioeconomic and demographic characteristics of schoolgirls in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

		No (%)	(Mean ±SD)
Schoolgirls Age Groups (n=384)	Early schoolgirls (10 to 14)	91 (24%)	
	Late schoolgirls (15 to 19)	293 (76%)	
Age (Years) (n=384)			15.67 ± 1.596
Education Level (n=384)	Intermediate (5-8 grade)	192 (50%)	
	Secondary schools (9-12 grade)	192 (50%)	
Households family size of Schoolgirls		(4, 14)	5.31± 2.053
Schoolgirls live with	Both parents	246(64.1 %)	
	Father only	18 (4.7 %)	
	Mother only	33 (8.6 %)	
	Other specify	87 (22.7 %)	
Schoolgirls parents living status	Both alive	330 (85.9 %)	
	Both died	5(1.3 %)	
	Father alive	17 (4.4 %)	
	Mother alive	32 (8.3 %)	
Household Income Monthly (ETB)	</= 1,210	68 (17.7%)	
	1,210 to 8,970	136 (35.4%)	
	I do not know	180 (46.9%)	
Schoolgirls family car	No	351 (91.4%)	
	Yes	33 (8.6 %)	
Family television	No	16 (4.2%)	
	Yes	368 (95.8%)	
Parents occupation	Farmer	5 (1.3%)	
	Govt employee other than Teacher	163 (42.4%)	
	Merchant	85 (22.1%)	
	Other specify	99 (25.8%)	
	Teacher	32 (8.3%)	
Schoolgirls parent education level	Basic education	115 (29.9%)	
	High school	144 (37.5%)	
	Higher education	76 (19.8%)	
	Illiterate	42 (10.9 %)	
	Vocation	7 (1.8%)	

Source: The researcher original findings, 2020

4.1.2. Schoolgirls knowledge on healthy eating behaviours, eating practices, and perceived health and weight status (self-assessed)

In the study, nine out of ten schoolgirls had not known medical problems of these eight used to consume healthy foods, and seven perceived positive about their health status and average active as compared to other schoolgirls of the same age-based on self-assessment. About half of schoolgirls used to eat their regular meals after under-five children. About three out of four schoolgirls had fair and above knowledge on healthy eating behaviors and balance diet and used to be served a meal in their family is normal.

And also about one out of five schoolgirls had poor knowledge of water, sanitation, and hygiene practices, and one-tenth of intermediate and 42(21.88%) in secondary schoolgirls had poor knowledge on healthy eating practices (balanced diet). This study showed that not all schoolgirls knew healthy eating behaviors, schools have the potential to reach out to schoolgirls at this critical age when eating habits are flooring a way for healthy behavior and dietary habits to adulthood and this finding is strongly supported both with the theoretical literature on health promotion model and empirical evidence that knowledge is the foundation to change the attitude and practices of the behaviors and schoolgirls spend more time of the day at school, thus providing a practical environment for education about healthy food choices is necessary (Foster *et al.* 2008) and poor dietary practices were because of low nutrition knowledge level led to poor health-seeking behavior (Mohamed, 2019).

Schoolgirls self-assessed knowledge on healthy eating practices, their health, water, sanitation, and hygiene practices have been shown in see table 3and 4.

Table 3: Schoolgirls self-assessed knowledge on healthy eating practices, their health, water, sanitation, and hygiene practices, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

		No (%)
Self-assessed health status	No	100 (26.0%)
	Yes	284 (74.0 %)
Schoolgirls known medical Ds	No	342 (89.1 %)
	Yes	42 (10.9 %)
Self-assessed knowledge on healthy eating practices	Poor	66 (17.2 %)
	Not bad	156 (40.6 %)
	Good	129 (33.6 %)
	I do not know	33 (8.6 %)
Self-assessed perception on eating healthy food	No	74 (19.3 %)
	Yes	310 (80.7 %)
Self-assessed knowledge on good water, sanitation, and hygiene practices	Poor	89 (23.2%)
	Good	119 (31.0%)
	Not Bad	110 (28.6%)
	I do not know	66 (17.2%)
Self-assessed how to feel health and nutrition club influencing their weight	No influence	367 (95.6 %)
	Average influence	15 (3.9 %)
	A strong and important influence	2 (0.5 %)

Source: The researcher original findings, 2020

Around half 198 (52%) schoolgirls regularly skip their meal of this one out of five skipped their breakfast whereas the rest skipped mixed and two out of five reported regularly felt hungry and an equal number of schoolgirls both from primary and secondary schools felt hungry on the regular base. The findings are supported in other similar studies like Onyiriuka *et al.* 2013 revealed that in a school-based cross-sectional study on the eating habits of adolescent girls in Nigerian urban secondary school found out that meal skipping was the main eating habits displayed. On the contrary, 134 (35%) schoolgirls used to consume snacks between meals. Biscuits (n: 36), injera (n: 33), and fruit (n: 28) were among the types of snacks schoolgirls ate.

About more than half of schoolgirls parents did not care about their body weight status and its change and of these, seven to nine out of ten schoolgirls did not have a special diet for their body weight, never tried losing or gaining weight plan. Surprisingly, in study 176 (91.67%) intermediate and 146(76.04%), secondary school students did not read or follow media concerning diet/nutrition issues. This study showed that a large majority of adolescent girls did not have special attention on their health, low interest in healthy readings, low parent attention, and low experience and knowledge on healthy stature and its health implication which might be

linked with low school health and nutrition topics through different courses such as via physical education.

Table 4: Schoolgirls weight status and weight management, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

		No (%)
Do you think, you are being served food in good way in your family/house	No	66 (17.2 %)
	Yes	285 (74.2 %)
	I do not Know	33 (8.6 %)
Schoolgirls think their family take care of weight status	No	228 (59.4 %)
	Yes	156 (40.6 %)
Schoolgirls following any special diet now	No	357 (93.0 %)
	Yes	27 (7.0 %)
Schoolgirls ever tried losing weight	No	295 (76.8%)
	Yes	89 (23.2%)
Schoolgirls ever tried gaining weight	No	332 (86.5 %)
	Yes	52 (13.5 %)
When Schoolgirls change weight, parent	Encourage me	138 (35.9 %)
	Discourage me	15 (3.9 %)
	They do not care	231 (60.2 %)

Source: The researcher original findings, 2020

A large majority, 366 (95%) schoolgirls drunk water frequently of these almost half used 2-4 cups of water. About, unhealthy foods, more than half of schoolgirls used to consume carbonated beverages (fizzy drinks), full-sugar beverages, and were adding sugar to their drinks (hot or cold). These findings supported with other scholar showed consumption of sugary soft drinks was reported by 22.7 percent of adolescents 13to17 years (Tefera *et al.* 2013), the inconsistencies in data might be explained with the current study includes from 10 to 19 years and carbonated and full-sugar beverages. The findings also supported in other similar studies, Onyiriuka *et al.* 2013 revealed that in a school-based cross-sectional study on the eating habits of adolescent girls in Nigerian urban secondary school found out that consumption of fast foods along with soft drinks were the main eating habits displayed.

Two hundred fifty-five (66%) schoolgirls never had school daily pocket money however these schoolgirls reported that they had experience eating outside the home at least once per week. This might be explained by the low socio-economic status of the parents and the assumption of many of the schools are nearby to the communities. About one out five, 59(15%), and 19(5%)

schoolgirls commonly used to buy pasty potato crisps, and potato crisps from the school canteen, respectively. This study also supported other scholars said that consumption of fruits and vegetables often declines when entering adolescence, while the consumption of unhealthy food types increases (Rasmussen *et al.* 2006). This has been confirmed in studies examining the consumption of soft drinks (Ranjit *et al.* 2010) and fast food (Larson *et al*. 2009).

Two hundred seventeen (57%) schoolgirls had meals in a group with their families on a regular base and 294 (76%) schoolgirls had experience eating their meal in front of watching television and these findings might be showing one of the issues on schoolgirls eating behaviors needs to be corrected in particular with parents involvement.

Three hundred thirty-five (87.2%) and 314 (81.8%) schoolgirls reported that their family size and school meal sharing do affect their meal size, respectively. Other empirical findings supported this study that large family size and low slot of the meal will affect schoolgirls' daily requirements. The obvious physiological growth in adolescence affects the body's nutritional needs increasing adolescents' requirements for energy and all nutrients to support rapid growth rate and development (Stang, 2001).

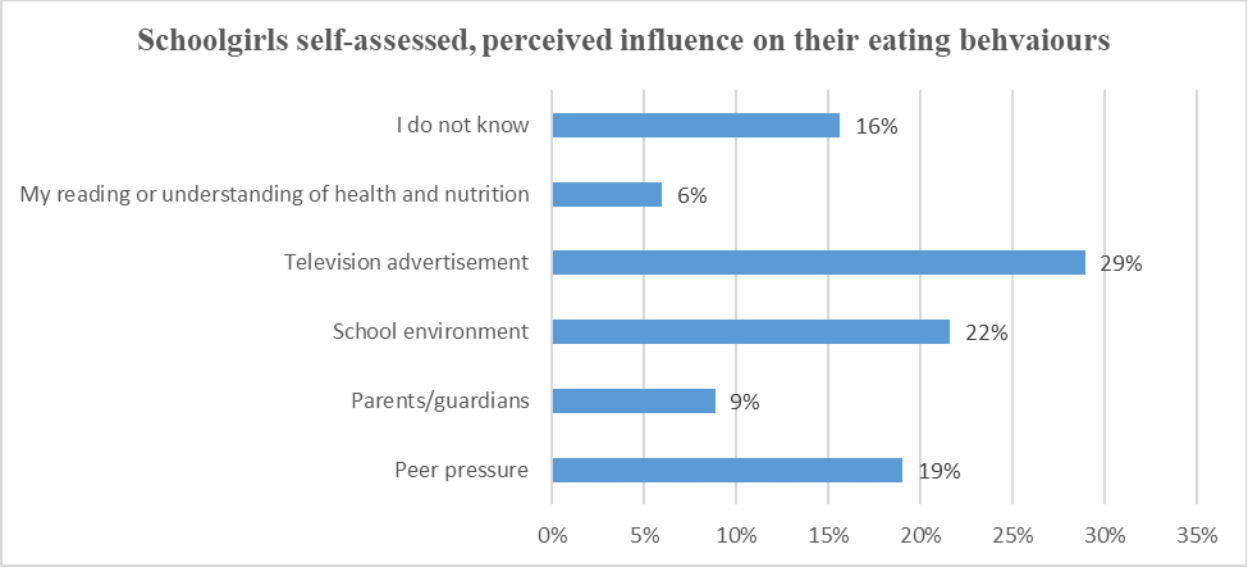

Figure 4: Schoolgirls self-assessed, perceived influence on their weight and health status, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

Source: The researcher original findings, 2020

4.1.3. Schoolgirls food frequency and dietary diversity status

Looking food frequency of schoolgirls, the frequency of food consumption in the total sample in a week, 334(86%) and 331(86%) never had ate meat and dairy throughout the week in the contrast, about 139(36%) and 235(61%) had eat carbohydrate (mainly bread) and fat sources food (mainly food oils) throughout the week. Others 134(35%) and 117(30%) schoolgirls reported consumption of vegetables and fruit sources on average 3-4 times and 1-2 times per week, respectively. Almost nine out of ten schoolgirls used to eat Injera with wot regularly per week and an equal number of schoolgirls observed among intermediate and secondary schools. A study in Adama showed that among the participants, all (100 %) of them consumed grains or other starchy roots and tubers (staples), followed by dark green vegetables (80.0%), other fruits, and vegetables (79.3%), and legumes (66.7%). (Roba *et al.* 2016). The difference might be explained due to the difference in socioeconomic background between the towns.

The majority of 186 (48%) of schoolgirls had low dietary diversity score, less than four, and their mean (±SD) dietary diversity score was 3.61 ± 1.33. (see table 5), whereas studies among schoolgirls in Adama city, central Ethiopia to assess nutritional status, and its associated factors showed based on the 24 h dietary recalls the mean Dietary Diversity Score (DDS) was 4.2 ± 2.01 (Roba *et al.* 2016). The inconstancies might be the sample size and the latter study sample size explanations two times and other explanations might be the socio-economic difference between the two towns.

Table 5: Schoolgirl dietary diversity status, in Akaki Kality subcity, Addis Ababa, 2020. (n=384).

		No (%)	Mean ±SD
Dietary diversity status/24HRs	Low dietary diversity [0-3]	186 (48%)	3.61 ± 1.326
	Medium dietary diversity [4-6]	191 (50%)	
	High dietary diversity [7-9]	7 (2%)	

Source: The researcher original findings, 2020

In the study, dietary diversifications differences observed among schoolgirls, who ate snacks between meals, drink fizzy regularly, read or follow media concerning diet issues, food supplements and involved in food preparation at home. Looking at the socio-economic status of the community and low pocket money allocation with schoolgirls, the probability of practicing

these foods at home is very less and finding showed that schoolgirls food habits were more influenced on outside of the house practices, seemingly during schooling and media-driven and which is supported with other scholars like Benavides vaello 2005, socio-environmental factors, family, peers, and media, are believed to influence an individual's food habits and food choices.

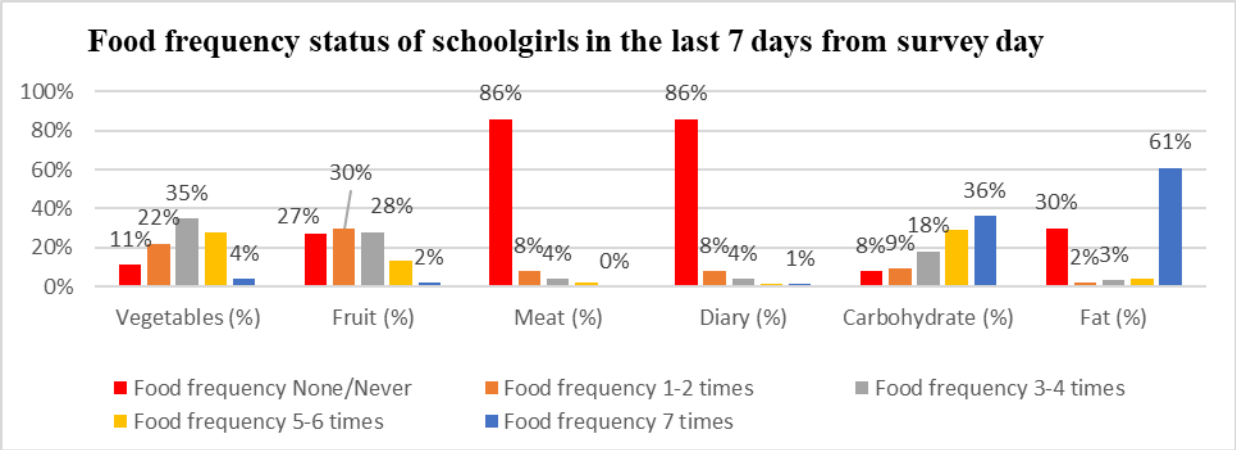

Figure 5: Schoolgirl food frequency status, in Akaki Kality subcity, Addis Ababa, 2020. (n=384).

Source: The researcher original findings, 2020

A total of 129 (69.35%) and 152 (79.58%) schoolgirls had low and medium dietary diversifications scores, respectively of these, nine out of ten schoolgirls felt their health status is good and had not known medical disease reported and majority, 133 (71.51%) and 121(63.35%) schoolgirls who had low and medium dietary diversifications scores, respectively used to eat outside their house once per week which is supported with other scholars like Benavides vaello 2005, socio-environmental factors, family, peers, and media, are believed to influence an individual's food habits and food choices.

In the table 6, nearly two out of ten schoolgirls who used to eat three to four times vegetable and how had almost on every day on carbohydrate foods over the week frequently before the survey day had medium level of dietary diversity scores whereas schoolgirls who had episode of less than one time on fruits, and never eat meat and milk related foods in the last 7 days from the survey day had low dietary diversity score status.

Table 6: Characteristics, frequency of foods and dietary diversity status of schoolgirls, in Akaki Kality subcity, Addis Ababa, 2020.

		Adolescent DDS Status # (%)			P value (CI)
Variables		Low	Medium	High	
Schoolgirls, eat vegetables in last 7 days	None	29 (7.6%)	15 (3.9%)	0 (0.0%)	0.000 (0.000 - 0.008)
	1-2 times	49 (12.8%)	33 (8.6%)	0 (0.0%)	
	3-4 times	56 (14.6%)	75 (19.5%)	3 (0.8%)	
	5-6 times	43 (11.2%)	60 (15.6%)	4 (1.0%)	
	7 times	9 (2.3%)	8 (2.1%)	0 (0.0%)	
Schoolgirls, eat fruit in last 7 days	None	63 (16.4%)	40 (10.4%)	0 (0.0%)	0.000 (0.000 - 0.008)
	1-2 times	62 (16.1%)	52 (13.5%)	3 (0.8%)	
	3-4 times	38 (9.9%)	66 (17.2%)	2 (0.5%)	
	5-6 times	20 (5.2%)	28 (7.3%)	2 (0.5%)	
	7 times	3 (0.8%)	5 (1.3%)	0 (0.0%)	
Schoolgirls, eat meat in last 7 days	None	170 (44.3%)	161 (41.9%)	3 (0.8%)	0.000 (0.000 - 0.008)
	1-2 times	13 (3.4%)	15 (3.9%)	1 (0.3%)	
	3-4 times	3 (0.8%)	11 (2.9%)	0 (0.0%)	
	5-6 times	0 (0.0%)	4 (1.0%)	3 (0.8%)	
	7 times	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Schoolgirls, eat diary in last 7 days	None	168 (43.8%)	161 (41.9%)	2 (0.5%)	0.000 (0.000 - 0.008)
	1-2 times	12 (3.1%)	17 (4.4%)	0 (0.0%)	
	3-4 times	4 (1.0%)	9 (2.3%)	4 (1.0%)	
	5-6 times	1 (0.3%)	2 (0.5%)	1 (0.3%)	
	7 times	1(0.3%)	2 (0.5%)	0(0.0%)	
Schoolgirls, eat carbohydrate in last 7 days	None	22 (5.7%)	9 (2.3%)	0 (0.0%)	0.000 (0.000 - 0.008)
	1-2 times	24 (6.2%)	12 (3.1%)	0 (0.0%)	
	3-4 times	28 (7.3%)	39 (10.2%)	1 (0.3%)	
	5-6 times	42 (10.9%)	64 (16.7%)	4 (1.0%)	
	7 times	70 (18.2%)	67 (17.4%)	2 (0.5%)	

Source: The researcher original findings, 2020

More than half, 117 (62.90 %), and 70 (37.63%) schoolgirls who had low dietary diversifications scores used to eat fat (linked with food oil) and carbohydrate (all bread-related foods) almost every day on a regular base respectively, 56 (30.11%) also ate vegetables three times on average per week whereas nine out of ten of these schoolgirls never ate meat and dairy products in the weekly base. Dietary diversity has been used as proxy indicators for food quality and security (Allen, 2003), which may be due to its ability to capture consumption of both macro and micronutrients or a more balanced diet in the general sense without the need of measuring the quantity of food consumed, which may, in turn, be difficult in certain contexts.

Schoolgirls who had low dietary diversifications scores reported that their family does not take care of their weight status (116, 62.37%), they never follow any special diet (174, 93.55%), they never read or follow media concerning diet issues (158, 84.95%) and never take any food supplements (168, 90.32%). Schoolgirls who had low dietary diversifications scores said, any activities performance once per week (64.52%), same activity during the holiday and non-holiday time 85(45.70%), and felt health and nutrition club in their school not influencing their weight 181(97.31%).

4.1.4. Schoolgirls physical activity, lifestyle & media influences

A large majority, 312(81.2%) and 235(61.2%) schoolgirls reported that they had water and latrine facilities in their homes. Level of education different observed among schoolgirls in terms of knowledge on water hygiene and sanitation practices. This might explain with as schoolgirls increase their education to the next level there might be potential knowledge change on understanding water hygiene and sanitation practices. Schoolgirls' social environment factors have been shown in table 7.

About 284(74.0%) and 206(54%) surveyed schoolgirls explained that no health and nutrition club in their school and do not buy food in their school canteen or school environment, respectively. A total of 272(70.8%) schoolgirls used to read any book daily, of these 207(53.9%) schoolgirls spend one to two hours per day on reading however, 322(84%) schoolgirls do not read or follow any media concerning diet issues. About 355(92.4%) schoolgirls reported reading do not influence on their food choice. However, 200(52.1%) food topics and 125(32.5%) music related to magazine topics/advertisements influence girl's food choices. Other empirical evidence supported this study, which was conducted by UNICEF in the Somali region, 85 percent of schoolgirls had not heard about balanced diets and no school information on health and nutrition which could be explained by the absence of nutrition education. (FMoH/UNICEF, 2016).

Table 7: Characteristics of schoolgirls social and environment factors, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

		No (%)
Availability of water in the house	No	72 (18.8%)
	Yes	312 (81.2%)
Availability of toilet in the house	No	149 (38.8%)
	Yes	235 (61.2%)
Schoolgirls felt family size affects meal size	No	49 (12.8%)
	Yes	335 (87.2%)
Schoolgirls felt school food sharing affects meal size	No	70 (18.2%)
	Yes	314 (81.8%)
Health and nutrition club presence in school	No	284 (74.0%)
	Yes	42 (10.9%)
	I have no idea	58 (15.1%)
Schoolgirls buy food from the school canteen or school environment	No	206 (54%)
	Yes	178 (46%)
Schoolgirls read book, magazine, or comics daily	No	112 (29.2%)
	Yes	272 (70.8%)
Number of hours per day spend on reading by schoolgirls	< an hour a day	153 (39.8%)
	1 to 2 hours a day	207 (53.9%)
	> 2 hours a day	24 (6.3%)
Number of hours per day schoolgirls spend watching television or video	None	29 (7.6%)
	Less than an hour a day	38 (9.9%)
	1 to 2 hours a day	170 (44.3%)
	More than 2 hours a day	147 (38.2%)
Schoolgirls perception, reading influences on their food choice	No	288 (75.0%)
	Yes	31 (8.1%)
	I do not know	65 (16.9%)
Schoolgirls perception, on television advertisement and program influence on their eating behaviors	No	39 (10.2%)
	Yes	345 (89.8%)
Schoolgirls read or follow any media, concerning diet/food protocols	No	322 (84%)
	Yes	62 (16%)

Source: The researcher original findings, 2020

In study groups, eight out of ten schoolgirls spent watching television/video on average more than an hour per day, and similarly, nine out of ten schoolgirls interested in the television advertisement program focused on food and drink related, and entertainments [KANA TV, Films, Music]. Television advertisement program does influence for 345(89.8%) schoolgirls eat behaviors, among these 226(58.9%) schoolgirls said eat behaviors is strongly influenced by television advertisement. About half of intermediate schoolgirls had an interest in advertisement

focused on food and drink-related whereas secondary schoolgirls had an interest in watching entertainments [KANA television, Films, Music] television programs.

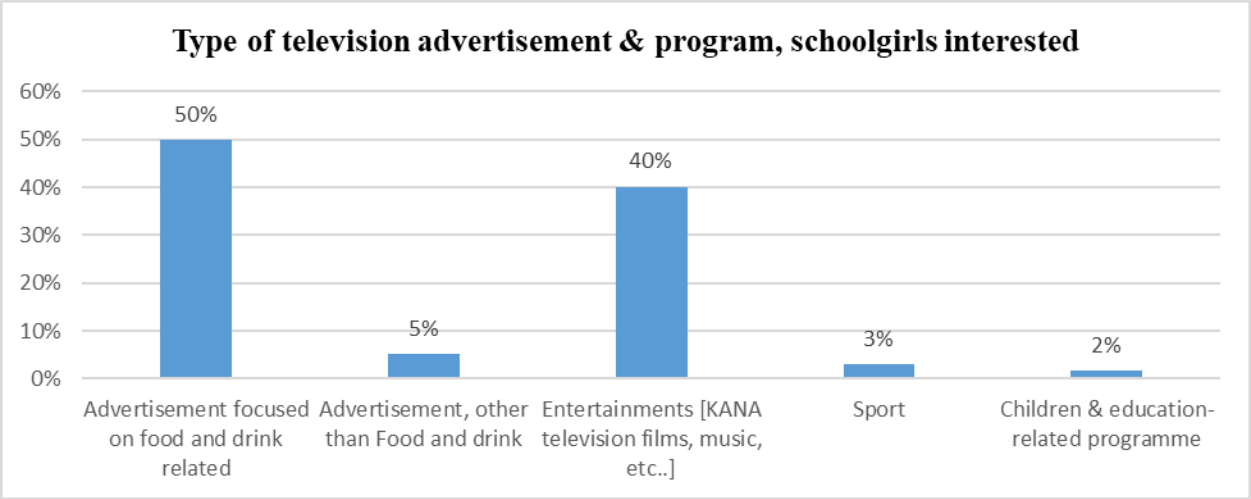

Figure 6: Type of television advertisement & program, schoolgirls interested, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)
Source: The researcher original findings, 2020

A total of 186(96.88%) intermediate schoolgirls and 159(82.81%) secondary schoolgirls said that television advertisement programs influenced their eating behaviors. Similarly, intermediate schoolgirls perceived that their weight and health was influenced by television advertisement 72(37.50%) whereas secondary schoolgirls perceived that weight and health were influenced by the school environment 50(26.04%). These findings strongly supported by other scholars' studies such as advertising, probably television and magazines, influenced preferences in 80% of these Nepalese adolescents (Sharma, 1998). Dietary changes are even more prominent among urban adolescents, as they are more exposed to brand marketing and advertising campaigns that target urban areas (Williams, 2013).

More than half, 200(52.1%) of schoolgirls normally go to bed early and 270(70.3%) schoolgirls normally get up early every day. About 326(84.9%) schoolgirls walk on foot when traveling to and from school. Two hundred fifty-three (65.9%) schoolgirls sitting down and 128(33.3%) standing or walking around while doing school breaks. Around one-third 123(32.0%), the schoolgirls are spending 1 to 2 hours a day playing games whereas 142(37.0%) never played. A large majority of schoolgirls 379(99%), do not smoke. A total of 192(100.00 %) intermediate and 187(97.40%) secondary schoolgirls never smoke a cigarette in a lifetime and 176(91.67%)

intermediate and 152(79.17%) secondary schoolgirls never take any food supplements. A total of 157(81.77%) intermediate and 182(94.79%) secondary schoolgirls have started menstruation. Schoolgirls' physical activity, lifestyle & media influences have been shown in table 8.

About 203(52.8%) schoolgirls reported that they do not perform enough exercise to keep healthy. Schoolgirls tended to think that they were not performing 226(58.9%) any kind of physical activity on daily basis. Around half of schoolgirls do have about the same physical activity performance during holidays. Most schoolgirls, 344(89.6%) involved in food preparation at home daily. This evidence might be supported by other empirical findings on the frequency of exercise often declines as adolescents grow older. The walking distances get shorter, and car driving increases (Pentz, 2009). National surveys in Norway indicated that the activity level of the average Norwegian adolescent was below the current recommendations of at least 30 minutes of physical activity a day (Wold *et al.* 2014).

4.1.5. Schoolgirls nutritional status

The average weight and height of school schoolgirls in the study place were 44.06kg (± 6.730) and 153.50cm (±5.825), respectively. Similarly, mean BMI and MUAC were 18.74 kg/m^2 (±2.965) and 23.52cm (±2.232), respectively.

In the study weight difference was observed among schoolgirls with water in their home, tried to lose their weight, who started menstruation and schoolgirls normally get up early in the morning. In the same line, it was found that height difference observed among schoolgirls with water and latrine in their home, tried to lose their weight, who started menstruation, family television, regular fizzy drinks, perform kind of physical activities daily and regularly eat on dark green leafy vegetable category.

Table 8: Anthropometric characteristics of schoolgirls compared to Anthroplus 2007 WHO references in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

Classifications	Nutrition Status	No (%)	(Mean ±SD)
Weight of schoolgirls (kg)		(23, 74)	44.06 (± 6.730)
Height of schoolgirls (cm)		(136, 170)	153.50 (±5.825)
BMI of schoolgirls (kg/m2)		(10, 30)	18.74 (±2.965)
MUAC of schoolgirls (cm)		(17, 28)	23.52 (±2.232)

Source: The researcher original findings, 2020

In the study also BMI difference was observed among schoolgirls with those had latrines in their home, who started menstruation and who perform regular physical activities this might be explained with the availability of latrine in the home encourage utilization, improve sanitation and health, in turn, improve keeping health and doing extra exercises which finally contributed to the BMI status.

A large majority of 324(84.4%) of schoolgirls had normal nutritional status according to height for age z-scores, and it was also found that 308(80.2%) of schoolgirls had normal nutritional status according to BMI for Age z-scores. The prevalence of overall stunting and thinness of schoolgirls was 60(15.0%) and 54(14.1%), respectively and 20 (5.2%) schoolgirls were overweight. This study had almost similar stunting prevalence of the adolescents at 15.6% (have short stature for their age) whereas the lower prevalence of thinness and higher prevalence of overweight as compared with study in Adama (Roba *et al.* 2016). The comparison showed that there might be similar chronic food insecurity across the towns whereas the difference in the socioeconomic and acute context across the towns. Similarly, Maiti et al. found the prevalence of stunting as 34.8%. This difference could be due to the differences in the age groups considered for the study and/ or the criteria used for classification of stunting as a later study was done among 10-14 years girls using Vishveshwara Rao's classification for height-for-age. Fifty-four (14.1%) had thinness, this was consistent with the study done by Das et al found the prevalence of thinness was 14.7% and 20(5.2%) schoolgirls had overweight. Comparison of Height-for-age (z-score) and BMI-for-age (z-score) in the study population was against WHO reference 2007 (5 to 19 years). (Anthroplus WHO, 2009). Anthropometric characteristics (Weight, Height, BMI & MUAC) of the study population have been shown in table 8.

Schoolgirls 271(83.64%) who have been diagnosed as normal and 41(73.21%) had moderate stunting reported that their meal size was affected by school sharing. Regular felt hungry due to household food insecurity among 30(53.57%) moderate stunting, and 3(75.00%) severe stunting schoolgirls. Near to half of the schoolgirls with better of the family had normal nutritional status both for height and BMI for age.

More than 4 out of five schoolgirls who had normal status against height for age reported that they think they used to eat healthy food, used to eat starchy foods regularly, and preferred to

have physical education in their school and similarly, more than half of schoolgirls who had normal status against height for age reported used to eat dark green leafy vegetable foods regularly.

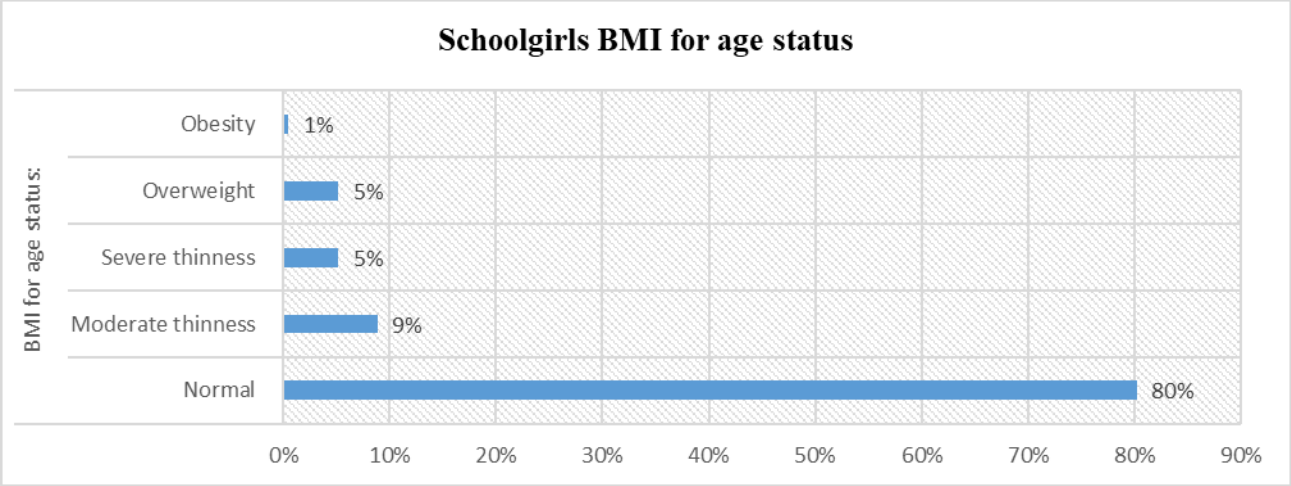

Figure 7: Schoolgirls BMI for age status, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

Source: The researcher original findings, 2020

One-third normal for height-age and more than half normal for BMI-age of schoolgirls used to eat carbohydrate and fat (linked with the vegetable oil) regularly. On the contrary, more than 4 out of five schoolgirls who had thinness never ate dairy on a regular base.

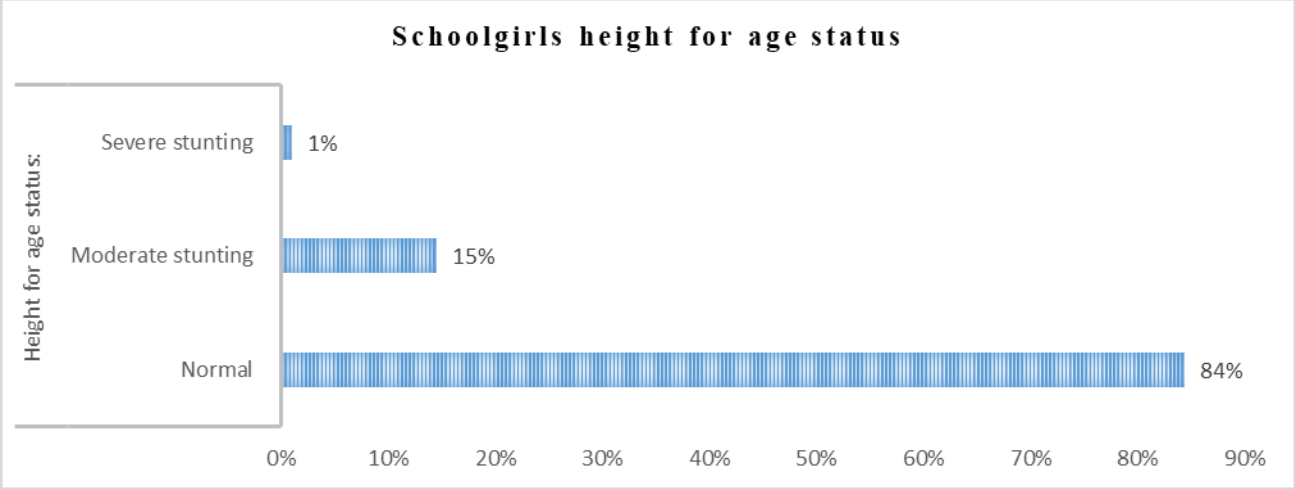

Figure 8: Schoolgirls height for age status, in Akaki Kality subcity, Addis Ababa, 2020. (n=384)

Source: The researcher original findings, 2020

Half of the schoolgirls who had moderate stunting and all with severe stunting reported do not have adequate water facilities in their home and poor water hygiene and sanitation knowledge. This might be explained with the known UNICEF conceptual frame and underline causes of the malnutrition linked with three different causal blocks of these poor water hygiene and sanitation is among the causes.

According to chi-squared test, factors associated with schoolgirls malnutrition with stunting were lack of water and latrine, knowledge on water hygiene sanitation practices, parents occupation, poor parent education, school sharing affect meal size, perceived healthy food and ate starchy staples food per day. The findings were strongly supported by other scholar studies, factors most frequently mentioned in association with stunting were lack of handwashing, latrines, and poor sources of drinking water (Tilahun *et al.* 2015 and Abdulkadir *et al.* 2016) and also living in rural areas, poor education of parents, food insecurity, big family size, and poverty were associated with both stunting and thinness (Huruy *et al.* 2013 and Abdulkadir *et al.* 2016). Measure of association with chi square test on schoolgirls height for age status has been shown in table 12 (Annex).

More than three out of four schoolgirls had both normal height and BMI for age status. This might show that the probability of one form of nutrition indices might indirectly be showing the other indices outcome as proxy measurement. Surprisingly, more than two-thirds of schoolgirls who had both thinness and overweight used to drink fizzy soft drinks and add sugar in any drink except water and this finding might need further empirical studies and explanation.

Schoolgirls who had moderate thinness 31(91.18), severe thinness 19(95.00%), overweight 18(90.00%), and obesity 2(100.00%) reported that used to eat a family meal in their home together with other adult family members. These findings might show that schoolgirls feeding in their house monotonous foods with their family whatever they have with no proper balancing diets in line with the daily requirements which might implication on the weight status of schoolgirls.

In this study, factors associated with malnutrition in schoolgirls with thinness were skipping breakfast while going to school due to household food insecurity, eat carbohydrates on regular basis throughout the week, and parent concern when schoolgirls change weight. This study is

more supported by other similar studies factors associated with schoolgirls with thinness were dietary factors such as meal frequency, meal skipping, and poor dietary diversity (Ahmed & Tomas, 2015). Measure of association with chi square test on schoolgirls BMI for age status has been shown in table 13 (Annex).

4.1.6. Logistic regression modeling

4.1.6.1. Factors affecting schoolgirls poor eating behaviours

The final model for schoolgirls eating behaviors with multinomial logistic regression showed that the model was statistically significant as compared to the null model with no predictors and the pseudo R^2 indicated that 34% of the variation of the model explained by the independent variable with powerful predictor .

Schoolgirls who have known medical disease are 45.7 times more likely to have poor eating behavior and schoolgirls who reported felt hungry are 4.7 times more likely to have poor eating behaviours. Similarly, schoolgirls whose parents never encourage or did not care about their weight change are 3 times more likely to have poor eating behavior and schoolgirls who perceived advertisement has an influence on their food choice are 2.7 times more likely to have poor eating behaviours. All of these was statistically significant at Prob > chi^2 (0. 0000)

Table 9: Multinomial logistic regression result on risks of poor eating behaviours on adolescent girls, in Akaki Kality subcity, Addis Ababa, 2020

Iteration 0: log pseudolikelihood = -388.23924
Iteration 1: log pseudolikelihood = -283.41819
Iteration 2: log pseudolikelihood = -260.5658
Iteration 3: log pseudolikelihood = -257.41185
Iteration 4: log pseudolikelihood = -257.36249
Iteration 5: log pseudolikelihood = -257.36247
Multinomial logistic regression

Number of Obs = 384
Wald chi2(17) = 137.19
Prob > chi2 = 0.0000
Pseudo R2 = 0.3371

Log pseudolikelihood = -257.36247

Eating behaviours	Robust		z	P>z	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
Good eating behaviours	(base outcome)					
Poor eating behaviours (category 4)						
WASH	1.120846	.2615465	0.49	0.625	.7094474	1.770808
AdHHEduc	.5920396	.0998998	-3.11	0.002	.4253245	.8241024
Admedst	45.7487	38.62183	4.53	0.000	8.745404	239.3192
Schmeal	.0368159	.0218495	-5.56	0.000	.0115044	.1178168
feelhungry	4.733266	2.811524	2.62	0.009	1.477589	15.16241
drinksugar	.1843185	.1059892	-2.94	0.003	.0597173	.5689024
wtfamily	3.008287	1.217952	2.72	0.007	1.360495	6.651837
infadverttopic	2.739364	.8646111	3.19	0.001	1.475671	5.085224
physicalexcercise	.4461307	.2578699	-1.40	0.163	.1436995	1.385061

Source: The researcher original findings, 2020

4.1.6.2. Determinants of schoolgirls stunting status

The final model for factors determined schoolgirls stunting with ordered logistic regression showed that the model was statistically significant as compared to the null model with no predictors and the pseudo R^2 indicated that 60% of the variation of the model explained by the independent variable with powerful predictor.

Schoolgirls who used to drink sugary fluids are 18.06 times [95% CI (2.49- 130.89)] and schoolgirls whose family income status is lower are 4.97 times [95% CI (2.46- 10.06)] more likely to be stunted. Similarly, schoolgirls who often feel hungry in the week are 5.24 times [95% CI (1.95- 14.05)] more likely to be stunted in their latter life. Moreover, the study showed that schoolgirls whose lower BMI/age are 1.53 times [95% CI (1.27- 1.84)] more likely to be stunted in their latter life. All of these was statistically significant at Prob > chi2 (0. 0000). These findings are contradicted with other scholar study which mentioned that factors most frequently in association with stunting were lack of handwashing, latrines, and poor sources of drinking water (Alelign et al. 2015 and Awel et al. 2016).

Table 10: Ordered logistic regression result on risks of stunting of schoolgirls, in Akaki Kality subcity, Addis Ababa, 2020.

Iteration 0: log pseudolikelihood = -181.12097
Iteration 1: log pseudolikelihood = -112.28333
Iteration 2: log pseudolikelihood = -78.927533
Iteration 3: log pseudolikelihood = -72.281095
Iteration 4: log pseudolikelihood = -71.913375
Iteration 5: log pseudolikelihood = -71.912142
Iteration 6: log pseudolikelihood = -71.912142
Ordered logistic regression

Number of Obs = 384
Wald chi2(17) = 61.81
Prob > chi2 = 0.0000
Pseudo R2 = 0.6030

Log pseudolikelihood = -71.912142

Stunting	Robust		z	P>z	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
BMI	1.530563	.1432915	4.55	0.000	1.273977	1.838827
Water	.065918	.0374982	-4.78	0.000	.0216167	.201011
Latrine	.0022084	.0025982	-5.20	0.000	.0002201	.0221572
fincome	4.974187	1.786587	4.47	0.000	2.460337	10.05656
HHOcup	.9331238	.1459031	-0.44	0.658	.6868241	1.267748
AdHHEduc	.6428083	.1179611	-2.41	0.016	.4486197	.9210528
Schmeal	1.668727	.9333109	0.92	0.360	.5575869	4.994111
feelhungry	5.237316	2.636513	3.29	0.001	1.952568	14.0479
mosteatperwk	2.248539	1.281541	1.42	0.155	.7358063	6.871276
fizzyoften	.1697794	.1964365	-1.53	0.125	.0175807	1.639583
fizzytype	18.05684	18.24896	2.86	0.004	2.491057	130.888
thinkhealthfood	.4127647	.2751375	-1.33	0.184	.1117674	1.524368
Fsupplements	2.921692	2.308719	1.36	0.175	.6208909	13.74844
smoke	2.833854	2.806122	1.05	0.293	.406917	19.73554
schoolbreak	.952222	.5404532	-0.09	0.931	.3130554	2.896377
DDS	1.524134	.6447534	1.00	0.319	.6651814	3.492259
Admedst	.1325604	.1019215	-2.63	0.009	.0293732	.5982407
/cut1	9.710178	2.175112			5.447036	13.97332
/cut2	15.45501	2.547212			10.46257	20.44746

Source: The researcher original findings, 2020

4.1.6.3. Determinants of schoolgirls thinness status

The final model for factors determined schoolgirls thinness with ordered logistic regression showed that the model was statistically significant as compared to the null model with no predictors and the pseudo R^2 indicated that 56% of the variation of the model explained by the independent variable with powerful predictor.

Schoolgirls who used to drink sugary fluids are 13.84 times [95% CI (1.74-109.97)] and schoolgirls whose family lower income status are 2.29 times [95% CI (1.33-3.92)] more likely to be thin. Similarly, schoolgirls who used to practice daily eat on late and irregular are 9.77 times [95% CI (4.60- 20.72)] and who never perform enough healthy exercise are 1.95 times [95% CI (1.07- 3.55)]more likely to be thin. All of these was statistically significant at Prob > chi2 (0. 0000). These findings supported with other scholar empirical evidence that factors associated with malnutrition in schoolgirls with thinness were dietary factors such as meal frequency, meal skipping, and poor dietary diversity (Mohammed and Tefera, 2015).

Table 11: Ordered logistic regression on risks of thinness of schoolgirls, in Akaki Kality subcity, Addis Ababa, 2020.

```
Iteration 0:   log pseudolikelihood = -279.06416
Iteration 1:   log pseudolikelihood = -196.04903
Iteration 2:   log pseudolikelihood = -144.46618
Iteration 3:   log pseudolikelihood = -125.14598
Iteration 4:   log pseudolikelihood =   -123.665
Iteration 5:   log pseudolikelihood = -123.64627
Iteration 6:   log pseudolikelihood = -123.64626
Ordered logistic regression
                                                  Number of Obs = 384
                                                  Wald chi2(14) = 110.18
                                                  Prob > chi2 = 0.0000
                                                  Pseudo R2 = 0.5569
Log pseudolikelihood = -123.64626
```

Thinness	Robust		z	P>z	[95% Conf. Interval]	
	Odds Ratio	Std. Err.				
fincome	2.285138	.6291892	3.00	0.003	1.332119	3.919964
homemealgood	.0779748	.054832	-3.63	0.000	.0196511	.3094004
homemealpattern	9.770038	3.747444	5.94	0.000	4.606862	20.71988
skipmeal	1.510932	.5870303	1.06	0.288	.705561	3.235605
balanceddiets	.6704782	.2542112	-1.05	0.292	.3188984	1.409668
whereeat	1.234748	.2502044	1.04	0.298	.8300305	1.836802
drinksugar	1.163035	.5616762	0.31	0.754	.4513501	2.996899
wtfamily	.7570088	.1573604	-1.34	0.181	.5036868	1.137735
smoke	.8098383	.6044793	-0.28	0.778	.1875188	3.497453
mosteatperwk	.6120984	.179314	-1.68	0.094	.3447164	1.086877
fizzyoften	.044251	.0536118	-2.57	0.010	.0041177	.4755409
fizzytype	13.83806	14.63465	2.48	0.013	1.741303	109.9705
DDSS	.5027155	.1776505	-1.95	0.052	.2514914	1.004897
enoughexcercise	1.94996	.5974107	2.18	0.029	1.069652	3.554749
/cut1	7.760798	1.865333			4.104813	11.41678
/cut2	10.38839	2.101174			6.270164	14.50661
/cut3	11.71539	2.166365			7.469392	15.96139
/cut4	15.00722	2.215764			10.6644	19.35004

Source: The researcher original findings, 2020

4.2. Qualitative section

A total of 80 schoolgirls were approached in 10 focus group discussion sessions. Age of the discussants were from 13 to 19 years of age.

4.2.1. Schoolgirls perception on eating behavior and dietary diversity

Most of the discussants (58) in the focus group discussion expressed their feeling on eating behaviour as practicing of daily eating with different foods as repeated habits. This also the definition of eating behavior. However, still there were some students did not define eating behavior this might implies that they do not have a knowledge which could be contributing to likelihood of practicing against the recommend good eating behavior.

The same groups of discussants also quoted that dietary diversity means eating variety of foods. They believed that eating different type of foods will create a healthy looks and shaped body. These findings indicated that majority of the participants had some knowledge on dietary diversity concept.

(focus group discussion 01-03, 06, 09, 10, January 2020, Akaky-Kaliti, Addis Ababa)

The study discovered out some outlier information from the qualitative finding on the eating behavior of students on commercial food around school.

‘’…I and my friends are eating different foods from the market around the school which are full of sugar and oil such as pasty, potato crisps, sandwiches and others.” (five discussants from focus group discussion 01 and 06, January 2020, Akaky-Kaliti, Addis Ababa)

This may be due to the fact that the market is easily available around the school and wants to attract the students by making low price, sugary and easily availability and students are using these foods without understanding of effects on their health and nutrition status.

4.2.2. Schoolgirls attracted with, in their daily life

Recently, in Ethiopia there are different television channels and advertisement which showing lifestyle and food programs on which young peoples can easily attracted with and this can be the potential influencing factors that students easily access and adapt on their day to day life. This was confirmed with about half of the participants on focus group discussion. Said that,

" We mostly looked at different outside and Ethiopia television channels such as Arab and KANA TV and interested to see their foods and dressing styles and wish to eat the foods and practicing different lifestyle on which we felt it's a sign of modernization….". (40 schoolgirls from focus group discussion 02, 04, 07 and 10, January 2020, Akaky-Kaliti, Addis Ababa)

4.2.3. Schoolgirls observing effects on eating behavior and dietary diversity

Most of the discussants (56) in the focus group discussion stated that there were few students in their class who regularly felt hungry over the week and mostly skip their breakfast meal which was mainly associated with lack of food in their home, and they thanked for the government which started food at school.

(focus group discussion 02, 03, 06 and 07-10, January 2020, Akaky-Kaliti, Addis Ababa)

The study revealed that most participants has irregular eating behavior and less diversified foods. This were discussed in the focus group discussion by saying

"We commonly practiced eating on late hours and eat when we feel hungry not respecting the schedule. Injera with Shiro and bread were the most common food most of our family used to eat over the week and our family could not prepare different foods since they could not afford to buy different foods types…..'' (ten discussants from focus group discussion 04 to 08, January 2020, Akaky-Kaliti, Addis Ababa)

Beside less dietary diversification and erratic eating by the participants, most of the families do not control to different behaviours which students practicing. For example, on the focus group discussion one of them was said that

‘’….. I stayed long time on watching television channels after school time, mostly eat late, my family does not care about my weight status and rather my family are worried to feed me whatever they have in the house without hungry me and my family considered that checking my body and healthy status on regular base did not sense as normal practice by the community, may be due to their low education status, and they also felt it as modernization come from out of ethiopia.’’ (a 17-year-old discussant from focus group discussion 07, January 2020, Akaky-Kaliti, Addis Ababa)

In addition to the above there were evidence observed in the discussion in some participants described about the medical problem which might be linked with nutrition deficiency.

‘’I have low blood disease and I take iron folic acid food supplements on regular base….’’ (five discussants from focus group discussion 01 and 09, January 2020, Akaky-Kaliti, Addis Ababa)

Some of the discussants (24) in the focus group discussion explained as observed different body structures which is not the same as compared with other same age groups like themselves in the class such as very thin, fat and very short body size students and they did not have knowledge on why it happened. These students also did not have interest about obtaining further information on health and nutrition since never heard any information in the school and they believed as themselves as healthy since they never did get any illness and they can take any food without difficulties.

(focus group discussion 02, 05, 10, January 2020, Akaky-Kaliti, Addis Ababa)

4.2.4. Schoolgirls suggestion to contribute for the solution

There were irregularly eating behavior and felt hungry over the week and mostly skip their breakfast meal which was mainly associated with lack of food at home.

Most of the discussants (72) in the focus group discussion explained that students should keep their health through eating good food timely at home and reduce commercial foods in particular sugary foods/drinks since it will reduce appetite and low food intake. They also need the food provided by the government in the school to be maintained as it is their alternative food sources while they are in the school especially for those students skip their meal.

(focus group discussion 01-03, 06 and 07-10, January 2020, Akaky-Kaliti, Addis Ababa)

There were long time on watching television channels after school time, mostly eat late, family does not control students behaviours and health which might be linked with families low attention or low priority on monitoring to students behaviours or low education or lack of time to control. Few participants suggested from the focus group discussion that

‘’……. thanks to technology in now adays, we are having good information easily by watching television channels which is normal to our community to keep our health, food preparation and doing exercise. However, most students are practicing the television or media advertisement what they have seen without analyzing the consequence since not all things are helpful for us which might affect their health and life therefore, I suggest to be selective on watching and adapting the technologies.’’ (Seven discussants from focus group discussion 04 to 08, January 2020, Akaky-Kaliti, Addis Ababa)

4.2.5. Community including the school, contribution for the solution

‘’….. I believe that school can help us as source of information, therefore; our mini media and physical education class should be strong and include health keeping exercise classes and transferring health information on regular base.’’ (a 15-year-old discussant from focus group discussion 03, January 2020, Akaky-Kaliti, Addis Ababa)

‘’Community especially family should keep attention to us on our eating, weight, and health status. We mostly are not with our family longer time in a day due to schooling; therefore, we easily practicing not good habits and mostly hidden from the family. Therefore, our family and teachers in the school should monitor students…….’’ (a 19-year-old discussant from focus group discussion 08, January 2020, Akaky-Kaliti, Addis Ababa)

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The overall stunting and thinness of schoolgirls in the study area were 60 (15.0%) and 54 (14.1%), respectively and about twenty (5.2%) schoolgirls were overweight.

This study revealed that about half of schoolgirls had low dietary diversity score with their average score of 3.61 which was supported with the qualitative finding that the schoolgirls eating behaviours in the study area were erratic, mostly felt hungry over the week and skip their breakfast meal while they go to school which was mainly associated with lack of food at home. Besides, schoolgirls had experience of watching television channels long time on after school time, mostly eat late, family does not control students behaviours and health. Government started feeding in the school is the main alternative food sources while they are in the school especially for those students skip their meal.

The econometric modeling empirical evidence rejected the null hypothesis that there was nutritional outcome difference among the eating behaviours and dietary diversification status of schoolgirls. Schoolgirls who used to drink sugary fluids and whose family lower income status had both stunting and thinness effects whereas schoolgirls who often feel hungry in the week and schoolgirls whose lower BMI/age had effects on schoolgirls stunting status and schoolgirls who used to practice daily eat on late and irregular and who never perform enough healthy exercise had association with schoolgirls thinness status

5.2. **Recommendation**

Government/schools:

- Akaki Kality subcity education office should maintain the school feeding programme to mitigate poor nutrition outcome following erratic feeding and meal skipping behaviours.
- Schools in each woredas of the subcity should strengthen healthy behaviour messaging through existing school media to improve schoolgirls healthy eating behaviours.

Community/Family:

- Family should keep attention and watch schoolgirls eating behaviours, weight, and health status since this is the second opportunity to create feature generation through healthy growing feature mothers.

Schoolgirls:

- Schoolgirls should be selective on watching and adapting the technologies and keep their fitness and health through perform enough healthy exercise and performing good eating behaviours.

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ANNEXES

Annex 1: Consent form

Effect of Dietary Diversity and Eating Behaviours on Adolescent Girl's Nutritional Status

Researcher: Solomon Girma Yirdaw. Akaki Kality sub city, Addis Ababa, Ethiopia. (+251)-911-879-302

This is to be submitted in partial fulfilment of the requirements for the degree of Master of Science in food security and development studies, Addis Ababa University Ethiopia.

I _____ (Name of Interviewer). Am here to interview randomly selected students from the list of grades (5-8) and (9-12) in this school. The purpose of this interview is to obtain information on "Effect of Dietary Diversity and Eating Behaviours on Adolescent Girl's Nutritional Status In Government Schools, Akaki Kality Subcity, Addis Ababa, Ethiopia". Now you are randomly selected to participate in this interview from the list of students. The participation in this assessment is voluntary (data collectors please leave if the students not willing to participate). Information and data obtained from you are considered as confidential. We are not recording any specific names. The information will be used to recommend the nutrition status. You will not gain any material benefit from agreeing to conduct this interview. We would appreciate if you can provide us with the most accurate answers as you can. Are you willing to talk with us and share your experience for this assessment?

- I understand and fully agree to voluntarily take part and cooperate with the researcher after explaining to me the nature and purpose of the research
- I understand that I need to respond on the questionnaire, which asks about my demographics, eating habits, nutrition and health knowledge, physical activities, and lifestyle
- I understand that the research team will also measure my height and weight.
- I understand that all information obtained from me will be in strict confidence, although information gained during the study may be published
- I have read and fully understood the above conditions and for any valid reason I can withdraw my participation in this project

Name: _____ Signed: _____ Date: _____

Annex 2: English version questionnaires

I _____ (Name of Interviewer). Am here to interview randomly selected students from the list of grades (5-8) and (9-12) in this school. The purpose of this interview is to obtain information on "Effect of Dietary Diversity and Eating Behaviours on Adolescent Girl's Nutritional Status in Government Schools, Akaki Kality Subcity, Addis Ababa, Ethiopia". Now you are randomly selected to participate in this interview from the list of students. The participation in this assessment is voluntary (data collectors please leave if the students not willing to participate). Information and data obtained from you are considered as confidential. We are not recording any specific names. The information will be used to recommend the nutrition status. You will not gain any material benefit from agreeing to conduct this interview. We would appreciate if you can provide us with the most accurate answers as you can. Are you willing to talk with us and share your experience for this assessment?

Part One: Quantitative questionnaire

Name of Woreda: _____

Name of School: _____

Interview Date: _____

Reference Number: _____

Date of Birth: _____

Age (yr):_____

Weight (kg): _____

Height (cm): _____

MUAC (cm): _____

SECTION (A): Socio-Demographic Characteristics

1. Educational level:

1.1. Intermediate (5-8 grade) _____

1.2. Secondary Schools (9-12 grade) _____

2. Number of brother and Sister.

2.1. Bother _____

2.2. Sister ____

3. Your sequence among your siblings? _____

4. How many family numbers live together including you? _____

5. From your family number, how many are age > 18 years? _____

6. With whom do you live?

a) Both parents

b) Father only

c) Mother only

7. Are parents alive?

a) Both alive

b) Father alive

c) Mother alive

d) Both died

8. Do you estimate your family largest income per month? _____

9. Do you have a family car?

a) Yes

b) No

10. Do you have television?

a) Yes

b) No

11. Which programme do you see mostly (from TV programme)? _

a) News/regular

b) Entertainment (music, film , dram..)

c) Educational (cooking, national geography, ..)

d) Sports

e) Other specify_____

12. What are the main household occupation status?

a) Farmer

b) Teacher

c) Other govt employee

d) Merchant

e) Other specify_____

13. What is education status of your parents?

a) Illiterate

b) Basic education

c) Highschool

d) Vocation

e) Higher education

SECTION (B): Dietary Intake, Food Habits, Social Environment and Perceptions of Health

14. Assess your knowledge on health eating practices or balanced diets

a) Poor

b) Not Bad

c) Good

d) I do not know

15. Do you consider yourself healthy in comparison with others your age?

a) Yes

b) No

16. Do you have any known medical problem? _____if yes, mention types of problem?

17. Do you to think that due to your family size affected your regular meal size?

a) Yes

b) No

18. Do you to think that due to friends in the school sharing your food affected your regular meal size?

a) Yes

b) No

19. Do you often feel hungry?

a) Yes

b) No

20. How often do you eat outside your home (frequency per week)?

a) Once

b) Twice

c) 3 times

d) More than three

21. Do you commonly skip any meal?

a) Yes

b) No

22. If yes, which meal does you skips?

a) Breakfast

b) Lunch

c) Dinner

23. Do you normally take breakfast before you go to school?

a) Yes

b) No

24. Do you eat snacks between meals?

a) Yes

b) No

25. If yes, what is the favorite snack between meals you have?

a) Sandwiches (cheese, eggs, hamburger, vegetable, others)

b) Potato crisps

c) Chocolate

d) Biscuits

e) Fruit

f) Donuts

g) Pizza

h) Nuts

i) Ice cream

j) Sambusa

k) Others (please print) _____

26. When eat in a group, do you eat in separate plates? In your home, are you eat with separate plate?

a) Yes (separate)

b) No (in group)

27. Which kind of food do you mostly eat/week?

a) Homemade food
b) Fast food
c) Food made outside home

28. Where do you usually eat? (choose only one)

a) Dining room
b) Bedroom
c) Kitchen
d) In front of the TV

29. How many times did you eat vegetables e.g. (green salad, carrots, cucumber, peas, and cabbage) in the last 7 days?

a) None
b) One time
c) Two times
d) More than 3times
e) More than 6 times

30. How many times did you eat fruits in the last 7 days?

a) None
b) One time
c) Two times
d) More than 3times
e) More than 6 times

31. How many times did you eat meat in the last 7 days?

a) None
b) One time
c) Two times
d) More than 3 times
e) More than 6 times

32. How many times did you take dairy products e.g. milk, cheese, cream, yogurt in the last 7 days?

a) None
b) One time
c) Two times

d) More than 3times

e) More than 6 times

33. How many times did you take carbohydrates e.g. bread, pasta, rice or cereals in the last 7 days?

a) None

b) One time

c) Two times

d) More than 3times

e) More than 6 times

34. How many times did you take or use fat for cooking e.g. Butter or vegetable oil in the last 7 days?

a) None

b) One time

c) Two times

d) More than 3times

e) More than 6 times

35. Which of the following do you drink most often?

a) Water

b) Fruit juice

c) Soft drinks

d) Hot drinks

36. Do you drink Fizzy drinks e.g. (pepsi or cola)?

a) Yes

b) No

37. If yes, what kind of fizzy drinks?

a) Full sugar

b) Diet drinks

38. Do you normally add sugar to your drinks?

a) Yes

b) No

39. How many cups of water do you drink/day?

a) 1 cup

b) 1-3 cups

c) 4-6 cups

d) 7 cups or more

40. Do you have daily pocket money?

a) Yes

b) No

41. Do you buy food from school canteen or school environment?

a) Yes

b) No

42. If yes, what type?

a) Sandwiches

b) Potato crisps

c) Chocolate

d) Biscuits

e) Donuts

f) Pizza

g) Nuts

h) Ice cream

i) Fruit

j) Others (please print) _____

43. In your opinion, do you think that you eat healthy food?

a) Yes

b) No

44. Do you think your family or guardian take care of your health status e.g. weight?

a) Yes

b) No

c) I don't know

45. Are you following any special diet now?

a) Yes

b) No

46. Have you ever tried losing weight?

a) Yes

b) No

47. Have you ever tried gaining weight?

a) Yes

b) No

48. When I'm trying to change my weight, my parent:

a) Encourage me

b) D iscourage me

c) They do not care

49. Do you read or follow media concerning diet issues?

a) Yes

b) No

50. Do you smoke (a cigarette/ Shisha)?

a) Yes

b) No

51. Do you take any food supplements?

a) Yes

b) No

52. If yes, what kind of supplements?

a) Multivitamins

b) Iron

c) Vitamin C

d) Zinc

e) Calcium

f) Others (please print)

53. Do you think you being served meal good in your family/house?

a) No

b) Yes

c) I do not know

54. Most commonly how you get meal in the house

a) After father and mother
b) After boy Adolescent
c) After under five children
d) Together with boy adolescent
e) Together with Adult family members
f) Any time

55. Did you start menstruating?

a) Yes
b) No

56. Do you have adequate water sources in your house?

a) No
b) Yes
c) I do not Know

57. Do you have adequate toilet sources in your house?

a) No
b) Yes
c) I do not Know

58. Assess your knowledge on water, sanitation and hygiene practices

a) Poor
b) Not Bad
c) Good
d) I do not know

SECTION (C): Physical activity, lifestyle and media influences

59. Do you normally go to bed early?

a) Yes
b) No

60. Do you normally get up early?

a) Yes
b) No

61. Which form of transport do you normally use when travel to and from school and apart from your journey to and from school?

a) Car
b) Walk
c) Public transport

62. Do you read book, magazine, or comics daily?

a) Yes
b) No

63. If yes, how many hours per day do you spend on reading them?

a) Less than an hour a day
b) 1 to 2 hours a day
c) More than 2 hours a day

64. Do you think that reading has an influence on your food choice?

a) Yes
b) No
c) I don't know

65. If yes, to what extent does reading influence your food choice?

a) Strong and important influence
b) Average influence
c) No influence

66. If yes, is the influence related to magazine topics or advertisement

a) Food topics
b) Advertisements
c) Both

67. How many hours per day do you spend watching TV or Video?

a) None
b) Less than an hour a day
c) 1 to 2 hours a day
d) More than 2 hours a day

68. Which type of TV advertisement/programme you are interested on? _____

a) Food and drink
b) Entertainments [music, drams, national geography]
c) Sport

d) Other specify _____

69. Does TV advertisement/programme have an influence of on eat behaviours?

a) Yes

b) No

70. If yes, to what extent is this influence?

a) Strong

b) Medium

c) No effect

71. How many hours per day do you spend playing computer or mobile games or social medias?

a) None

b) 1 to 2 hours a day

c) More than 2 hours a day

d) Less than an hour a day

72. Are you involved in food preparation or cooking at home?

a) Yes

b) No

73. Do you normally perform any kind of physical activities such as physical exercise, school sport club, washing up or cleaning up, supporting household activities, supporting in agriculture activities, walking, horse riding, shopping, table tennis, etc…?

a) Yes

b) No

74. If yes, how often do you perform these activities per week?

a) Less than 1 hour

b) 1 to 3

c) 3 to 6 hours

d) More than 6 hours

75. What do usually do at school breaks?

a) Sitting down (talking, reading or eat)

b) Standing or walking around

c) Running or performing other physical activities

76. During holidays how active are you in comparison to school days?

a) Less active
b) About the same
c) More active

77. In general speaking, do you think that you perform enough exercise to keep healthy?

a) Yes
b) No
c) I have no idea

78. How active are you, in comparison to others your age and sex?

a) Below average
b) A bout average
c) Above average

79. Do you think health and nutrition club and sessions are available in your school?

a) Yes
b) No
c) I have no idea

80. If yes, how do you feel this platform influencing your weight and health?

a) Strong and important influence
b) Average influence
c) No influence

81. Would you prefer to have physical education classes at school?

a) Yes
b) No
c) I have no idea

82. Would you identify who/what are the influencing your weight and health?

a) Peer pressure
b) Parents/Guardians
c) School Environment
d) TV Advertisement
e) My reading or understanding on health and nutrition
f) I do not know

Part Two

Section (d): Dietary diversity questionnaire

#	Dietary Diversity Questionnaire	Food group	Yes/No
83	Did you eat one of the lists in Starchy staples category in the last 24 Hrs.	Corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + insert local foods e.g. porridge or paste White potatoes, white yam, white cassava, or other foods made from roots	
84	Did you eat one of the lists in Dark green leafy vegetables category in the last 24 Hrs.	Dark green leafy vegetables, including wild forms + locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach	
85	Did you eat one of the lists in Other vitamin A rich fruits and vegetables category in the last 24 Hrs.	pumpkin, carrot, squash, or sweet potato that are orange inside + other locally available vitamin A rich vegetables (e.g. red sweet pepper) Ripe mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach, and 100% fruit juice made from these + other locally available vitamin A rich fruits	
86	Did you eat one of the lists in Other fruits and vegetables category in the last 24 Hrs.	Other vegetables (e.g. tomato, onion, eggplant) + other locally available vegetables Other fruits, including wild fruits and 100% fruit juice made from these	
87	Did you eat one of the lists in Organ meat category in the last 24 Hrs.	Liver, kidney, heart or other organ meats or blood-based foods	
88	Did you eat one of the lists in Meat and fish category in the last 24 Hrs.	Beef, pork, lamb, goat, chicken, duck Fresh or dried fish or shellfish	
89	Did you eat one of the lists in Eggs category in the last 24 Hrs.	Eggs from chicken, duck, guinea fowl or any other egg	
90	Did you eat one of the lists in Legumes, nuts and seeds category in the last 24 Hrs.	Dried beans, dried peas, lentils, nuts, seeds or foods made from these (e.g. hummus, peanut butter)	
91	Did you eat one of the lists in Milk and milk products category in the last 24 Hrs.	Milk, cheese, yogurt or other milk products	

Part Three: Qualitative questionnaire

Focus Group Discussion Guides:

1. What do you feel about the eating behavior and dietary diversity?
2. What schoolgirls attracted with in their daily life?
3. What effects are you observing from schoolgirls eating behavior and dietary diversity?
4. What do you recommend?
5. What can the community contribute for the solution?

Annex 3: Amharic version questionnaires

አማርኛ ትርጉም

የቃለ መጠይቅ ቅጽ

ከ _____ (ቃለ መጠይቅ አድራጊው ስም)። በዚህ ትምህርት ቤት ውስጥ (ከ5-8) እና (ከ9-12) ከተመዘገቡት ዝርዝር ውስጥ በአጋጣሚ ለተመረጡ ተማሪዎች ቃለ መጠይቅ ለማድረግ ነው ። የዚህ ቃለ-ምልልስ ዓላማ "በመጀሪያ እና በሁለተኛ ደረጃ ትምህርት ቤቶች ፣ በአቃቂ ቃሊቲ ክፍለ-ከተማ ፣ አዲስ አበባ ፣ ኢትዮጵያ ውስጥ በጉርምስና ዕድሜ ላይ በሚገኙ ልጃገረዶች የአመጋገብ ሁኔታ ላይ የአመጋገብ ልዩነት እና የአመጋገብ ባህሪዎች ውጤት" መረጃ ለማግኘት ነው ። አሁን በዚህ ቃለ መጠይቅ ላይ ከተማሪዎች ዝርዝር ውስጥ ለመሳተፍ በዘፈቀደ ተመርጠዋል ። መረጃው የአመጋገብ ሁኔታን ለመምከር ይጠቅማል ። ይህንን ቃለ-ምልልስ ለማካሄድ በመስማማት ምንም ዓይነት ቁሳዊ ጥቅም አያገኙም ። በጣም ትክክለኛ የሆኑትን መልሶች በተቻለዎት መጠን ቢሰጡን እናመሰግናለን ። ለዚህ ግምገማ ከእኛ ጋር ለመነጋገር እና ተሞክሮዎን ለማካፈል ፈቃደኛ ነዎት?

<u>አካለ ንጽጽር መጠይቅ</u>

የወረዳው ስም _____

የትምህርት ቤት ስም _____

የቃለ መጠይቅ ቀን _____

የማጣቀሻ ቁጥር: _____

የትውልድ ቀን: _____

ዕድሜ (ዓመት) _____

ክብደት (ኪግ): _____

ቁመት (ሴ.ሜ): _____

MUAC (ሴ.ሜ): _____

ክፍል ሀ: የሶሽዮ-ዲሞግራፊክ ባህሪዎች

1. የትምህርት ደረጃ

1.1. መካከለኛ (ከ5-8 ክፍል) _____

1.2. ሁለተኛ ደረጃ ትምህርት ቤቶች (ከ 9-12 ክፍል) _____

2. የወንድም እና የእህት ብዛት።

2.1. ወንድም _____

2.2. እህት ____

3. በወንድሞችና እህቶች መካከል የእርስዎ ቅደም ተከተል? _____

4. እርስዎን ጨምሮ ስንት የቤተሰብ ቁጥሮች አብረው ይኖራሉ? _____

5. ካሉት የቤተሰቡ አባላት መካከል በዕድሜ ደረጃ ከ18 ዓመት በታች ምን ያህል ናቸው? _____

6. ከማን ጋር ነው የምትኖረው/የምትኖሪው?

ሀ) ከሁለቱም ወላጆች

ለ) ከአባት ብቻ

ሐ) ከእናት ብቻ

መ) ሌላ (ይግለጹ) _____

7. ወላጆች በሕይወት አሉ?

ሀ) ሁለቱም በሕይወት አሉ

ለ) አባት በሕይወት አለ

ሐ) እናት በሕይወት አለች

መ) ሁለቱም ሞተዋል

8. በወር ትልቁን የቤተሰብዎን ገቢ ይገምታሉ? _____

9. የቤተሰብ መኪና አለዎት?

ሀ) አዎ

ለ) የለም

10. የቤተሰብ ቴሌቪዥን አለዎት?

ሀ) አዎ

ለ) የለም

11. የትኛው ፕሮግራም በአብዛኛው ይመለከታሉ (ከቴሌቪዥን ፕሮግራም)? _

ሀ) ዜና / መደበኛ

ለ) መዝናኛ (ሙዚቃ ፣ ፊልም ፣ ድራማ ..)

ሐ) ትምህርታዊ (ምግብ ማብሰል ፣ ብሔራዊ ጂአግራፊ ፣ ..)

መ) ስፖርት

ሠ/ ሌላ ካለ-----

12. የቤተሰብ ዋናው የቤት ሥራ ሁኔታ ምንድ ነው?

ሀ) ገበሬ

ለ) አስተማሪ

ሐ) ሌላ የመንግሥት ሠራተኛ

መ) ነጋዴ

ሠ) ሌላ ይግለጹ _____

13. የወላጆችዎ የትምህርት ሁኔታ ምንድነው?

ሀ) ማንበብና መጻፍ

ለ) መሰረታዊ ትምህርት

ሐ) ከፍተኛ ትምህርት ቤት

መ) ሙያ

ሠ) ከፍተኛ ትምህርት

<u>ክፍል (ለ): - የመትመገቧቸው የምግብ ሁኔታዎች፣ የምግብ ልማዶች ፣ ማህበራዊ አከባቢ እና የጤንነት ግንዛቤዎች</u>

14. በጤና መመገብ ልምዶች ወይም በተመጣጣኝ ምግቦች ላይ ያለዎትን እውቀት ይገምግሙ

ሀ) ዝቅተኛ ነው

ለ) መጥፎ አይደለም

ሐ) ጥሩ ነው

መ) አላውቅም

15. ከሌሎች ከእድሜዎ ጋር በማነፃፀር እራስዎን ጤናማ እንደሆኑ አድርገው ይቆጥሩታል?

ሀ) አዎ

ለ) የለም

16. የታወቀ የታወቀ የሕክምና ችግር አለብዎት? _____ ከሆነ አዎ ፣ የችግር ዓይነቶችን ይጥቀሱ?

17. በቤተሰብዎ ብዛት ምክንያት መደበኛ የምግብ መጠንዎን ይነካል ብለው ያስባሉ?

ሀ) አዎ

ለ) የለም

18. በትምህርት ቤት ውስጥ ባሉ ጓደኞችዎ ምክንያት ምግብዎን በመጋራት መደበኛ የመመገቢያ መጠንዎ ላይ ተጽዕኖ አሳድሯል ብለው ያስባሉ?

ሀ) አዎ

ለ) የለም

19. ብዙውን ጊዜ ረሃብ ይሰማዎታል?

ሀ) አዎ

ለ) የለም

20. ከቤትዎ ውጭ ምን ያህል ጊዜ ይመገባሉ (በሳምንት ድግግሞሽ)?

ሀ) አንዴ

ለ) ሁለት ጊዜ

ሐ) 3 ጊዜ

መ) ከሶስት በላይ

21. በየቀኑ/በተለምዶ የምትመገብባቸው የአመጋገብ ደረጃዎችን አልፈህ/ሽ የምትመገብበት ወቅት አለህ/አለሽ?

ሀ) አዎ

ለ) የለም

22. አዎ ከሆነ የትኛው ምግብ ነው የሚዘሉት?

ሀ) ቁርስ

ለ) ምሳ

ሐ) እራት

23. ወደ ትምህርት ቤት ከመሄድዎ በፊት በተለምዶ ቁርስ ይወስዳሉ?

ሀ) አዎ

ለ) የለም

24. ከአመጋገብ ደረጃዎች መካከል መክሰስ/ መቆያ አዘውትረህ ትመገባለህ?

ሀ) አዎ

ለ) የለም

25. አዎ ከሆነ ፣ በምግብዎ መካከል በጣም የሚወዱት ምግብ ምንድን ነው?

ሀ) ሳንድዊቾች (አይብ ፣ እንቁላል ፣ ሀምበርገር ፣ አትክልት ፣ ሌሎች)

ለ) የድንች ጥብስ

ሐ) ቸኮሌት

መ) ብስኩት

ሠ) ፍራፍሬ

ረ) ዶናት

ሰ) ፒዛ

ሸ) ለውዝ

ቀ) አይስክሬም

በ) ሳምቡሳ

ተ) ሌሎች (እባክዎን ያትሙ) _____

26. በቡድን ሲመገቡ በተናጠል ሳህኖች ውስጥ ይመገባሉ? በቤትዎ ውስጥ ፣ በተለየ ሳህን ይመገባሉ?

ሀ) አዎ (በተለየ)

ለ) አይ (በቡድን)

27. በሳምንት ውስጥ በአብዛኛው የሚበሉት የትኛውን ዓይነት ምግብ ነው?

ሀ) በቤት ውስጥ የሚሰራ ምግብ

ለ) ፈጣን ምግብ

ሐ) ከቤት ውጭ የተሰራ ምግብ

28. ብዙውን ጊዜ የመመገቢያ ቦታህ/ቦታሽ የት ነው? (አንዱን ብቻ ይምረጡ)

ሀ) የመመገቢያ ክፍል ውስጥ

ለ) መኝታ ቤት ውስጥ

ሐ) ወጥ ቤት ውስጥ

መ) ከቴሌቪዥኑ ፊት ለፊት

29. አትክልቶችን ምን ያህል ጊዜ በልተዋል ለምሳሌ. ባለፉት 7 ቀናት ውስጥ (አረንጓዴ ሰላጣ ፣ ካሮት ፣ ዱባ ፣ አተር እና ጎመን)?

ሀ) የለም

ለ) አንድ ጊዜ

ሐ) ሁለት ጊዜ

መ) ከ 3 ጊዜ በላይ

ሠ) ከ 6 ጊዜ በላይ

30. ባለፉት 7 ቀናት ውስጥ ስንት ጊዜ ፍራፍሬዎችን ተመገቡ?

ሀ) የለም

ለ) አንድ ጊዜ

ሐ) ሁለት ጊዜ

መ) ከ 3 ጊዜ በላይ

ሠ) ከ 6 ጊዜ በላይ

31. ባለፉት 7 ቀናት ውስጥ ስንት ጊዜ ስጋ ተመገቡ?

ሀ) የለም

ለ) አንድ ጊዜ

ሐ) ሁለት ጊዜ

መ) ከ 3 ጊዜ በላይ

ሠ) ከ 6 ጊዜ በላይ

32. የወተት ተዋጽኦዎችን ለምሳሌ ስንት ጊዜ ወስደዋል ። ባለፉት 7 ቀናት ውስጥ ወተት ፣ አይብ ፣ ክሬም ፣ እርጎ?

ሀ) የለም

ለ) አንድ ጊዜ

ሐ) ሁለት ጊዜ

መ) ከ 3 ጊዜ በላይ

ሠ) ከ 6 ጊዜ በላይ

33. ካርቦሃይድሬትን ስንት ጊዜ ወስደሃል ለምሳሌ. ባለፉት 7 ቀናት ውስጥ ዳቦ ፣ ፓስታ ፣ ሩዝ ወይም እህሎች?

ሀ) የለም

ለ) አንድ ጊዜ

ሐ) ሁለት ጊዜ

መ) ከ 3 ጊዜ በላይ

ሠ) ከ 6 ጊዜ በላይ

34. ለምግብ ማብሰያነት /ማጣፈጫነት ለምሳሌ. ባለፉት 7 ቀናት ውስጥ ቅቤ ወይም የአትክልት ዘይት? ስንት ጊዜ ትጠቀማለህ/ሽ?

ሀ) የለም

ለ) አንድ ጊዜ

ሐ) ሁለት ጊዜ

መ) ከ 3 ጊዜ በላይ

ሠ) ከ 6 ጊዜ በላይ

35. ከሚከተሉት ውስጥ ብዙውን ጊዜ የሚጠጡት የትኛው ነው?

ሀ) ውሃ

ለ) የፍራፍሬ ጭማቂ

ሐ) ለስላሳ መጠጦች

መ) ሙቅ መጠጦች

36. የፊዚን መጠጦች ለምሳሌ ትጠላለህ/ሽ? (ፔፕሲ ወይም ኮላ)?

ሀ) አዎ

ለ) የለም

37. አዎ ከሆነ ምን ዓይነት የጋዝ መጠጦች?

ሀ) ሙሉ ስኳር

ለ) የአመጋገብ መጠጦች

38. በመደበኛነት በመጠጥዎ ላይ ስኳር ይጨምራሉ?

ሀ) አዎ

ለ) የለም

39. በቀን ስንት ኩባያ ውሃ ይጠጣሉ?

ሀ) 1 ኩባያ

ለ) 1-3 ኩባያዎች

ሐ) 4-6 ኩባያዎች

መ) 7 ኩባያዎች ወይም ከዚያ በላይ

40. በየቀኑ የኪስ ገንዘብ አለዎት?

ሀ) አዎ

ለ) የለም

41. ምግብ ቤት ከትምህርት ቤት ምግብ ቤት ወይም ከትምህርት ቤት አከባቢ ይገዛሉ?

ሀ) አዎ

ለ) የለም

42. አዎ ከሆነ ምን ዓይነት?

ሀ) ሳንድዊቾች

ለ) የድንች ጥብስ

ሐ) ቸኮሌት

መ) ብስኩት

ሠ) ዶናት

ረ) ፒዛ

ሰ) ለውዝ

ሸ) አይስ ክሬም

ቀ) ፍራፍሬ

በ) ሌሎች (እባክዎን ያትሙ) _____

43. በአንተ /ባንቺ አስተያየት ጤናማ የአመጋገብ ስርአት የምትመገብ/ቢ ይመስልሃል/ይመስልሻል?

ሀ) አዎ

ለ) የለም

44. ቤተሰብዎ ወይም አሳዳጊዎ የጤንነትዎን ሁኔታ የሚወስዱ ይመስልዎታል ለምሳሌ. ክብደት?

ሀ) አዎ

ለ) የለም

ሐ) አላውቅም

45. አሁን ማንኛውንም ልዩ አመጋገብ እየተከተሉ ነው?

ሀ) አዎ

ለ) የለም

46. ክብደት ለመቀነስ ሞክረው ያውቃሉ?

ሀ) አዎ

ለ) የለም

47. ክብደት ለመጨመር ሞክረው ያውቃሉ?

ሀ) አዎ

ለ) የለም

48. ክብደቴን ለመለወጥ ስሞክር ወላጆ

ሀ) አበረታቱኝ

ለ) ተስፋ አስቆራጭ

ሐ) ግድ የላቸውም

49. ስለ አመጋገብ ጉዳዮች ሚዲያ ያነባሉ ወይም ይከተላሉ?

ሀ) አዎ

ለ) የለም

50. ያጨሳሉ (ሲጋራ / ሺሻ)?

ሀ) አዎ

ለ) የለም

51. ማንኛውንም የምግብ አይነት አሚልተህ/ሽ ተመግበህ/ተመግበሽ ማሚያ ታውቂያለሽ?

ሀ) አዎ

ለ) የለም

52. አዎ ከሆነ ፣ ምን ዓይነት ማሟያዎች?

ሀ) ብዙ ቫይታሚኖች

ለ) ብረት

ሐ) ቫይታሚን ሲ

መ) ዚንክ

ሠ) ካልሲየም

ረ) ሌሎች (እባክዎን ያትሙ)

53. በቤተሰብዎ / በቤትዎ ውስጥ ጥሩ ምግብ እየተሰጠዎት ነው ብለው ያስባሉ?

ሀ) አይ

ለ) አዎ

ሐ) አላውቅም

54. በአብዛኛው በቤት ውስጥ ምግብ እንዴት እንደሚመገቡ

ሀ) ከአባት እና ከእናት በኋላ

ለ) ከልጁ በኋላ በጉርምስና ዕድሜ ላይ

ሐ) ከአምስት ዓመት በታች ከሆኑ በኋላ

መ) ከወንድ ልጅ ጎረምሳ ጋር

ሠ) ከጎልማሳ የቤተሰብ አባላት ጋር

ረ) በማንኛውም ጊዜ

55. የወር አበባ መጀመር ጀመሩ?

ሀ) አዎ

ለ) የለም

56. በቤትዎ ውስጥ በቂ የውሃ ምንጮች አሉዎት?

ሀ) አይ

ለ) አዎ

ሐ) አላውቅም

57. በቤትዎ ውስጥ በቂ የመፀዳጃ ምንጮች አሉዎት?

ሀ) አይ

ለ) አዎ

ሐ) አላውቅም

58. በውሃ, በንፅህና እና በንፅህና አጠባበቅ ልምዶች ላይ ያለዎትን እውቀት ይገምግሙ

ሀ) ዝቅተኛ ነው

ለ) መጥፎ አይደለም

ሐ) ጥሩ ነው

መ) አላውቅም

ክፍል (ሐ)-አካላዊ እንቅስቃሴ ፣ ኑሮአችን

59. በመደበኛነት ቀደም ብለው ይተኛሉ?

ሀ) አዎ

ለ) የለም

60. በመደበኛነት ቀደም ብለው ይነሳሉ?

ሀ) አዎ

ለ) የለም

61. ከቤት ወደ ት/ቤት እና ከት/ቤት ወደ ቤት ስተንቀሳቀስ/ሽ የምትጠቀመው/የምትጠሚው የትራንስፖርት የትኛው ነው?

ሀ) መኪና

ለ) መራመድ

ሐ) የህዝብ ማመላለሻ

62. መጽሐፍ ፣ መጽሔት ወይም አስቂኝ በየቀኑ ያነባሉ?

ሀ) አዎ

ለ) የለም

63. አዎ ከሆነ ለማንበብ በቀን ስንት ሰዓት ያጠፋሉ?

ሀ) በቀን ከአንድ ሰዓት በታች

ለ) በቀን ከ 1 እስከ 2 ሰዓት

ሐ) በቀን ከ 2 ሰዓታት በላይ

64. ንባብ በምግብ ምርጫዎ ላይ ተጽዕኖ ያሳድራል ብለው ያስባሉ?

ሀ) አዎ

ለ) የለም

ሐ) አላውቅም

65. አዎ ከሆነ በማንበብ በምግብ ምርጫዎ ላይ ምን ያህል ተጽዕኖ ያሳድራል?

ሀ) ጠንካራ እና አስፈላጊ ተጽዕኖ

ለ) አማካይ ተጽዕኖ

ሐ) ተጽዕኖ የለውም

66. አዎ ከሆነ ከመጽሔት ርዕሶች ወይም ከማስታወቂያ ጋር የተዛመደ ተጽዕኖ ነው

ሀ) የምግብ ርዕሶች

ለ) ማስታወቂያዎች

ሐ) ሁለቱም

67. ቴሌቪዥን ወይም ቪዲዮ ለመመልከት በቀን ስንት ሰዓት ያጠፋሉ?

ሀ) የለም

ለ) በቀን ከአንድ ሰዓት በታች

ሐ) በቀን ከ 1 እስከ 2 ሰዓት

መ) በቀን ከ 2 ሰዓታት በላይ

68. የትኛውን ዓይነት የቴሌቪዥን ማስታወቂያ / ፕሮግራም ይፈልጋሉ? _____

ሀ) ምግብ እና መጠጥ

ለ) መዝናኛዎች [ሙዚቃ ፣ ድራማዎች ፣ ብሔራዊ ጂኦግራፊ]

ሐ) ስፖርት

መ) ሌላ ይግለጹ _____

69. የቴሌቪዥን ማስታወቂያ / ፕሮግራም በምግብ ባህሪዎች ላይ ተጽዕኖ አለው?

ሀ) አዎ

ለ) የለም

70. አዎ ከሆነ ይህ ተጽዕኖ እስከ ምን ድረስ ነው?

ሀ) ጠንካራ

ለ) መካከለኛ

ሐ) ምንም ውጤት የለም

71. ኮምፒተርን ወይም የሞባይል ጨዋታዎችን ወይም ማህበራዊ ሚዲያዎችን ለመጫወት በቀን ስንት ሰዓት ያጠፋሉ?

ሀ) የለም

ለ) በቀን ከ 1 እስከ 2 ሰዓት

ሐ) በቀን ከ 2 ሰዓታት በላይ

መ) በቀን ከአንድ ሰዓት በታች

72. በምግብ ዝግጅት ውስጥ ወይም በቤት ውስጥ ምግብ ማብሰል ላይ ተሳትህ/ተሳትፈሽ ተውቂያለሽ/ህ?

ለ) የለም

73. በመደበኛነት እንደ አካላዊ እንቅስቃሴ ፣ የትምህርት ቤት ስፖርት ክበብ ፣ ማጠብ ወይም ማጽዳት ፣ የቤት ውስጥ እንቅስቃሴዎችን መደገፍ ፣ በግብርና እንቅስቃሴዎች መደገፍ ፣ በእግር መሄድ ፣ በፈረስ ግልቢያ ፣ በግብይት ፣ በጠረጴዛ ቴኒስ ፣በመሳሰሉት ይሳተፋሉ?

ሀ) አዎ

ለ) የለም

74. አዎ ከሆነ በሳምንት ምን ያህል ጊዜ እነዚህን ተግባራት ያካሂዳሉ?

ሀ) ከ 1 ሰዓት በታች

ለ) ከ 1 እስከ 3

ሐ) ከ 3 እስከ 6 ሰዓታት

መ) ከ 6 ሰዓታት በላይ

75. በትምህርት ቤት እረፍት ላይ አብዛኛውን ጊዜ ምን ያደርጋሉ?

ሀ) መቀመጥ (ማውራት ፣ ማንበብ ወይም መመገብ)

ለ) ቆሞ ወይም ዙሪያውን መራመድ

ሐ) ሌሎች አካላዊ እንቅስቃሴዎችን መሮጥ ወይም ማከናወን

76. በበዓላት ወቅት ከትምህርት ቀናት ጋር በማነፃፀር ምን ያህል ንቁ ነዎት?

ሀ) ዝቅተኛ

ለ) እምብዛም

ሐ) የበለጠ ንቁ

77. በአጠቃላይ ሲናገሩ ጤናን ለመጠበቅ በቂ የአካል ብቃት እንቅስቃሴ ያካሂዳሉ ብለው ያስባሉ?

ሀ) አዎ

ለ) የለም

ሐ) እኔ ምንም ሀሳብ የለኝም

78. ከእድሜዎ እና ከጾታ አኩያህ/ሽ ጋር ሲነፃጸር ምን ያህል ንቁ ነህ/ሽ?

ሀ) ከአማካይ በታች

ለ) በአማካይ

ሐ) ከአማካይ በላይ

79. የጤና እና የተመጣጠነ ምግብ ክበብ እና ክፍለ ጊዜዎች በት / ቤትዎ ውስጥ ይገኛሉ ብለው ያስባሉ?

ሀ) አዎ

ለ) የለም

ሐ) እኔ ምንም ሀሳብ የለኝም

80. አዎ ከሆነ ፣ ይህ መድረክ በክብደትዎ እና በጤንነትዎ ላይ ተጽዕኖ የሚያሳድረው እንዴት ይስለዎታል?

ሀ) ጠንካራ እና አስፈላጊ ተጽዕኖ

ለ) አማካይ ተጽዕኖ

ሐ) ተጽዕኖ የለውም

81. በትምህርት ቤት የአካል ማጎልመሻ ትምህርት እንዲኖርዎት ይመርጣሉ?

ሀ) አዎ

ለ) የለም

ሐ) እኔ ምንም ሀሳብ የለኝም

82. በክብደትዎ እና በጤንነትዎ ላይ ተጽዕኖ የሚያሳድሩ ማን / ምን እንደሆኑ ለይተው ያውቃሉ?

ሀ) የአቻ ግፊት

ለ) ወላጆች / አሳዳጊዎች

ሐ) የትምህርት ቤት አካባቢ

መ) የቴሌቪዥን ማስታወቂያ

ሠ) በጤና እና በአመጋገብ ላይ ያለኝ ንባብ ወይም ግንዛቤ

ረ) አላውቅም

<u>ክፍል (መ): - የአመጋገብ ልዩነት ጥያቄዎች</u>

	የአመጋገብ ልዩነት መጠይቅ	የምግብ ቡድን	አዎ / የለም
83	ባለፉት 24 ሰዓቶች ውስጥ በስታርቺ ምድብ ውስጥ ካሉት ዝርዝሮች ውስጥ አንዱን ተመግበሃል/ተመገበሻል?	በቆሎ ፣ ሩዝ ፣ ስንዴ ፣ ማሽላ ፣ ወይም ሌላ ማንኛውም እህሎች ወይም ከእነዚህ (ለምሳሌ ዳቦ ፣ ገንፎ ወይም ሌሎች የእህል ውጤቶች) የተሰሩ የአከባቢ ምግቦችን ያስገቡ ። ገንፎ ወይም ሌላ የጥራጥሬ ምርቶች ነጭ ድንች ፣ ነጭ ያማ ፣ ነጭ ካሳቫ	
84	ባለፉት 24 ሰዓቶች ውስጥ ከአረንጓዴ ቅጠላማ አትክልቶች ምድብ ውስጥ አንዱንዝርዝር ተመግበሃል/ተመገበሻል?	ጥቁር አረንጓዴ ቅጠል ያላቸው አትክልቶች ፣ በአከባቢ የሚገኙ ቫይታሚን ኤ የበለፀጉ ቅጠሎችን ማለትም ፣ ካሳቫን ፣ ጎመን ፣	
85	ባለፉት 24 ሰዓቶች ውስጥ በሌሎች ቫይታሚን ኤ የበለጸጉ ፍራፍሬዎችና አትክልቶች ምድብ ውስጥ አንዱን ከተዘርዘሩትመካከል ተመግበሃል/ተመገበሻል?	በአገር ውስጥ በሚገኙ ሌሎች ቫይታሚን ኤ የበለፀጉ አትክልቶች (ለምሳሌ ቀይ ጣፋጭ ፔፐር) ብርቱካናማ የሆኑ ዱባ ፣ ካሮት ፣ ዱባ ወይም ስኳር ድንች	

86	ባለፉት 24 ሰዓቶች ውስጥ በሌሎች ፍራፍሬዎችና አትክልቶች ምድብ ውስጥ ካሉት ዝርዝር ውስጥ አንዱን ተመግበሃል/ተመገበሻል?	ሌሎች አትክልቶች (ለምሳሌ ቲማቲም ፣ ሽንኩርት ፣ ኤግፕላንት) ሌሎች በአገር ውስጥ የሚገኙ አትክልቶች ሌሎች ፍራፍሬዎች ፣ ከእነዚህ ውስጥ የዱር ፍራፍሬዎችን እና 100% የፍራፍሬ ጭማቂን ጠምሮ	
87	ባለፉት 24 ሰዓቶች ውስጥ በኦርጋን የሥጋ ምድብ ውስጥ ካሉት ዝርዝር ውስጥአንዱን	ጉበት ፣ ኩላሊት ፣ ልብ ወይም ሌላ የሰውነት አካል ሥጋ ወይም በደም ላይ የተመሰረቱ ምግቦች	
88	ባለፉት 24 ሰዓቶች ውስጥ በስጋ እና በአሳ ምድብ ውስጥ ካሉ ዝርዝሮች ውስጥ አንዱን ተመግበሃል/ተመገበሻል?	የበሬ ሥጋ ፣ የአሳማ ሥጋ ፣ የበግ ፣ ፍየል ፣ ዶሮ ፣ ዳክዬ ትኩስ ወይም ደረቅ ዓሳ ወይም	
89	ባለፉት 24 ሰዓቶች ውስጥ በእንቁላል ምድብ ውስጥ ካሉት ዝርዝሮች ውስጥ አንዱን	እንቁላል ከዶሮ ፣ ከዳክ ፣ ከጊኒ ወፍ ወይም ከሌላ ከማንኛውም እንቁላል	
90	ባለፉት 24 ሰዓቶች ውስጥ በጥራጥሬ ፣ በለውዝ እና በዘር ዘር ውስጥ ካሉ ዝርዝር ውስጥ አንዱን	የደረቁ ባቄላዎች ፣ የደረቁ አተር ፣ ምስር ፣ ለውዝ ፣ ዘሮች ወይም ከእነዚህ የተሠሩ ምግቦች (ለምሳሌ	
91	ባለፉት 24 ሰዓቶች ውስጥ ከወተት እና ከወተት ተዋጽኦዎች ምድብ ውስጥ አንዱን ዝርዝር	ወተት ፣ አይብ ፣ እርጎ ወይም ሌሎች የወተት ተዋጽኦዎች	

Annex 4: Statistical findings

Table 12: Characterstics, schoolgirls height for age status, in Akaki Kality subcity, Addis Ababa, 2020.

		Height for Age Status, # (%)			P value (CI)
Variables		Normal	Moderate stunting	Severe stunting	
Schoolgirls, parents' alive status	Both alive	287 (74.7%)	41 (10.7%)	2 (0.5%)	0.000 (0.000 - 0.008)
	Both died	4 (1.0%)	1 (0.3%)	0 (0.0%)	
	Father alive	10 (2.6%)	7 (1.8%)	0 (0.0%)	
	Mother alive	23 (5.99%)	7 (1.8%)	2 (0.5%)	
Schoolgirls, water source availability	No	39 (10.2%)	29 (7.6%)	4 (1.0%))	0.000 (0.000 - 0.008)
	Yes	285 (74.2%)	27 (7.0%)	0 (0.0%)	
Schoolgirls, latrine availability	No	92 (23.96%)	53 (13.8%)	4 (1.0%))	0.000 (0.000 - 0.008)
	Yes	232 (60.4%)	3 (0.8%)	0 (0.0%)	
Self-assessed, schoolgirls knowledge on good water, hygiene and sanitation practices	Poor	29 (7.6%)	56 (14.6%)	4 (1.0%))	0.000 (0.000 - 0.008)
	Good	119 (30.99%)	0 (0.0%)	0 (0.0%)	
	Not Bad	110 (28.6%)	0 (0.0%)	0 (0.0%)	
	I do not Know	66 (17.2%)	0 (0.0%)	0 (0.0%)	
Schoolgirls, parent occupation	No reliable job	74 (19.3%)	24 (6.3%)	1 (0.3%)	0.010 (0.000 - 0.021)
	Farmer	4 (1.0%)	1 (0.3%)	0 (0.0%)	
	Teacher	56 (14.6%)	5 (1.3%)	0 (0.0%)	
	Govt employee other than Teacher	111 (28.9%)	19 (4.9%)	1 (0.3%)	
	Private job including trade	76 (19.8%)	7 (1.8%)	2 (0.5%)	
	Driver	3 (0.8%)	0 (0.0%)	0 (0.0%)	
Schoolgirls, parent education	Illiterate	37 (9.6%)	4 (1.0%)	1 (0.3%)	0.016 (0.003 - 0.028)
	Read & Write	80 (20.8%)	26 (6.8%)	1 (0.3%)	
	Elementary School	14 (3.6%)	2 (0.5%)	0 (0.0%)	
	High School	153 (39.8%)	22 (5.7%)	2 (0.5%)	
	Vocation	7 (1.8%)	0 (0.0%)	0 (0.0%)	
	Higher Education	33 (8.6%)	2 (0.5%)	0 (0.0%)	
Schoolgirls, felt sharing food in school affect their meal size	No	53 (13.8%)	15 (3.9%)	2 (0.5%)	0.013 (0.002 - 0.024)
	Yes	271 (70.6%)	41 (10.7%)	2 (0.5%)	
Schoolgirls, often	No	207 (53.9%)	26 (6.8%)	1 (0.3%)	0.003 (0.000

feel hungry/day	Yes	117 (30.5%)	30 (7.8%)	3 (0.8%)	- 0.008)
Schoolgirls, mostly eat food per week	Injera with wot	293 (76.3%)	48 (12.5%)	1 (0.3%)	
	Fast food (outside home)	29 (7.6%)	8 (2.1%)	3 (0.8%)	
	Bread and other school foods	2 (0.5%)	0 (0.0%)	0 (0.0%)	0.013 (0.002 - 0.024)
Schoolgirls, kind of fizzy drinks often	None	147 (38.3%)	20 (5.2%)	1 (0.3%)	
	Full sugar	169 (44.0%)	33 (8.6%)	2 (0.5%)	0.034 (0.016 - 0.052)
	Diet drinks	8 (2.1%)	3 (0.8%)	1 (0.3%)	
Schoolgirls, perceived that they eat healthy food on regular base	No	57 (14.8%)	14 (3.6%)	3 (0.8%)	
	Yes	267 (69.5%)	42 (10.9%)	1 (0.3%)	0.010 (0.000 - 0.021)
Schoolgirls who smoke	No	322 (83.9%)	53 (13.8%)	4 (1.0%)	0.049 (0.028 - 0.071)
	Yes	2 (0.5%)	3 (0.8%)	0 (0.0%)	
Health and nutrition club are availability in schoolgirls school	No	244 (63.5%)	39 (10.2%)	1 (0.3%)	
	Yes	39 (10.2%)	3 (0.8%)	0 (0.0%)	
	I have no idea	41 (10.7%)	14 (3.6%)	3 (0.8%)	0.005 (0.000 - 0.012)
Schoolgirls, eat starchy staples foods in the last 24 Hrs	No	36 (9.4%)	13 (3.4%)	1 (0.3%)	
	Yes	288 (75%)	43 (11.2%)	3 (0.8%)	0.016 (0.003 - 0.028)
Schoolgirls, eat dark green leafy vegetables foods in the last 24 Hrs	No	155 (40.4%)	39 (10.2%)	0 (0.0%)	
	Yes	169 (44.0%)	17 (4.4%)	4 (1.0%)	0.049 (0.028 - 0.071)
Schoolgirls, eat milk and milk products foods in the last 24 Hrs	No	299 (77.9%)	55 (14.3%)	4 (1.0%)	
	Yes	25 (6.5%)	1 (0.3%)	0 (0.0%)	0.039 (0.020 - 0.058)

Source: The researcher original findings, 2020

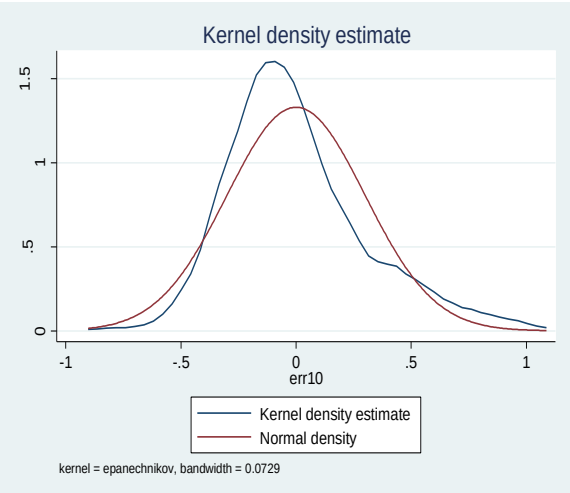
Table 13: Characterstics, schoolgirls BMI for Age Status, in Akaki Kality subcity, Addis Ababa, 2020.

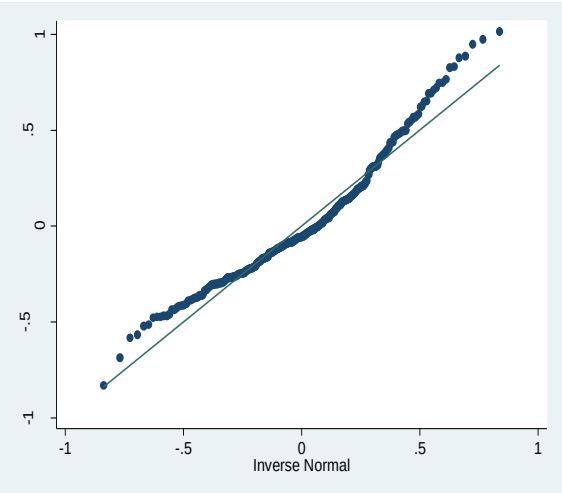
		BMI for Age Status, #(%)					P value (CI)
Variables		Normal	Moderate thinness	Severe thinness	Overweight	Obesity	
Schoolgirls, age category	10-14 years	73 (23.7%)	5 (14.7%)	1 (5%)	4 (20%)	0 (0%)	0.026 (0.010 - 0.042)
	15-19 years	235 (76.3%)	29 (85.3%)	19 (95%)	16 (80%)	2 (100%)	
Schoolgirls, commonly skip their regular meal	No	159 (41.4%)	16 (4.2%)	4 (1.0%)	7 (1.8%)	0 (0%)	0.005 (0.000 - 0.012)
	Yes	149 (38.8%)	18 (4.7%)	16 (4.2%)	13 (3.4%)	2 (0.5%)	
Schoolgirls, take breakfast before go to school	No	76 (19.8%)	13 (3.4%)	11 (2.9%)	6 (1.6%)	1 (0.3%)	0.013 (0.002 - 0.024)
	Yes	232 (60.4%)	21 (5.5%)	9 (2.3%)	14 (3.6%)	1 (0.3%)	
Schoolgirls, favorite snacks eat	None	204 (53.1%)	21 (5.5%)	11 (2.9%)	14 (3.6%)	0 (0%)	0.021 (0.007 - 0.035)
	Sandwiches (eggs, vegetable, meat, others)	4 (1.0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
	Potato crisp	23 (5.99%)	2 (0.5%)	1 (0.3%)	0 (0%)	0 (0%)	
	Sambusa	7 (1.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
	Biscuits	26 (6.8%)	5 (1.3%)	2 (0.5%)	3 (0.8%)	0 (0%)	
	Fruit	22 (5.7%)	2 (0.5%)	2 (0.5%)	2 (0.5%)	0 (0%)	
	Injera	22 (5.7%)	4 (1.0%)	4 (1.0%)	1 (0.3%)	2 (0.5%)	
Self-assessed, schoolgirls knowledge on health eating practices	Poor	0 (0%)	29 (7.6%)	18 (4.7%)	17 (4.3%)	2 (0.5%)	0.000 (0.000 - 0.008)
	Not Bad	156 (40.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
	Good	121 (31.5%)	3 (0.8%)	2 (0.5%)	3 (0.8%)	0 (0%)	
	I do not know	31 (8.%)	2 (0.5%)	0 (0%)	0 (0%)	0 (0%)	
Schoolgirls perceived being served feeding good in their family	No	0 (0%)	29 (7.6%)	18 (4.7%)	17 (4.4%)	2 (0.5%)	0.000 (0.000 - 0.008)
	Yes	279 (72.7%)	3 (0.8%)	1 (0.3%)	2 (0.5%)	0 (0%)	
	I do not Know	29 (7.6%)	2 (0.5%)	1 (0.3%)	1 (0.3%)	0 (0%)	
Schoolgirls, commonly get regular meal in their house	After father and mother	28 (7.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0.000 (0.000 - 0.008)
	After boy Adolescent	16 (4.2%)	1 (0.3%)	0 (0%)	0 (0%)	0 (0%)	
	After under five	224 (58.3%)	0 (0%)	1 (0.3%)	2 (0.5%)	0 (0%)	

	children						
	Together with boy adolescent	15 (3.9%)	2 (0.5%)	0 (0%)	0 (0%)	0 (0%)	
	Together with Adult family members	25 (6.5%)	31 (8.1%)	19 (4.9%)	18 (4.7%)	2 (0.5%)	
Schoolgirls, carbohydrate in last 7 days	None	23 (5.99%)	1 (0.3%)	4 (1.0%)	3 (0.8%)	0 (0%)	0.010 (0.000 - 0.021)
	1-2 times	27 (7.0%)	4 (1.0%)	2 (0.5%)	2 (0.5%)	1 (0.3%)	
	3-4 times	52 (13.5%)	7 (1.8%)	6 (1.6%)	3 (0.8%)	0 (0%)	
	5-6 times	86 (22.4%)	13 (3.3%)	6 (1.6%)	5 (1.3%)	0 (0%)	
	7 times	120 (31.3%)	9 (2.3%)	2 (0.5%)	7 (1.8%)	1 (0.3%)	
Schoolgirls, perceived their family take care of their weight status	No	188 (48.96%)	21 (5.5%)	10 (2.6%)	9 (2.3%)	0 (0%)	0.021 (0.007 - 0.035)
	Yes	120 (31.3%)	13 (3.4%)	10 (2.6%)	11 (2.9%)	2 (0.5%)	
Schoolgirls, ever tried losing weight	No	248 (64.6%)	26 (6.8%)	10 (2.6%)	10 (2.6%)	1 (0.3%)	0.000 (0.000 - 0.008)
	Yes	60 (15.6%)	8 (2.1%)	10 (2.6%)	10 (2.6%)	1 (0.3%)	
While schoolgirls change their weight, parent give	Encourage	102 (26.6%)	14 (3.6%)	10 (2.6%)	10 (2.6%)	2 (0.5%)	0.000 (0.000 - 0.008)
	Discourage	12 (3.1%)	1 (0.3%)	2 (0.5%)	0 (0%)	0 (0%)	
	Do not care	194 (50.5%)	19 (4.9%)	8 (2.1%)	10 (2.6%)	0 (0%)	

Source: The researcher original findings, 2020

kdensity err10, normal





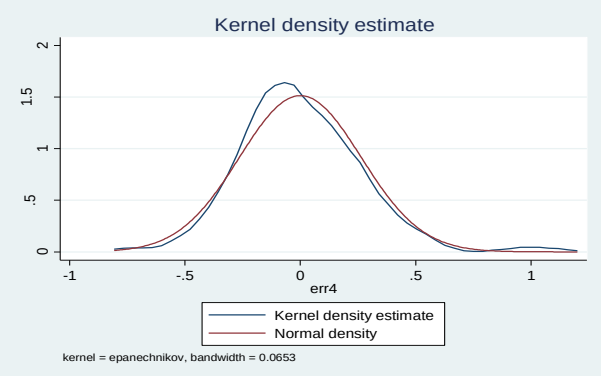
qnorm err10

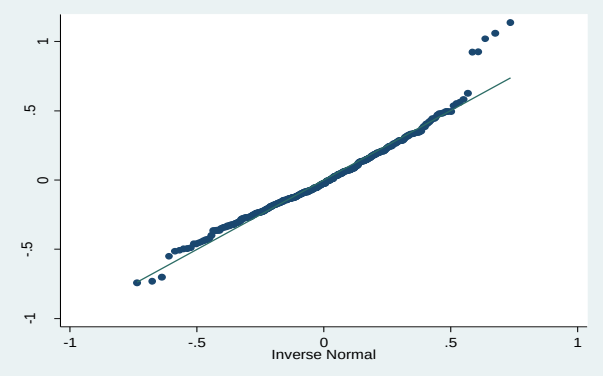
swilk err10

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
err10	384	0.95570	11.758	5.853	0.00000

Figure 9: Checking post estimation tests on eating behaviours, on adolescent girls, in Akaki Kality subcity, Addis Ababa, 2020





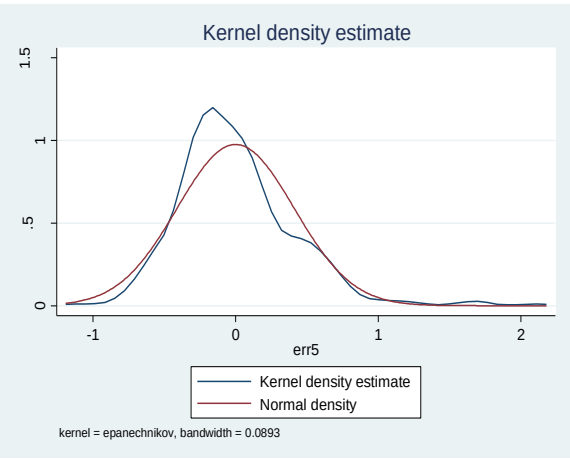
Shapiro-Wilk W test for normal data

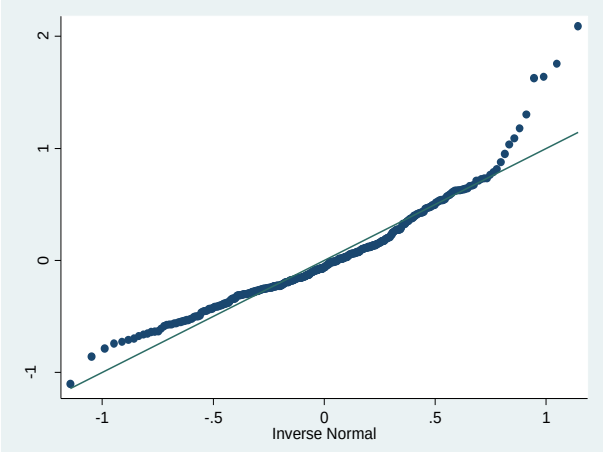
Variable	Obs	W	V	z	Prob>z
err4	384	0.97017	7.918	4.914	0.00000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of HAS

chi2(1) = 146.79
Prob > chi2 = 0.0000

Figure 10: Checking post estimation tests on Height for Age status, on adolescent girls, in Akaki Kality subcity, Addis Ababa, 2020





Shapiro-Wilk W test for normal data

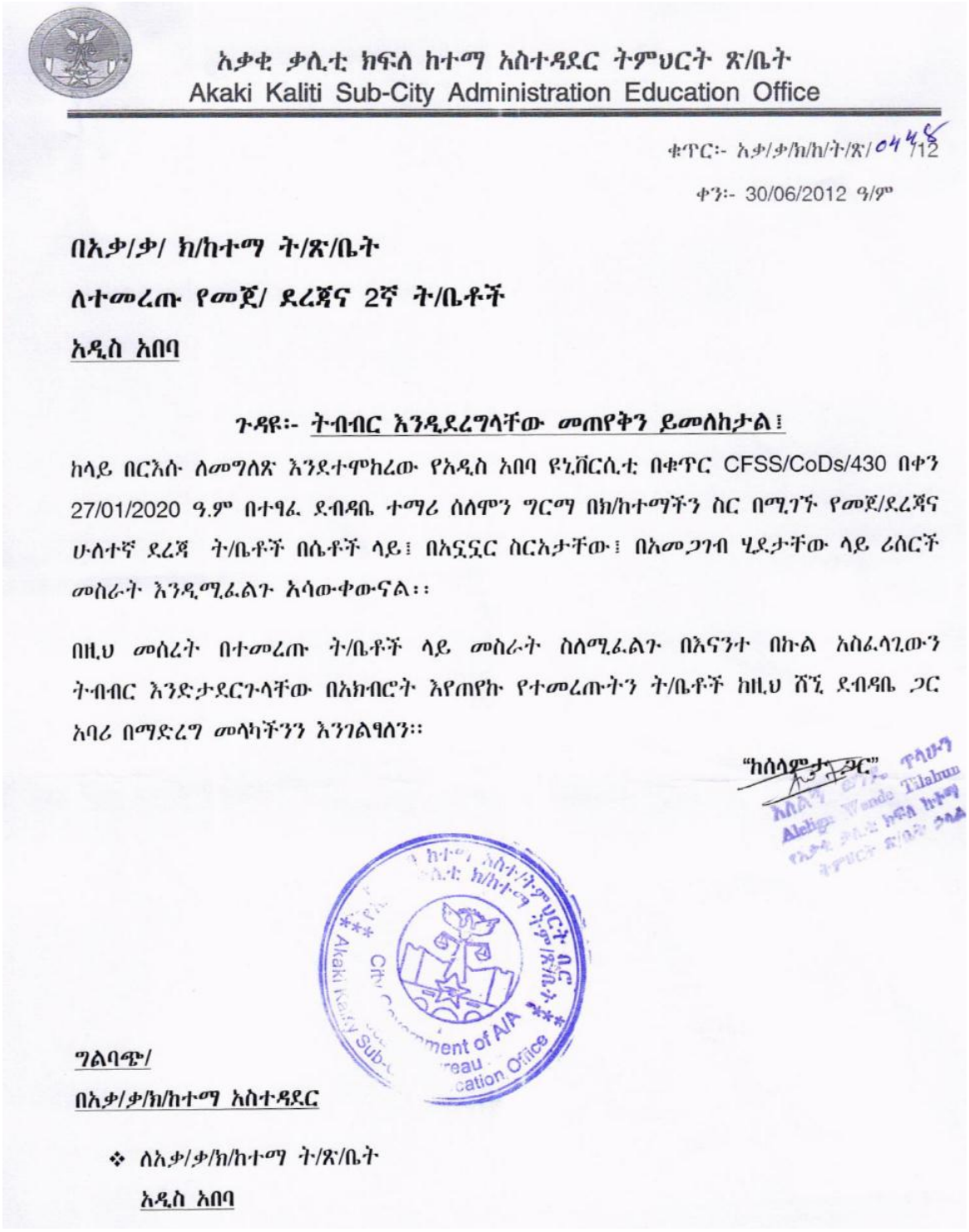
Variable	Obs	W	V	z	Prob>z
err5	384	0.94003	15.917	6.572	0.00000

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of BMIAS

chi2(1) = 69.25
Prob > chi2 = 0.0000

Figure 11: Checking post estimation tests on BMI for Age Status, on adolescent girls, in Akaki Kality subcity, Addis Ababa, 2020
Source: The researcher original findings, 2020

Annex 5: Akaki-Kality subcity administrative, education office supportive letter



አቃቂ ቃሊቲ ክፍለ ከተማ አስተዳደር ትምህርት ጽ/ቤት
Akaki Kaliti Sub-City Administration Education Office

ቁጥር፡- አቃ/ቃ/ክ/ከ/ት/ጽ/ 0446/12

ቀን፡- 30/06/2012 ዓ/ም

በአቃ/ቃ/ ክ/ከተማ ት/ጽ/ቤት

ለተመረጡ የመጀ/ ደረጃና 2ኛ ት/ቤቶች

አዲስ አበባ

ጉዳዩ፡- ትብብር እንዲደረግላቸው መጠየቅን ይመለከታል፤

ከላይ በርእሱ ለመግለጽ እንደተሞከረው የአዲስ አበባ ዩኒቨርሲቲ በቁጥር CFSS/CoDs/430 በቀን 27/01/2020 ዓ.ም በተፃፈ ደብዳቤ ተማሪ ሰለሞን ግርማ በክ/ከተማችን ስር በሚገኙ የመጀ/ደረጃና ሁለተኛ ደረጃ ት/ቤቶች በሴቶች ላይ፤ በአኗኗር ስርአታቸው፤ በአመጋገብ ሂደታቸው ላይ ሪሰርች መስራት እንዲሚፈልጉ አሳውቀውናል፡፡

በዚህ መሰረት በተመረጡ ት/ቤቶች ላይ መስራት ስለሚፈልጉ በእናንተ በኩል አስፈላጊውን ትብብር እንድታደርጉላቸው በአክብሮት እየጠየኩ የተመረጡትን ት/ቤቶች ከዚህ ሸኚ ደብዳቤ ጋር አባሪ በማድረግ መላካችንን እንገልፃለን፡፡

"ከሰላምታ ጋር"

ጥላሁን ወንዴ
Alelign Wende Tilahun

ግልባጭ/

በአቃ/ቃ/ክ/ከተማ አስተዳደር

- ለአቃ/ቃ/ክ/ከተማ ት/ጽ/ቤት
  አዲስ አበባ

ተ.ቁ	የት/ቤቱ ስም	የሚገኝበት ወረዳ
	የመጀ/ደረጃ ት/ቤት	
1	አቃቂ መንግስት	1
2	ኢትዮ ጃፓን	2
3	ሰላም ፍሬ	3
4	ቃሊቲ ቡልቡላ	5
5	ቂሊልጦ ቁ.1	9
6	ቀርሳ	11
	ሁለተኛ ደረጃ ት/ቤት	
1	ፊታ/አባ/ 2ኛ ደረጃና መሰናዶ	1
2	ኢትዮ ጃፓን 2ኛ ደረጃ	2
3	ገላን 2ኛ ደረጃ	4
4	ቡልቡላ 2ኛ ደረጃና መሰናዶ	6
5	ቃሊቲ 2ኛ ደረጃ	7
6	ደራርቱ ቱሉ መሰናዶ	8