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# Academic Performance and its Associated Factors Among Well Nourished and Under-Nourished Public-School Adolescents in Bahir Dar City, Northwest, Ethiopia,2022

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**BAHIR DAR UNIVERSITY**

**COLLEGE OF MEDICINE AND HEALTH SCIENCES**

**SCHOOL OF PUBLIC HEALTH**

**DEPARTMENT OF Nutrition and Dietetics**

# Academic Performance and its Associated Factors Among Well Nourished and Under-Nourished Public-School Adolescents in Bahir Dar City, Northwest, Ethiopia,2022

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**A THESIS SUBMITTED TO THE DEPARTMENT OF NUTRITION AND DIETETICS, SCHOOL OF PUBLIC HEALTH, COLLEGE OF MEDICINE AND HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH IN NUTRITION.**

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| **FULL TITLE OF THE RESEARCH** | ACADEMIC PERFORMANCE AND ITS ASSOCIATED FACTORS AMONG WELL-NOURISHED AND UNDER-NOURISHED PUBLIC-SCHOOL ADOLESCENTS IN BAHIR DAR CITY, NORTHWEST, ETHIOPIA, 2022 |
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## ABSTRACT

**Background:** Adolescence is an essential stage in the human life cycle, a transition period between childhood and adulthood. These age group are risk groups for malnutrition, but they are not part of a target in many interventions' strategies. According to the World Bank report, academic performance of students of Sub-Saharan African countries is less than half of what is expected for their age. In Ethiopian the repetition rate in primary and secondary education is 6.9% and 8.2% respectively. Improved nutrition is believed to have the potential to positively influence students' academic performance and behavior. Therefore, this study aimed to determine the association between nutritional status and academic performance.

**Objective:** The objective of this study was to assess academic performance and its associated factors among well-nourished and under-nourished public-school adolescents in Bahir Dar city, Northwest, Ethiopia, 2021.

**Methods:** An institution-based comparative cross- sectional study was conducted on 976 adolescents from September 20,2021- October 20,2021 among public-school adolescents in Bahir Dar city, Northwest Ethiopia. Multistage sampling technique was used to select the study participants. Nutritional status was measured using body mass index for age using weight and height. The academic performance was measured using the mean mark score of two consecutive semesters' results of all subjects. Structured questionnaire was used to collect the data. Data was entered into Epi-data and then analyzed by Antro plus software and SPSS software Version 23, Descriptive statistics was used to present the data, Binary logistic regression and multivariable analysis was also done. Statistical association of variables was declared at p-value < 0.05.

**Results**: The comparison of magnitude of poor academic performance among well-nourished and under-nourished were calculated separately. The magnitude of poor academic performance was higher among under-nourished students 24%, (95% CI:19.9,27.3) than well-nourished students,12.5%, (95% CI:9.5,15.4). Having a mother who can't read and write (AOR=4.0,95%CI:1.50,11.0), living in large family (AOR=2.0,95%CI:1.2,3.3), having scarce textbook (AOR=8.2,95%CI:5.1,14.6), poor dietary diversity score (AOR=1.9,95%CI:1.1,3.1). Using internet (AOR=1.98,95%CI:1.1,3.59) were significantly associated with poor academic performance among under-nourished adolescent students. While facing scarce textbook (AOR = 10, 95% CI: (5.6,19.4), meal skipping (AOR = 3.5, 95% CI: 1.8-7.0) were found to have

significant association with poor academic performance among well-nourished adolescent students.

**Conclusion and Recommendation:** The magnitude of poor academic performance was higher among under-nourished groups than well-nourished groups. Predictor variables, which had significant association with poor academic performance were identified. It is recommended to design interventions targeted at improving adolescents' nutritional status which is base for academic achievement.

## LIST OF ACRONYMS

AOR…….Adjusted Odds Ratio

BAZ…….Body Mass Index for Age

BMI……..…... Body Mass Index

CI…….... Confidence Interval

COR…….Crude Odds Ratio

DDS……. Dietary Diversity Score

DHS……. Demographic Health Survey

E.C ……...Ethiopian Calendar

GER……..Gross Enrolment Rate

GPA……..…Grade Point Average

HAZ……. Height for Age Z Score

NER……..Net Enrolment Rate

SD…….Standard Deviation

SDG……. ……Sustainable Development Goal

SPSS…….Statistical Package for Social Science

VIF……Variance Inflation Factor

WAZ…….Weight for Age Z Score

WHO……World Health Organization?

WHZ……Weight for Height z Score

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# 1 INTRODUCTION

## 1.1 Background of the study

Academic achievement is important for the successful development of young people in society. Students who do well in school are better able to make the transition into adulthood and to achieve occupational and economic success and help them to tackle the technologically demanding occupations of the future(1). Academic performance is educational learning and achievement in schools, colleges and universities to get certain score, promotion to next level(2). Students are most essential asset for any educational institute thus social and economic development of the country is directly linked with student academic performance(3), but there are several factors that affects students' academic achievements such as socio-economic, demographic, behavioral (4).

Adolescence is critical period of development which represents the age of 10–19 years, it is a tap root growth and development life stage which has implications for future nutritional status. These population comprises one-sixth of the world' s population; of which over 90% live in Sub-Saharan Africa and South and Southeast Asia(5). In Ethiopia, it is estimated that around 43million (41%) of the total population is under the age of 15. More than 28 percent is aged 15 to 29. These youthful populations of Ethiopia is an incredible asset and untapped resource for positive growth.(6).

Since nutritional status is the state of balance between nutrient intake and requirement. This critical period of growth and development needs an increased nutritional requirements due to the fact that it's an opportunity for catch-up growth following childhood deficits(7).

Students with insufficient diets are reported to have more problems with health, academic learning, and psychosocial behavior(8). If there is an imbalance between intake and requirement it will results in an over nutrition or under nutrition. Which both nutritional problems can have long lasting consequences on an adolescent's physical development (9).

## 1.2 Statement of the problem

According to the World Bank report, academic performance of students of Sub-Saharan African countries is less than half of what is expected for their age(9). Ethiopia is among the countries where adolescent students' academic achievement is unacceptably low(10).

Central Asia, Eastern and Western Europe and North America display repetition rates that vary between 1% and 2% on the other hand Sub-Saharan Africa shows highest repetition rate (around 20%)(11). While increased GER in Ethiopia is an indicator of success in enrolment, the repetition rate in primary and secondary education is 6.9%and 8.2% respectively(12).

Parallel to the high increment in enrollment and high dropout rate, concerns on the quality of primary education have been raised(13). Ethiopia's learning outcomes are low, 4$^{th}$ grade and 8$^{th}$ grade students tested in 2015 at the proficiency level defined as "Below Basic" in all subjects meaning that the student has minimal understanding of the subject and lacks the skills to solve simple problems appropriate for that grade level(14). Undernourished adolescents have lowered resistance to infection; they are more likely vulnerable to common diseases like diarrheal diseases and respiratory infections(15). A study done in Mali shows significant decline in academic performance and in school attendance with increasing intensity of infection. absenteeism was the main factor explaining the variation in academic performance, although a significant effect of infection remained.

Despite the fact that Ethiopia has made remarkable progress in expanding access to education over the past two decades, dropout rates are high, and the enrolment rate in upper-secondary school is still in single digits due to different reasons(12).

Adolescent undernutrition remains one of the most important public health problems in Ethiopia. Almost a quarter of Ethiopian adolescents were affected by stunting and underweight(16). Recently, researchers discovered 1/3 of surveyed adolescents actually reported poor food habits and lower school achievements (17).

The human and economic consequences of student's undernutrition are profound. In the short term, a greater risk of death, illness. In the longer term, lower skill development and a greater chance of being poor in adulthood. Then add that to the impact on society with malnutrition costing countries billions of dollars every year in lost productivity and holding back economic development, which affects everyone. Youth unemployment is estimated at nearly 27 percent. One reason for the high youth unemployment rate is low literacy (68 percent).

Ethiopia's secondary school gross enrollment rate is 39.8 percent far too inadequate for a country with Ethiopia's natural resources, economic potential and global ambition(18).

The prevalence of thinness in adolescent students is 26.1% in recent study done in northern Ethiopia. The link between nutrition and educational performance might become strong in countries like Ethiopia where poor nutrition is prominent. Education is a crucial pathway to eradicate poverty and achieve economic development in Ethiopia. Then comparing the performance of adolescents with the base of their nutritional status might help to assess the link between nutrition and educational performance since adolescence is last chance for beating the consequences of malnutrition and breaking the intergenerational cycle of malnutrition and poor health. The effects of malnutrition are not being motivated to study, absenteeism, and lack of focus, followed by behavior effects, inattentive, refusal, and getting angry(19).

There is no enough study conducted on the adolescent age (crucial period) groups which is seeming neglected by different sectors. Therefore, this study attempts to measure the link between undernutrition and academic performance among adolescents and will try to show the burden of malnutrition on students' academic performance. Understanding the potential association between nutritional status and academic achievement may help in the development of effective interventions to improve adolescent students' nutritional status and academic performance.

### 1.3 Significance of the Study

This study may show the magnitude of academic performance and its associated factors of adolescence in the study area and help to take possible actions. In addition, it may show the contributing factors for having impaired academic performance during adolescent age. If the association and the gap are not identified regarding nutritional status and academic performance, it will cost a nation a lot which in return affects the growth of the country.

Policy makers and planners may use the findings of this study to allocate appropriate resources for the intervention under the recommendation. By far this study benefits the zonal and regional education and health office policy makers and planners to intend appropriate interventions in order to deal with the impact of poor academic performance of school adolescents.

It can be used as a baseline for further studies including systematic reviews on this topic and may add its own inputs for the scientific world.

# 2 LITERATURE REVIEW

Academic performance in school adolescents is very important for the future the development of one's country in different aspect which is affected by several factors such as, meal pattern, sociodemographic and economic conditions and parental education and support and behavioral characteristics of a student. This literature review is done to assess the current nutritional status, academic achievement and factors associated with academic performance.

## 2.1 Overview of adolescent nutritional status

A meta-analysis study done in London 2017 revealed that the mean BMI estimates for youths aged 10–19 in Southeast Asia, East Africa, West Africa, and Central Africa were <20 for both male and female adolescents. The lowest BMIs were seen in Ethiopia, Niger, Senegal, India, Bangladesh, Myanmar, and Cambodia(20). In 2016 a study in India showed that the overall prevalence of stunting, thinness and being overweight were 53.57%, 48.75% and 4.64%, respectively(21). From the global DHS data collected in 2018 the three countries with the highest prevalence of thinness in boys are Namibia (22%), Senegal (25%), and Ethiopia (28%)(22). In a study conducted in northern Ethiopia prevalence of adolescents were 26.1%.

A multilevel analysis of Ethiopian Demographic and Health Survey (2016) revealed that Six in ten adolescent boys in Ethiopia are thin, The magnitude of thinness among adolescent boys was found to be 58.5% (95% CI; 56.6, 60.3) which shows despite the high prevalence, adolescent undernutrition in low and middle countries lacks the attention it deserves.

The anthropometric assessment of the study participants in Debretabor town 2018 showed that the overall prevalence of any form of malnutrition was 56.14%. Out of this, 88 (22%) were stunted, 34 (32.4%) wasted, 97 (24.3%) underweight and 5 (1.3%) overweight(23).

## 2.2 Factors associated with academic performance

### 2.2.1 Socio-demographic factors with academic performance

A study done in Indonesia on the impact of sociodemographic factors on academic achievements among high school students showed that Female students scored significantly better than male students in mathematics and reading(24). But differently from the study done in Debre-tabor primary school children, the mean academic performance for primary school children for male is greater than that of females, and a study done in Ethiopia Wolayta-sodo also showed being a girl student decreased academic performance,(23, 25). As the student factor, School distance has negative effect on student academic achievement.

Students who spend more than thirty minutes from home to school adversely affect academic achievement, kindergarten attendance experience has also significant effect on reading and math scores. Another factor which is considered to have a positive impact on student academic achievement is use of student textbook(24).

From the study done in Ethiopia, Wolayta-Sodo students living condition with their parents has significantly lowered the academic performance of students when compared with students whose parents are in marital union(25). Regarding factors, the study of Debremarkos revealed that age and monthly income were significant factors for academic performance among primary school children(26). The performance of highly educated parents' children was found good as compared to less educated parents(27). A study done in Lalibela revealed that Children who have mothers with secondary and above educational status had more than two times higher average semester score than children with illiterate mothers(28).

Parents' occupation has a significant impact on the academic performance of their children in their studies. Most children from parents with more professional and lucrative jobs perform better than children whose parents have poorly paid jobs the other factor that had shown significant association were Parents' income level has a significant effect on the academic performance of their children, wealthy parents tend to produce children with better academic performance than poor parents(29). Another study conducted in Nigeria on influence of family size and students' academic performance, small family size has been linked with higher academic achievement(30).

### 2.2.2 Nutritional status and Academic performance

A systematic review done in 2017 found regular breakfast consumption, higher consumption of fruit, vegetables, and lower consumption of junk foods, were all associated with higher academic achievement(31).

The study conducted in Debre tabor revealed that there was a statistically significant positive relationship between academic achievement and the HAZ of the study participants (24)Also, from a study done in Dessie on school aged children only BMI for age Z score (BAZ) had no statistically significant association with average semester result(32). A study done in Debremarkos revealed that students those nutritional status had stunted were 79% less likely to score high academic performance as compared with normal. Students whose nutritional status had under-weight were 37% less likely to score high academic performance compared with their counterparts(26).

A cross sectional study done in western Ethiopia Nekemt revealed that Being underweight affected the students' academic performance. Those students who Skip breakfast, stunted and underweight were less likely to have good academic performance(33).

A study done in Goba Ethiopia in 2016 revealed that variables including residence, maternal education, paternal education, diet diversity, meal frequency, breakfast habit, iodized salt consumption, sex of the child, occupation, attendance of preschool program and family size were not significantly associated with academic performance(34). In different study, study participants who ate breakfast sometimes perform poorly when compared with those ate always(23).

### 2.2.3 Behavioral factors and academic performance

A cross-sectional study done on Pakistan undergraduate students showed there is a significant positive impact of attendance on academic performance(35). A journal publication done from Kenya mentioned that absenteeism can lead to depression and also result in poor quality of education as a result of time lost while being away from school. It could also lead to moral degradation that leads to drug abuse, early pregnancies and unruly behavior (36). A study done in Scotland also supports the previous findings show absences are negatively associated with academic achievement(37).

A study done on Iceland adolescent's internet use and academic achievement in 2015 shows that there was a negative correlation between average time spent online and how well students felt they did at school compared with others(38). Another study contradicts the previous one which is internet usage are found to be helpful to achieve the high academic performance for the students(39). A study done in Ethiopia showed that 71.9% of adolescents who spend their time on the internet for social media purposes performed below the mean academic score(25).

### 2.2.4 Student's characteristics and academic performance

Age of the child and absenteeism were variables that have a statistically significant negative association on the other hand being the head of the house, and attending preschool have a statistically significant positive association with educational achievement in the study done in Debretabor(23).

### 2.2.5 Dietary diversity, meal skipping habit and academic performance

Students who reported higher academic performance were more likely to consume milk and vegetable and fruits daily, from a study done in Canada (40) A study done in southern

Ethiopia showed that 83.2% of the participants with a dietary diversity of more than four performed below the mean academic score(25). As far as my search there is less evidence on the effect of dietary diversity on academic performance of students. A systematic review done on college Students in Australia on associations between Dietary Intake and Academic Achievement, showed that one of the factors that had association with academic performance were meal skipping(31). Breakfast is suggested as part of a balanced diet because eating breakfast linked with the healthier macro and micronutrient intakes, BMI, and lifestyle(41).A cross sectional study conducted in southern Ethiopia also shown that habit of skipping breakfast affected the cognitive performance of early adolescents(41). A study done in Nekemte revealed also that Skipping breakfast was associated with poor academic performance in the present study. Children who didn't skip their breakfast were 2 times more likely to have good academic score(33).

## 3. CONCEPTUAL FRAME-WORK

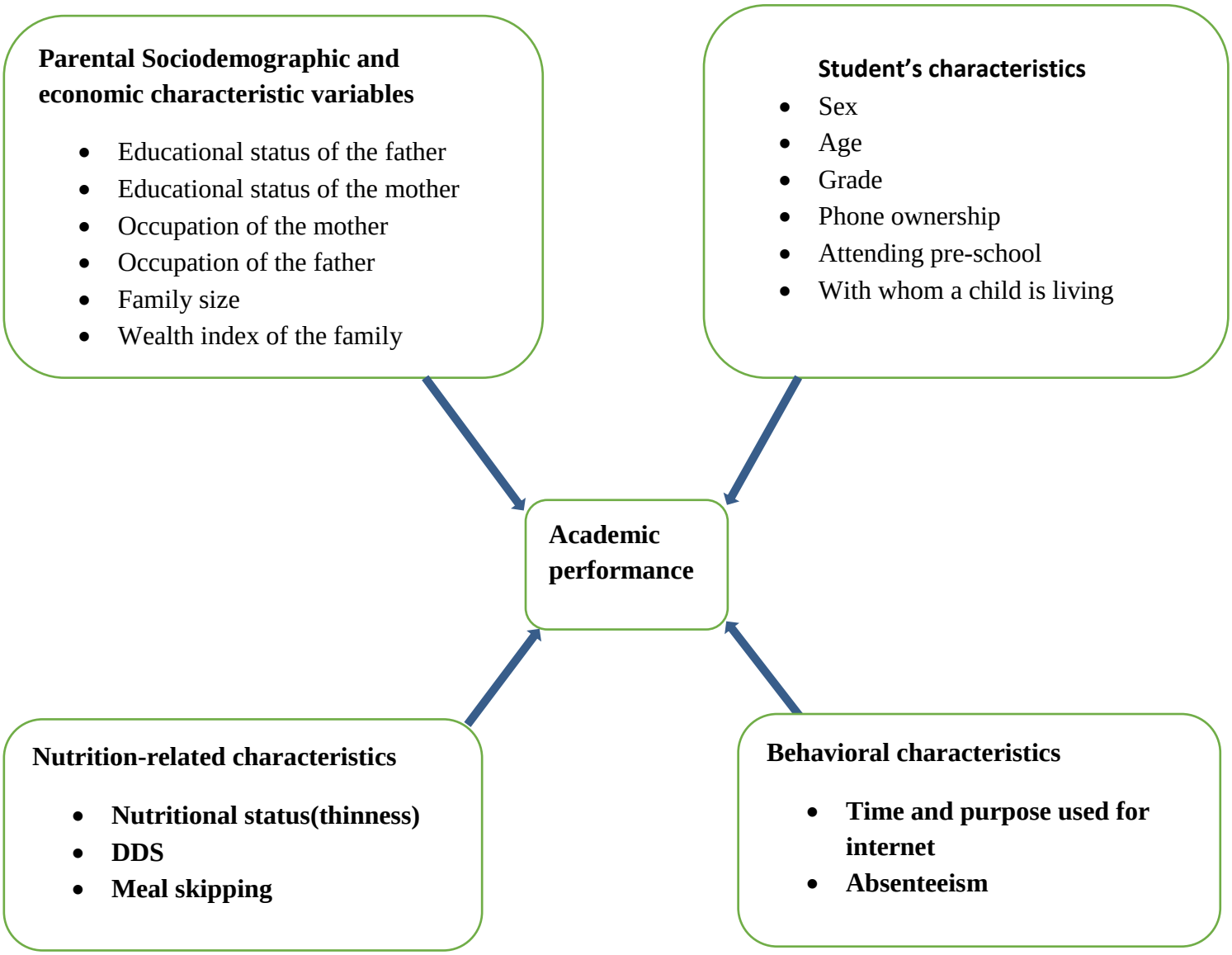


**Figure 1: Conceptual framework for academic performance and its association with nutritional and other variables**

# 4. OBJECTIVES

## 4.1 General objective

- To assess academic performance and its associated factors among well-nourished and under-nourished public-school adolescents in Bahir Dar city Northwest Ethiopia, 2021.

## 4.2 Specific objectives

- To compare the academic performance of under-nourished adolescents with well-nourished adolescents in public-school of Bahir Dar city Northwest Ethiopia,2021
- To identify Factors associated with academic performance among well-nourished public-school adolescents in Bahir Dar city Northwest Ethiopia, 2021.
- To identify Factors associated with academic performance among under-nourished public-school adolescents in Bahir Dar city Northwest Ethiopia, 2021.

# 5. METHODS

## 5.1 Study design and period

An institution based comparative cross-sectional study was conducted from September 20,2021-October 20,2021 among well-nourished and under nourished public-school adolescents in Bahir Dar city, Northwest Ethiopia, 2021.

## 5.2 Study area

This study was conducted in Bahir Dar city which is the third largest city in Ethiopia, after Addis Ababa and Dire Dawa, and has estimated population 170,000. It is the central city of the Amhara region located 565 Km Northwest Addis Ababa (the capital city of Ethiopia). (Ethiopian Worldometer 2021, Institute of land administration).

As information obtained from Bahir Dar Education and Administration Bureau there are about 43 primary, secondary and preparatory schools from these 17 are public schools (29,531 adolescent students) and 26 are private schools (8891adolescent students).

## 5.3 Source population

The source population of the study was all adolescent students who attend public school in Bahir Dar city.

## 5.4 Study population

The study population were all adolescent students who attend in the selected public schools in Bahir Dar city.

## 5.5 Study unit

Selected adolescents from selected public schools in Bahir Dar city during the data collection period were the study subjects.

## 5.6 Inclusion and Exclusion criteria

### 5.6.1 Inclusion criteria

School adolescents age between 11-19 years and who attend regular program in selected schools in 2020/2021 academic year was included and those who has both semesters grade.

### 5.6.2 Exclusion criteria

Adolescents who were transferred-in from other schools in the academic year 2020/2021 (new students), Adolescent's students with special education needs.

## 5.7 Study Variables

### 5.7.1 Dependent variable:

- Academic performance (Poor/Good academic performance)

### 5.7.2 Independent variables:

- Socio-economic and demographic variables (age, religion, educational status of the mother, occupation of the mother, father's educational status, father's occupation, and wealth index of the family, living with parents)
- Dietary diversity, Meal kipping(breakfast)
- Nutritional status
- Behavioral characteristics (internet using, absenteeism, breakfast skipping habit.)

## 5.8 Operational Definitions of Terms

**Academic performance** is the measurement of student achievement across various academic subjects(42).

**Good academic performance:** average grade point of the two semesters >=50(42).

**Absenteeism:** Absenteeism in school is the habit of staying away from school without providing a genuine or any reason for not attending classes(36) a student who is absent for 10% of the academic calendar year will be considered as absent(43).

**Internet use for social media:** >=3 hour per day for social media purpose in week (44).

**Well-nourished adolescents** = adolescent students with BMI for age z score ≥-2 SD and <+1SD.(WHO)

**Under-nourished adolescents** = adolescent students with BMI for age z score<-2 SD(WHO)

**Large family size** = a family who has >5 members (45).

**Dietary diversity score =** dietary diversity is dietary assessment which is defined as the number of different foods or food groups consumed in the previous day and measured by dietary diversity score. 10 number of food groups. (FAO,2018).

**Poor dietary diversity score** <5 food groups.

**Breakfast skippier=** a student who rarely having breakfast (never and 1-3 times per week) and frequently having breakfast (4 -7 times per week) (46)

**Textbook scarcity=** a student who doesn't have all their required exercise books for their grade level at hand(47).

### 5.9 Sample size determination

The sample size of the study was determined using nutritional status as a factor those are significantly associated with the outcome variables were considered with confidence level of 95%, power of 80%, and ratio one to one and using open Epi info software program. The possible calculated sample size is shown in the following table and adds an additional 10% contingency for non-response and design effect 1.5. By taking the larger sample size the final sample size was 976, since the ratio is one to one 488 sample will be used in each group.

**Table 1:Sample size determination for academic performance and associated factors among well-nourished and under-nourished public-school adolescents in Bahir Dar city 2021.**

| Variables | %Of outcome exposed (p1) | %Of outcome unexposed (p1) | OR | CL | Ratio | Power | 10% non-respondent | Desig n effect | Finally sample size | Reference |
|---|---|---|---|---|---|---|---|---|---|---|
| Underweight | 53.0 | 36.7 | 0.57 | 95% | 1:1 | 80% | 31 | 1.5 | 524 | (33)(nekemte) |
| Stunting | 53.2 | 41.4 | 0.66 | 95% | 1:1 | 80% | 88 | 1.5 | 976 | (33) |

P1= % of poor academic performance among under-nourished.

P2= % of poor academic performance among well-nourished.

### 5.10 Sampling technique

A multistage sampling technique was used to select the study participants for this study. There are a total of seventeen public schools which holds 29,531 adolescents, among these, 5 schools were selected randomly as a primary sampling unit, of these 30% of classes from each school were selected by simple random method as a secondary sampling unit then lists of all students from selected classes were obtained from the school register and pre-nutritional assessment were done then well-nourished and undernourished students were identified and students neither of the two nutritional status were excluded from the list. Systematic sampling technique were applied on each group based on the list to find the last study subjects.

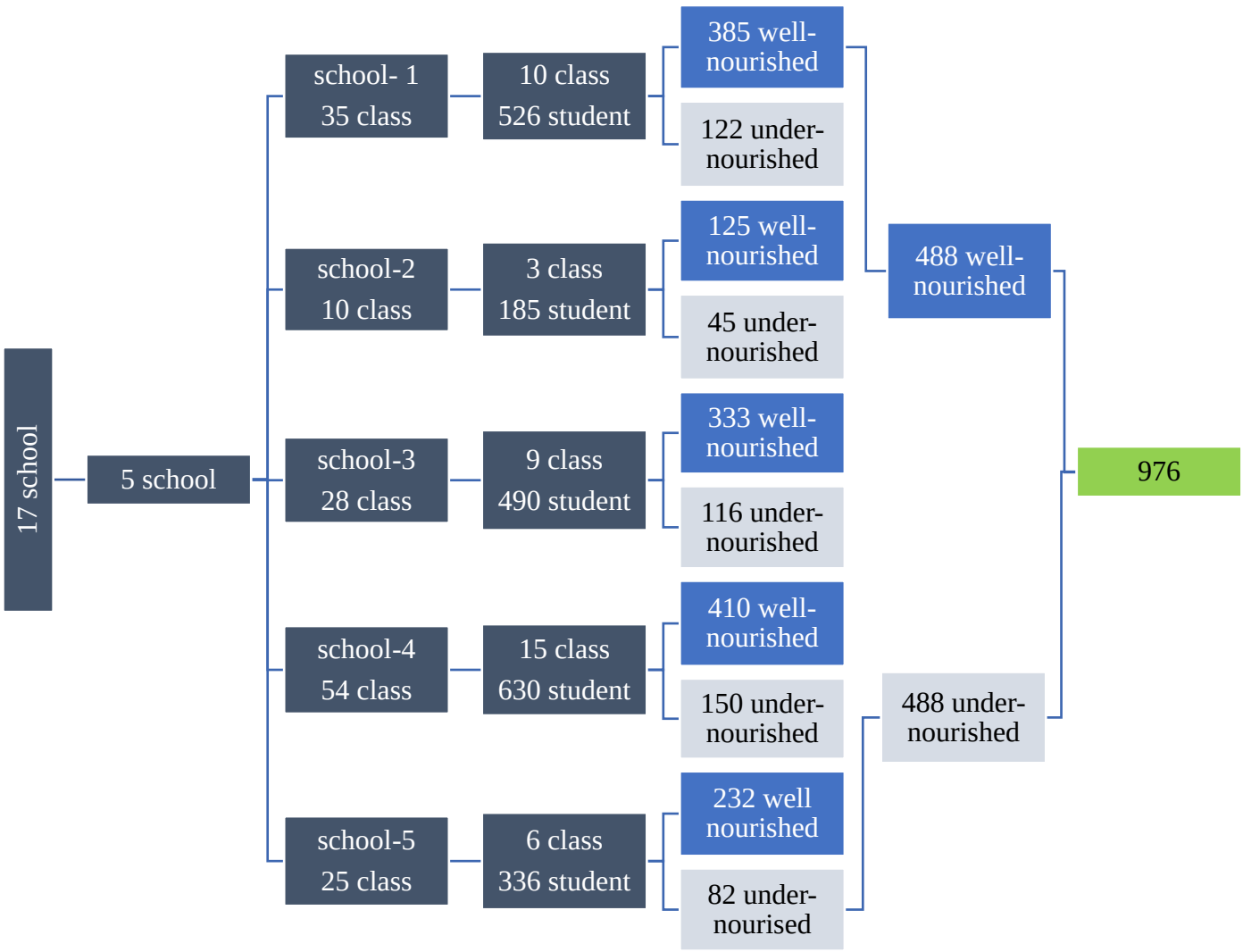


**Figure 2:Sampling technique procedure for selecting study participants.**

### 5.11 Data collection tools and procedures

Questionnaires was prepared by reviewing different literatures and for dietary diversity by using food and agriculture organization guideline. Data was collected by self-administered structured questionnaire to assess the student's parental sociodemographic and economic status other behavioral factors. The nutritional status was assessed using anthropometric measurement indices of the WHO standard reference 2007. Dietary diversity was determined by using the Dietary Diversity Score (DDS). 24-hour recall of adolescents' consumption of foods was used to collect information on the dietary diversity. Foods was categorized into 10 groups based on FAO recommendations. The response categories were taken as "Yes" if at least one food item in the group is consumed and "No" when a food item in the group is not consumed.

During anthropometric measurement weight was measured to the nearest 0.1kg using calibrated digital weight scales in standing position with light cloths and bare foot. Height was measured to the nearest 0.1cm using height measuring meter in standing position. Trained data collector was measuring the anthropometric measurements. The students' academic result from which the average grade point of two consecutive semesters was taken from school registrar. Two BSc nurse supervisors and 6 graduate nurses as a data collector were recruited.

All subjects taken by students were given in the academic year 2021, were considered to determine the academic performance of students. Annual average score was calculated by taking the result of two consecutive semesters of the academic year. To differentiate academic performance among nutritional status on educational performance, average marks of the overall subjects the students took were divided into two categories, poor score and good score, based on a cut-off mark of 50%. This cut off point was determined by considering the pass mark set by federal ministry of education of the country.

### 5.12 Data quality assurance and managements

Training for data collectors and supervisors was prepared and given by the principal investigators two days prior to the beginning of data collection. Trained data collectors and supervisors under the supervision of the principal investigator was recruited to collect data and supervise the data collection process respectively. The principal investigators had regular onsite supervision of supervisors and data collectors. The collected data was checked for its

completeness during data collection. The questionnaires were initially prepared in English language and translated in to Amharic (local language) and again it retranslated back to English language to ensure consistencies. During anthropometric measurement Periodic calibration of the instruments was made by placing standard calibration on the scale. During the data collection process communication was taken immediately before proceeding the next day data collection for any mistakes made. A pre-test was done on 5% of the school adolescents in non-selected public school. During pretesting, the questionnaire was checked for its clarity, simplicity, understandability, completeness, consistency and coherency.

### 5.13 Data processing and Analysis

Data was checked for its completeness, missing values and errors in coding and entering by the principal investigators in to EPI data version 3.1 and exported to SPSS version 23 for analysis. Anthropometric data was imported into Antro-plus and exported to SPSS version 23, A descriptive analysis was conducted to get summary data on frequencies, means and standard deviations of the students and their parental socio-demographic and economic characteristic variables. Principal Component Analyses and Factor Analyses were done for wealth index. Binary logistic regression and multivariable logistic regression analysis was used. Chi square test were done to determine whether a difference appear among well-nourished and malnourished adolescents regarding academic performance. Hosmer and lemshow-goodness of fit were done to check model fitness. Variables were checked for multicollinearity (VIF)and all were below 10. Variables with a p-value of less than 0.25 in the binary logistic regression analysis were candidate variables for multiple logistic regression analysis. Variables with the p-value <0.05 in the multivariable logistic regression analysis was considered as having statistically significant association with the dependent variable.

### 5.14 Ethical considerations

Ethical approval was obtained from Bahir Dar university, Ethical Review Board. after permission was obtained from school administration in Bahir Dar city, it was given to the selected schools. parental consent was obtained. After the written consent was obtained from parents of study subjects, assent was obtained by explaining the purpose and the importance of the study to the study subjects with standard assurance of confidentiality.

### 5.14 Dissemination of findings

The result of this study is submitted and disseminated to Bahir Dar University, school of Public Health Department of Nutrition and Dietetics. It will be also disseminated to the

Regional Education office of Bahir Dar city and other stakeholders. Further effort will be made for publication on journals.

# 6 RESULTS

## 6.1 Socio demographic characteristics of adolescents and their parents'

A total of 942 adolescent students were recruited in the study, with a response rate of 96.5%. Half of the adolescent students were well-nourished and the other half (471) were under-nourished. From well-nourished adolescents, nearly 2/5$^{th}$ (39.3%) were early adolescents while 286 (60.7%) were late adolescents. Among under-nourished groups, 142(30.1%) were early adolescents. Mean age of undernourished adolescents is 15.7 years (±9 months). In both comparative groups female students took the greater number; around 70% from well-nourished adolescents and 55% from under-nourished participants. Majority of study participants from both well-nourished (82.5%) and under-nourished (78.6%) groups were followers of orthodox Christianity and. In under-nourished adolescents, student's mother who can't read and write (16.6%) was higher than father's (9.1%). Similarly, student's mother who can't read and write (11.0%) was higher than father's (7.0%) among well-nourished adolescents. From well-nourished adolescents more than 3/4$^{th}$ of them lived in small size family, while almost half (45%) of under-nourished adolescents lived in large family from all study participants 192 skip meal among those 49(25.5%) skippers skip meal due to lack of food (Table 1).

**Table 2: Socio-demographic and socioeconomic characteristics of school adolescents and their parents, Bahir Dar, Ethiopia,2022 (n=942)**

| Variables | | Well nourished (471) (%) | Undernourished (471) (%) | $X^2$ | p-value |
|---|---|---|---|---|---|
| Age | 11-14(Early adolescents | 185(39.3) | 142(30.1) | 8.66 | 0.003 |
| | 15-19(Late adolescents) | 286(60.7) | 329(69.9) | | |
| Grade | Primary school (5-8) | 221(46.9) | 158(33.5) | 17.51 | 0.000 |
| | Secondary school (9-12) | 250(53.1) | 313(66.5) | | |
| Sex | Male | 142(30.1) | 210(44.6) | 20.91 | 0.000 |
| | Female | 329(69.9) | 261(55.4) | | |
| Religion | Orthodox | 389(11.7) | 370(78.6) | 2.55 | 0.279 |
| | Muslim | 55(11.7) | 70(14.9) | | |
| | Protestant | 27(46.6%) | 31(6.6) | | |
| With whom a student is living | With both | 368(78.1) | 348(73.9) | 4.81 | 0.180 |
| | With a mother | 37(7.9) | 40(8.5) | | |
| | With a father | 17(3.6) | 31(6.6) | | |
| | With others | 49(10.4) | 52(11.0) | | |
| Mothers' educational status | Unable to read and write | 52(11.0) | 78(16.6) | 11.43 | 0.022 |
| | Primary | 165(35.0) | 143(30.4) | | |
| | Secondary | 101(21.4) | 112(23.8) | | |
| | Diploma | 118(25.1) | 118(25.1) | | |
| | Degree | 35(7.4) | 20(4.2) | | |
| Fathers' educational status | Unable to read and write | 33(7.0) | 43(9.1) | 14.71 | 0.005 |
| | Primary | 103(21.9) | 66(14.0) | | |
| | Secondary | 86(18.3) | 104(22.1) | | |
| | Diploma | 133(28.2) | 159(33.8) | | |
| | Degree | 116(24.6) | 99(21.0) | | |
| Mothers' occupational status | Government worker | 90(19.1) | 118(25.1) | 12.51 | 0.013 |
| | Private worker | 105(22.3)) | 125(26.5) | | |
| | Merchant | 73(15.5) | 75(15.9) | | |
| | Agriculture | 24(5.1%) | 19(4.0) | | |
| | House wife | 179(38) | 134(28.5) | | |
| Fathers' occupational status | Government worker | 195(41.4) | 234(49.7) | 15.01 | 0.010 |
| | Private worker | 82(17.4) | 86(18.3) | | |
| | Merchant | 71(15.1) | 75(15.9) | | |
| | Agriculture | 123(26.1) | 76(16.1) | | |
| Family size | Small | 359(76.2) | 258(54.8) | 47.92 | 0.000 |
| | Large | 112(23.8) | 213(45) | | |
| Family wealth index | Poorest | 81(17.2) | 59(12.5) | 44.06 | 0.000 |
| | Poor | 131(27.8) | 75(15.9) | | |

| | | | | | |
|---|---|---|---|---|---|
| | Medium | 108(22.9) | 98(20.8) | | |
| | Rich | 133(28.2) | 226(48.0) | | |
| | Richest | 18(3.8) | 13(2.8) | | |
| **Poor academic performance** | Yes | 412(87.5) | 358(76.0) | 20.70 | 0.000 |
| | No | 59(12.5) | 113(24.0) | | |

### 6.2 Dietary related variables of adolescent students

The overall proportion of adolescents who have poor dietary diversity score accounts 47% from these 51.4% are under-nourished adolescents. While 23.8% of under-nourished adolescents skip their meal, only 17% skip their meal from well-nourished groups, which is higher among under-nourished adolescents (Table 3).

**Table 3: Dietary related variables of adolescent students Bahir Dar Northwest Ethiopia, 2022(n=942)**

| Variables | | Nutritional status | | $X^2$ | P value |
|---|---|---|---|---|---|
| | | Well-nourished (471) (%) | Under-nourished (471) (%) | | |
| DDS | Poor | 201(42.7) | 242(51.4) | 7.163 | 0.007 |
| | Good | 270(57.3) | 229(48.6) | | |
| Meal skipping habit | No | 391(83.0) | 359(76.2) | 6.699 | 0.010 |
| | Yes | 80(17.0) | 112(23.8) | | |
| Skipping reason | Lack of food | 20(25) | 29(25.9) | 0.289 | 0.866 |
| | Fasting | 44(55) | 64(57.1) | | |
| | Other reason | 16(20) | 19(17.0) | | |

### 6.3 The magnitude of poor academic performance among public school-going adolescents (both well-nourished and under-nourished).

The overall magnitude of poor academic performance among adolescent students was 18.3% with a 95% CI (15.7,20.9). The comparison on magnitude of poor academic performance among well-nourished and under-nourished was calculated separately. This is because Nutritional status (well-nourished vs under-nourished) assessed using body mass index for age was significantly associated [AOR=1.83, CI (1.23,2.71)] with poor academic performance. The magnitude of poor academic performance was higher among under-nourished adolescent students 24%, with 95% CI (19.9,27.3) than well-nourished adolescents,12.5% with CI (9.5,15.4). (Figure.3)

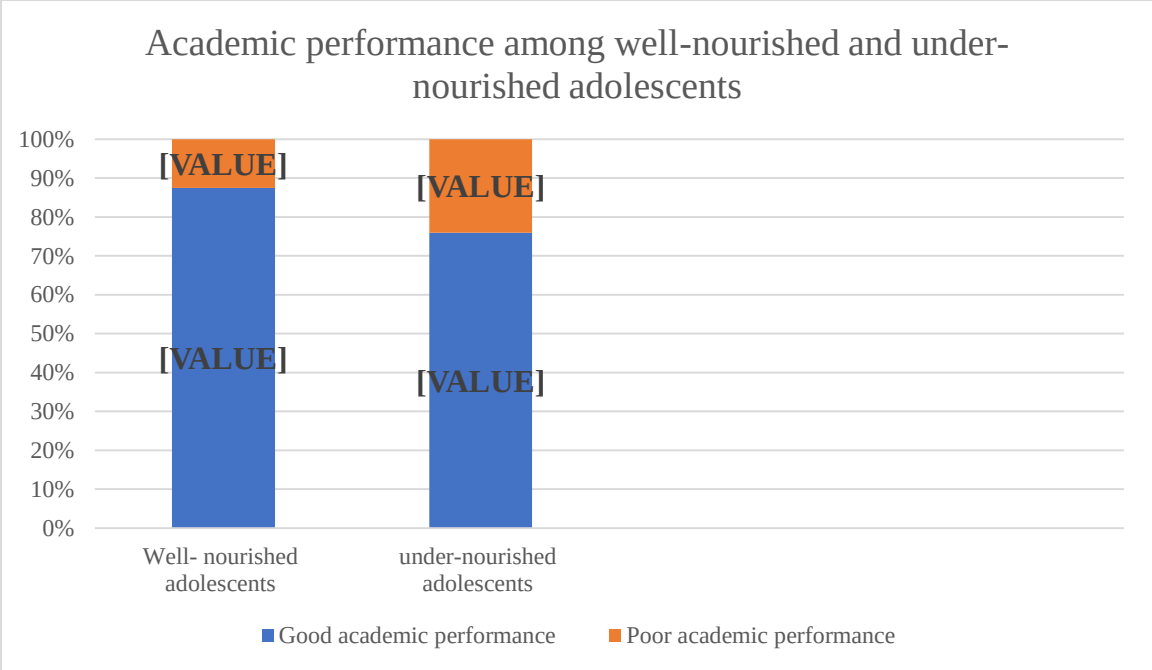


**Figure 3: Academic performance among well-nourished and under-nourished adolescents, Bahir Dar, Ethiopia, 2022**

### 6.4 Factors associated with academic performance

#### 6.4.1 Factors associated with poor academic performance in well-nourished school adolescents

For well-nourished school adolescents, bivariate analysis was carried out and ten variables that had a P-value <0.25 were a candidate for multivariable logistic regression. In multivariable analysis, two of them were found to have statistically significant associations. Adolescents who had textbook scarcity were 10 times (AOR = 10, 95% CI: (5.6,19.4) more likely to have poor academic performance as compared to those who had all the textbook at hand. Those adolescents who had a habit of meal skipping were 3.5 times (AOR = 3.5, 95% CI: 1.8-7.0) more likely have poor academic performance as compared to those who had not habit of meal skipping. (Table 4).

**Table 4: Multivariable binary logistic analysis that shows factors associated with poor academic performance among well-nourished school adolescents, Bahir Dar, Ethiopia, 2022**

| Variables | | Poor academic performance | | COR(95% CI) | AOR (95% CI) |
|---|---|---|---|---|---|
| | | Yes (%) | No (%) | | |
| Age | Early-adolescents | 19(10.3) | 166(89.7) | 1 | 1 |
| | Late-adolescents | 40(14.0) | 246(86.0) | 1.42(0.79,2.5) | 1.32(0.63,2.76) |
| Father's occupational status | Government worker | 20(10.3) | 175(89.7) | 1 | 1 |
| | Private worker | 13(15.9) | 69(84.1) | 1.6(0.77,3.49) | 1.73(0.69,4.36) |
| | Merchant | 12(16.9) | 59(83.1) | 1.7(0.82,3.86) | 1.05(0.35,3.14) |
| | Agriculture& Other | 14(11.4) | 109(88.6) | 1.1(0.54,2.3) | 0.67(0.21,2.11) |
| Textbook scarcity | No | 26(6.6) | 366(93.4) | 1 | **1** |
| | Yes | 33(41.8) | 46(58.2) | 10(5.5,18.3) | **10.4(5.6,19.4)**** |
| Internet | No | 47(11.6) | 358(88.4) | 1 | 1 |
| | Yes | 12(18.2) | 54(81.8) | 1.69(0.8,3.39) | 1.67(0.70,4.00) |
| Attending kindergarten | No | 46(13.7) | 289(86.3) | 1.5(0.78,2.8) | 1.3(0.57,2.9) |
| | Yes | 13(9.6) | 123(90.4) | 1 | 1 |
| DDS | Poor | 35(17.4) | 166(82.6) | 2.1(1.2,3.7) | 1.75(0.90,3.41) |
| | Good | 24(8.9) | 246(91.1) | 1 | 1 |
| Meal skipping | No | 38(9.7) | 353(90.3) | 1 | 1 |
| | Yes | 21(26.3) | 59(73.8) | 3.3(1.8,6.0) | **3.55(1.8,7.00)**** |

*** Significant factor * p value<0.05, **p value less than 0.01**

### 6.4.2 Factors associated with academic performance among under-nourished adolescent students attending public school

In the bivariate analysis, seven factors were associated with poor academic performance among under-nourished adolescent students. In the bivariate logistic regression analysis having illiterate father, whose father occupational status is agriculture and other, an adolescent with a large family size, who had textbook scarcity and never attend kindergarten besides a student who had poor dietary diversity score and meal skipping habit were a candidate for multivariable logistic regression at p <0.25. In multivariable analysis five variables were found to have statistically significance. Students mother who can't read and write were 4 times more likely to have poor academic performance than those who had a mother with diploma level of education (AOR=4.0,95%CI:1.50,11.0) Students who had been living in large family size were 2 times more likely to perform poor in their academic result (AOR=2.0,95%CI:1.2,3.3) as compared to those with small family. Students who had scarce textbook were 8.2 times more likely to perform poor as compared to those who hadn't

(AOR=8.2,95%CI:5.1,14.6). the odds of having poor academic performance were nearly 2 times higher in adolescents with poor dietary diversity score than those with good dietary diversity score (AOR=1.9,95%CI:1.1,3.1). the odds of having poor academic performance were 1.98 times higher in internet users than non-users (AOR=1.9895%CI:1.1,3.59). (Table 5)

**Table 5: Multivariable binary logistic regression that shows factors associated with poor academic performance among undernourished school adolescent students, Bahir Dar, Ethiopia,2022**

| Variables | | Poor academic performance | | COR (95% CI) | AOR (95% CI) |
|---|---|---|---|---|---|
| | | Yes (%) | No (%) | | |
| Sex | Male | 59(28.1) | 151(71.9) | 1 | 1 |
| | Female | 54(20.7) | 207(79.3) | 0.6(0.43,1.02) | 0.76(0.45,1.27) |
| Age | Early adolescents | 27(19) | 115(81) | 1 | 1 |
| | Late adolescents | 86(26.1) | 243(73.9) | 1.5(0.92,2.45) | 1.16(0.61,2.2) |
| Religion | Orthodox | 82(22.2) | 288(77.8) | 0.59(0.27,1.32) | 0.43(0.15,1.21) |
| | Muslim | 21(30) | 49(70) | 0.90(0.36,2.2) | 0.51(0.14,1.84) |
| | Protestant | 10(32.3) | 21(67.7) | 1 | 1 |
| Mother's educational status | Unable to read and write | 31(39.7) | 47(60.3) | 2.84(1.52,5.29) | **4.08(1.50,11.0)*** |
| | Primary school | 32(22.4) | 111(77.6) | 1.24(0.69,2.21) | 1.43(0.65,3.17) |
| | Secondary school | 24(21.4) | 88(78.6) | 1.17(0.63,2.18) | 1.34(0.63,2.81) |
| | Diploma and above | 26(18.8) | 112(81.2) | 1 | 1 |
| Father's educational status | Unable to read and write | 18(41.9) | 25(58.1) | 3.7(1.6,8.3) | 2.72(0.66,11.08) |
| | Primary school | 18(27.3) | 48(72.7) | 1.9(0.9,4.1) | 1.66(0.52,5.34) |
| | Secondary school | 27(26) | 77(74) | 1.8(0.9,3.6) | 2.51(0.93,6.79) |
| | Diploma | 34(21.4) | 125(78.6) | 1.4(0.7,2.7) | 1.29(0.58,2.85) |
| | Degree and above | 16(16.2) | 83(83.8) | 1 | 1 |
| Mother's occupational status | Government worker | 25(21.2) | 93(78.8) | 1 | 1 |
| | Private worker | 27(21.6) | 98(78.4) | 1.02(0.55,1.89) | 0.89(0.42,1.90) |
| | Merchant | 23(30.7) | 52(69.3) | 1.64(0.85,3.1) | 1.16(0.48,2.7)) |
| | Agriculture/ House wife | 38(24.8) | 115(75.2) | 1.22(0.69,2.1) | 0.43(0.17,1.09) |
| Father's occupational status | Government worker | 45(19.2) | 189(80.8) | 1 | 1 |
| | Private worker | 19(22.1) | 67(77.9) | 1.19(0.65,2.18) | 0.61(0.28,1.34) |
| | Merchant | 20(26.7) | 55(73.3) | 1.5(0.8,2.8) | 0.88(0.33,2.38) |
| | Agriculture and other | 29(38.2) | 47(61.8) | 2.5(1.4,4.5) | 1.89(0.63,5.63) |
| Family size | Small | 50(19.4) | 208(80.6) | 1 | 1 |
| | Large | 63(29.6) | 150(70.4) | 1.7(1.14,2.6) | **1.71(1.02,2.86)*** |
| Wealth index | Poor | 39(29.1) | 95(70.9) | 1.51(0.93,2.45) | 0.46(0.18,1.16) |
| | Medium class | 23(23.5) | 75(76.5) | 1.13(0.64,1.98) | 0.85(0.42,1.72) |

| | | | | | |
|---|---|---|---|---|---|
| | Rich | 51(21.3) | 188(78.7) | 1 | 1 |
| Text book | No | 55(14.8) | 316(85.2) | 1 | **1** |
| scarcity | Yes | 58(58) | 42(42) | 7.9(4.8,12.9) | **7.9(4.65,13.44)**** |
| Owing mobile | No | 108(24.7) | 329(75.3) | 1 | 1 |
| phone | Yes | 5(14.7) | 29(85.3) | 0.5(0.19,1.39) | 0.42(0.13,1.40) |
| Internet usage | No | 82(22.7) | 280(77.3) | 1 | 1 |
| | Yes | 31(28.4) | 78(71.6) | 1.3(0.8,2.2) | **1.98(1.1,3.59)*** |
| Attending | No | 102(26.1) | 292(73.9) | 2.3(1.1,4.6) | 1.95(0.89,4.2) |
| kindergarten | Yes | 10(13.2) | 66(86.8) | 1 | 1 |
| DDS | Poor | 76(31.4) | 166(68.6) | 2.3(1.5,3.7) | **2.16(1.29,3.61)*** |
| | Good | 37(16.2) | 192(83.8) | 1 | 1 |
| Meal skipping | No | 78(21.7) | 281(78.3) | 1 | 1 |
| habit | Yes | 35(31.3) | 77(68.8) | 1.6(1.0,2.6) | 0.95(0.47,1.92) |

*** Significant factor * p value less than 0.05, **p value less than 0.01**

## 7. DISCUSSION

This study revealed the prevalence and associated factors of poor academic performance among well-nourished and under-nourished school going adolescents in Bahir Dar city. Nutritional status specific magnitude of poor academic performance was 24% among under-nourished adolescents which is higher than among well-nourished adolescents,12.5%.

In the current study one of the predictor variables which has shown strong statistical association with poor academic performance was text book scarcity in both groups. A study done in Indonesia support this study which revealed a factor that had largest and significant effect on reading and math scores were use of textbook showing that having scarce text book adversely affects academic performance(24). The consequences on students' ability to learn and the quality of learning are seriously affected and the absence of textbooks is likely to lead to the failure of any educational program(47). A text book is very important tool which contains detailed sequence of teaching procedures that tell the students what to do, also textbooks have an impact on academic performance as students spend most of their time studying in a classroom which influences the teaching and learning process.

The results of a Korean study revealed a negative correlation between the use of internet for non-academic purposes and academic performance of students(48), which supports the current finding. From the same study it is explained that the impact of using internet as a medium to help student learning, increasing the academic achievement(49), which is contradicted with the current study results showing that using internet has a positive association with academic performance among adolescents. The discrepancies might be due to on what purpose the students used it and to what level they are addicted to it.

Adolescents from under-nourished group who had a mother who can't read and write were more likely to score poor academic performance compared to those who had a mother with higher educational level. A study done in Lalibela revealed that Children who have mothers with secondary and above educational status had more than two times higher average semester score than children with mothers who can't read and write (28) a study done on Parental Education and Children Academic Performance Dire Dawa, Ethiopia(50) the study done in Pakistan(51), in Nigeria(52), were also in consistent with this study. another study conducted in India also revealed that 87 percent of those students whose mothers were highly educated scored high score than those whose mothers were uneducated (53),. this might be because parents with lower educational status may not have adequate knowledge regarding

nutrition, food diversity, also if the mother is educated it is believed that she can help her child in extra-curricular activities by encouraging them.

The current study found a significant association between meal skipping and poor academic performance among the well-nourished adolescents, which is consistent with a study done in southern Ethiopia (34, 54),. This result was also in agreement with a systematic review done on college Students in Australia on associations between Dietary Intake and Academic Achievement,(31) there is a fact that skipping meal leads to lower metabolism, lack of energy that can cause students to experience sluggish behavior and fatigue which can lower attention during attending class. Breakfast is considered to be one of the most important meals of the day. Moreover, recent studies have demonstrated that breakfast enhances intellectual capacity, concentration, attention and academic performance (54). As breakfast can be defined as the first meal eaten in the day before performing daily activities and it usually contributes to about 20% - 30% of total daily energy needs(55). Evidence suggests that breakfast consumption may improve cognitive function related to memory, test grades, and school attendance(56, 57).

Dietary diversity was significantly associated with academic performance in overall (both malnourished and well-nourished) adolescents this finding is in agreement with a study done in Nepal, poor dietary diversity score had higher odds of poor academic performance in both English language and Mathematics reported among pupils with low DDS in comparison to those with normal DDS. Those with low dietary diversity score had significantly higher proportion of low academic performance compared with those who had high dietary diversity score(52). Eating diversified foods is critical in the development of the brain through the supply of different nutrients, and the generation of energy required for continuous functioning, then the chance of having this will be greater while consuming diversified food.

Family size was declared as having statistically significant association with academic achievement from malnourished group of study participants, those who lived in large family size are 1.7 times (AOR=1.7) more likely to have poor academic performance. A study conducted in Nigeria on influence of family size and students' academic performance, small family size has been linked with higher academic achievement(30). The reason is believed to be with larger family size the chance of having financial instability might be increased leading the student to skip meal or share food with his or her siblings. Large family size

creates in the upbringing of children some identified problems such as feeding-insufficient malnutrition.

## 8. LIMITATIONS OF THE STUDY

The study did not use the children's IQ test due to a lack of standardized testing systems in Ethiopia which is designed in the country context so the cutoff marks, ministry of education is now using were used as a tool for measuring adolescents' academic performance. Despite these, adequate sample size was used which could help the findings generalizable to primary school students.

## 9. CONCLUSION

The magnitude of academic performance among undernourished school adolescents were higher than the magnitude seen under well-nourished groups. Variables such as having illiterate mother, text book scarcity, using internet, having poor dietary diversity score, were found to have significant association from undernourished school adolescents. On the other hand, meal skipping habit and textbook scarcity had shown statistically significant association among well-nourished adolescents.

## 10.RECOMMENDATIONS

Depending on the finding from the study the following recommendations are forwarded.

**For parents**

Parental monitoring is believed to reduce the problem relating with internet. Thus, adolescents should be supervised in their daily routines and encouraged to participate in family and outdoor activities Mostly adolescents use their parent's phone as a tool to use internet specially for social media so it is important for every parent to check on their child what they are doing.

**For school**

It would be helpful if school could provide a special medium for nutrition education and for intervention to improve children's health and nutritional status aiming to help children acquire nutrition knowledge and to develop and encourage desirable eating habits and food choices, emphasizing to let students recognize how healthy diet influences well-being and academic achievement.

Schools based nutrition education program should also be organized for mothers of students emphasizing on benefits of giving diversified food, home gardening which promote lifelong healthy eating behaviors to improve their nutrition.

**For ministry of education**

Regarding text book scarcity education office should also avail all necessary text books required by students at the right time since students were complaining they usually don't get full textbook.

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# 12. ANNEXS

## Annex I. Consent form

Title of the Research Project: Academic performance and its associated factors among well-nourished and malnourished public school going adolescents in Bahir Dar North West Ethiopia.

Name of Principal Investigator (PI): Hanna Ewnetu

Name of Organization: Bahir Dar University

Hello, my name is ----------

The purpose of this questionnaire is to compare academic performance of well-nourished and malnourished public school going adolescents and its associated factors in Bahir Dar city. Your child is selected as a study participant hoping that he/she would be willing to help me by providing some information. If you allow me, I have some questions which are answered by your child. The questionnaires include socio-economic and demographic, individual factors assessment questionnaires, dietary assessment. All the information will be kept confidential and the name and address will not be included. Only honest answer would contribute to theidentification and prevention of the problem. Your role for success of the research is crucial and I appreciate your contribution. Would this be with you?

I understood the advantage of the research and the role I will have in the research. I have agreed to let my child participate in the research.

A. Yes

B. No

If the family agrees to let the child to be interviewed, please fill.

Starting time: ----------

End time: ----------

Date of data collection: ----------

Name of data collector: ----------signature of data collector: ----------

## Annex II. Questionnaires

ID number ----------

Socio-Demographic and economic Characteristics

| SN | Socio-economic and demografic factors | Possible choices | Response/s |
|---|---|---|---|
| 101 | Age (years with months) | | |
| 102 | Sex | 1 Female 2 male | |
| 103 | Grade | | |
| 104 | Religion | 1.Ortodox<br>2.Muslim<br>3.Protestant<br>4.Catholic<br>5.Others-- | |
| 105 | With whom do you live with? | 1.Mother only<br>2.Father only<br>3.Mother and father<br>4.Grand families<br>5.Others | |
| 106 | Mother's educational status | 1.Can't read and write | |
| | | 2.Primary Education | |
| | | 3.Secondary-Education | |
| | | 4.Diploma | |
| | | 5.Degree and Above | |
| 107 | Father's educational status | 1.Can't read and write | |
| | | 2.Primary Education | |
| | | 3.Secondary-Education | |
| | | 4.Diploma | |
| | | 5.Degree and Above | |
| 108 | Mother's Occupational status | 1.Governmental work | |
| | | 2.Private work | |

| | | | |
|---|---|---|---|
| | | 3 Merchant | |
| | | 4.Agriculture | |
| | | 5.Housewife | |
| 109 | Father's occupational status | 1.Governmental work | |
| | | 2.Private work | |
| | | 3 Merchant | |
| | | 4.Agriculture | |
| | | 5.Housewife | |
| 110 | Family size | | |

| S.N | Wealth index variables in the family | Options | |
|---|---|---|---|
| 201 | Do you have electric service | 1Yes 2. No | |
| 202 | Do you have mobile phone? | 1Yes 2. No | |
| 203 | Dou you have radio? | 1Yes 2. No | |
| 204 | Do you have television? | 1Yes 2. No | |
| 205 | Do you have refrigerator? | 1Yes 2. No | |
| 206 | Do you have grill? | 1Yes 2. No | |
| 207 | Do you have table? | 1Yes 2. No | |
| 208 | Dou you have chair? | 1Yes 2. No | |
| 209 | Do you have a bed with cotton/sponge/or spring mattress? | 1Yes 2. No | |
| 210 | Does anyone in your family have a bank account? | 1Yes 2. No | |
| 211 | Where do you get drinking water? | 1.Piped water<br>2.Ground water 3. Spring | |

| | | | |
|---|---|---|---|
| | | water | |
| 212 | What type of toilet do you use the most? | 1.ventilated pit latrine<br>2.Traditional pit latrine 3 no toilet | |
| 213 | What is the source of energy that you usually use for cooking? | 1.Electric 2. wood | |
| 214 | What is the floor of the house made of? | 1. Mud 2. Concrete | |
| 215 | What is the wall of your house is made of? | 1. Mud<br>2. Cement | |
| 216 | What is the roof of your house is made of? | 1.Iron 2. Plastic | |
| 217 | What do you have for transportation? | 1.Car 3.Bycycle<br>2.Motorbike 4. Gari 5. Noting | |
| 219 | Do you have a farming land? | 1. Yes 2. No | |
| 220 | Do you have laundry? | 1. Yes 2. No | |
| 221 | Do you have computer? | 1. Yes 2. No | |
| 222 | Do you have shower? | 1. Yes 2. No | |
| 223 | Dou you have clock? | 1. Yes 2. No | |
| 224 | Does your house have window? | 1. Yes 2. No | |
| 225 | Do you have cow? | 1. Yes 2. No | |
| 226 | Do you have ox? | 1. Yes 2. No | |
| 227 | Do you have horse? | 1. Yes 2. No | |
| 228 | Do you have mule? | 1. Yes 2. No | |
| 229 | Do you have goat? | 1. Yes 2. No | |
| 230 | Do you have sheep? | 1.Yes 2. No | |
| 231 | Do you have hen? | 1.Yes 2. No | |

| | | | |
|---|---|---|---|
| 232 | Do you have calf? | 1.Yes 2. No | |
| 233 | Do you have donkey? | 1.Yes 2. No | |
| 234 | Do you have hive? | 1.Yes 2. No | |

**Environmental factors**

| | | | |
|---|---|---|---|
| 301 | What is main source of water that you use at home? | 1. Piped water | |
| | | 2. Dam | |
| | | 3. Borehole | |
| | | 4. Wells | |
| | | 5. Others (specify) | |
| 302 | Do you treat your drinking water? | 1. Yes 2. No | |
| 303 | If the answer to Q-202 is yes, which of the following methods do you use? | 1. Boiling | |
| | | 2. Filtering | |
| | | 3. Adding wuha agar | |
| | | 4. Others (specify) | |
| 304 | What type of latrine do you use in your house | 1. No latrine | |
| | | 2. Traditional pit latrine | |
| | | 3. Ventilated improved | |
| 305 | Do you wash your hand always before eating? | 1. Yes 2. No | |
| 306 | Were you sick for the last 1year? (Malaria, Fever, Diarrheal Vomiting, Skin disease, Ear infection) | 1. Yes 2. No | |
| **Behavioral characteristics** | | | |
| 401 | Have you had much work-load at home/out of home? | 1 yes<br>2 no | |
| 402 | How much time do you study after school | ---------- | |

| | | | |
|---|---|---|---|
| 403 | Do u have a shortage of educational materials (text books) | 1 yes<br>2 no | |
| 404 | Do you have cell phone | 1 yes<br>2 no | |
| 405 | Do you use internet | 1 yes<br>2 no | |
| 406 | For what purpose do use internet for | 1 for social media<br>2 for academic purpose<br>3 for both | |
| 407 | how much time do you spend on internet for social media | 1 In week days by hour<br>2 in weekend days by hour | |

**Dietary diversity practice**

Please tell me everything that You ate yesterday during the day or night (whether at home or outside the

home). Think about when you first woke up yesterday. Did you eat anything at that time? What did you do after that? Did you eat anything at that time? If yes, ask: Please tell me everything you ate at that time. Probe: 'Anything else?' until student says 'nothing else.' If the student mentions mixed dishes like a sauce or stew, probe: What additional food were in that mixed dish? Probe: 'Anything else?' Until student says 'nothing else.' Repeat questions until knowing what he/she ate all day to sleep time.

| | Food categories | Description (lists of food under each food group | Under each food groups, if at least one food is consumed in the past 24-hour circle yes if no food from listed is consumed circle no |
|---|---|---|---|
| 501 | Grains white roots and tuber | Injera, bread, rice, noodles, porridge, or other foods made from grains, such as, tef, maize, barley, wheat, sorghum, Mille | 1 yes<br>2 no |
| 502 | Pulses (beans, peas | Any foods made from beans, peas, lentils or nuts | 1 yes<br>2 no |

| | | | |
|---|---|---|---|
| | and lentils | | |
| 503 | Nuts and seeds | Any food made from nuts, seed (sesame, selyit, chickpea) | 1 yes<br>2 no |
| 504 | All diary | Cheese, yogurt, or other milk products | 1 yes<br>2 no |
| 505 | Flesh foods | Liver, kidney, heart or other organ meats? Any meat such as beef, pork, lamb, goat, chicken or duck | 1 yes<br>2 no |
| 506 | Eggs | Eggs | 1 yes<br>2 no |
| 507 | Vitamin A rich dark green leafy vegetables | Any dark green leafy vegetables (gommen, spinach, lettuce, merengue leaves, Sama, Kosta cabbage | 1 yes<br>2 no |
| 508 | Other vitamin A rich vegetables and fruits | Carrot pumpkin, sweet potato that are yellow ripe papaya mango | 1 yes<br>2 no |
| 509 | Other vegetables | Peppers, tomatoes | 1 yes<br>2 no |
| 510 | Other fruits | | 1 yes<br>2 no |

**Anthropometric measurement**

| | | | |
|---|---|---|---|
| 601 | Weight in kilogram | Measurement1<br>Measurement2 | |
| 602 | Height in centimeter | Measurement1<br>Measurement2 | |
| 603 | BMI | | |

**Academic performance and absent record of the student from the registrar office**

| | | |
|---|---|---|
| 701 | Semester one average | |
| 702 | Semester two average | |
| 703 | Final average | |
| 704 | Number of absences in the year | |

## III የአማረኛ መጠይቅ ቅጽ

ክፍል 1 የፈቃድ ቅጽ

አባሪ 1. (የስምምነት ዉል)የፈቃድ ቅጽ

የምርምር ፕሮጀክቱ ርዕስ- በባሕር ዳር ሰሜን ምዕራብ ኢትዮጵያ በጥሩ የተመጣጠነ ምግብ ባገኙ እና የተመጣጠነ ምግብ እጥረት ባለባቸው የመንግሥት ትምህርት ቤት ታዳጊዎች መካከል የአካዳሚክ አፈፃፀም እና ተጓዳኝ ምክንያቶች።

ጤና ይስጥልኝ ስሜ ---------- ይባላል እኔ የመጣሁት ሀና እውነቱ ለተባሉት በባህርዳር ዩኒቨርስቲ የህብረተሰብ ጤና አጠባበቅ የማስተርስ ፕሮግራም የምርቃት ጥናትና ስለሚሰሩት ምርምር በባሕር ዳር ሰሜን ምዕራብ ኢትዮጵያ በጥሩ የተመጣጠነ እና የተመጣጠነ ምግብ እጥረት ባለባቸው የመንግሥት ትምህርት ቤት ታዳጊዎች መካከል የአካዳሚክ አፈፃፀም ልዩነት እና ተጓዳኝ ምክንያቶች ለማጥናት እሳችሀዉን ወክየ መረጃ ለመሰብሰብ ነው። ልጅዎ አንዳንድ መረጃዎችን በመስጠት እኔን ለመርዳት ፈቃደኛ እንደሚሆን ተስፋ በማድረግ እንደ የጥናት ተሳታፊ ሆኖ ተመርጧል። ከፈቀዱልኝ ፣ በልጅዎ የሚመለሱ አንዳንድ ጥያቄዎች አሉኝ። መጠይቆቹ ማህበራዊ-ኢኮኖሚያዊ እና የስነ ሕዝብ አወቃቀር ፣ የግለሰብ ምክንያቶች የግምገማ መጠይቆች ፣ የአመጋገብ ግምገማ ያካትታሉ። ሁሉም መረጃዎች በሚስጥር ይቀመጣሉ እና ስሙ እና አድራሻው አይካተቱም። ችግሩን ለይቶ ለማወቅ እና ለመከላከል አስተዋፅኦ ያለው ትክክለኛ መልስ ብቻ ነው። ለስኬቱም የእርስዎ ሚና ወሳኝ ነው እና የእርስዎን አስተዋፅኦ አደንቃለሁ። ይህ ከእርስዎ ጋር ይሆናል? የምርምርውን ጥቅም እና በምርምር ውስጥ የምኖረውን ሚና ተረድቻለሁ። ልጄ በምርምር ውስጥ እንዲሳተፍ ለመፍቀድ ተስማምቻለሁ።

ሀ አወ
ለ አይደለም

ልጁ ቃለ መጠይቅ እንዲደረግለት ቤተሰቡ ከተስማማ ፣ እባክዎን ይሙሉ።

የመነሻ ጊዜ ፡-

የማብቂያ ጊዜ ፡-

መረጃ የተሰበሰበበት ቀን ----------

የመረጃ ሰብሳቢው ስም ---------- የመረጃ ሰብሳቢው ፊርማ ---------- ----------

የመታወቂያ ቁጥር --------

አባሪ 2. መጠይቆች

ክፍል ፣ ማህበራዊ-ስነ-ሕዝብ እና ኢኮኖሚያዊ ባህሪዎች

| ተ.ቁ | ማህበራዊ-ኢኮኖሚያዊ እና ህዝባዊ ሁነ ቶች | ሊሆኑ የ ሚቻሉ አ ማራጮች | ማሳስ |
|---|---|---|---|
| 101 | እድሜ | ---------- | |
| 102 | ጸታ | 1. ሴት 2. ወንድ | |
| 103 | ክፍል | ---------- | |
| 104 | ሀይማኖት | 1. አርቶዶክስ<br>2. ማኳሊም<br>3. ፕሮቴስታንት<br>4. ካቶሊክ<br>5. -- ሌላ | |
| 105 | ከማን ጋር ይኖራል/ትኖራለች | 1. Mother<br>2. Father<br>3. Mother and father<br>4. Grand families<br>5. others | |
| 106 | የእናት የትምህርት ደረጃ | 1. መደበኛ ት/ት የለም<br>2. የ መጀመሪያ ደረጃ<br>3. ሁለተኛ ደረጃ<br>4. ዲፕሎማ<br>5. ዲግሪ እና ከዛ በላይ | |
| 107 | የአባት የትምህርት ደረጃ | 1. መደበኛ ት/ት የለም<br>2. የ መጀመሪያ ደረጃ<br>3. ሁለተኛ ደረጃ<br>4. ዲፕሎማ<br>5. ዲግሪ እና ከዛ በላይ | |
| 108 | የእናት የስራ ሁኔታ | 1. የ መንግስት ሰራተኛ<br>2. የ ግል<br>3. ንግድ<br>4. ግብርና | |

| | | | |
|---|---|---|---|
| | | 5. የ ቤት እ ማ ቤት<br>6. ሌ ላ ---------- | |
| 109 | የ አ ባ ት የ ስ ራ ሁ ኔ ታ | 1. የ መ ን ግ ስ ት ሰ ራ ተ ኛ<br>2. የ ግ ል<br>3. ን ግ ድ<br>4. ግ ብ ር ና<br>5. የ ቤ ት እ ማ ቤ ት<br>6. ሌ ላ ---------- | |
| 110 | የ ቤ ተ ሰ ብ ብ ዛ ት | ---------- | |

| | | | አ ወ ካ ሉ ብ ዛ ት ይ ጠ ቀ ስ |
|---|---|---|---|
| 201 | የ ኤ ሌ ክ ት ሪ ክ አ ገ ል ግ ሎ ት ታ ግ ኛ ላ ች ሁ? | 1. አ ዎ 2.የ ለ ም | |
| 202 | ስ ል ክ አ ለ ህ/አ ለ ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 203 | ራ ዲ ዮ አ ል ህ/አ ል ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 204 | ቴ ሌ ቪ ዥ ን አ ለ ህ/አ ል ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 205 | ፍ ሪ ጅ አ ል ህ/አ ል ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 206 | የ ኤ ሌ ት ሪ ክ ምጣ ድ አ ል ህ/አ ል ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 207 | ጠ ረ ጴ ዛ አ ለ ህ/አ ለ ስ ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 208 | ሚ ሬ ፊ ያ ወ ን በ ር አ ለ ህ/አ ል ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 209 | አ ል ጋ ከ ጥ ጥ/ስ ፖ ን ጅ/ስ ፕ ሪ ን ግ ፍ ራ ሽ ጋ ር አ ለ ህ/አ ለ ሽ? | 1. አ ዎ 2.የ ለ ም | |
| 210 | ከ ቤ ተ ሰ ባ ች ሁ መ ካ ከ ል የ ባ ን ካ ደ ብ ተ ር ያ ለ ው አ ለ? | 1. አ ዎ 2.የ ለ ም | |
| 211 | በ አ በ ዛ ኛ ው የ ም ት ጠ ቅ መ ጣ ት የ መ ፀ ዳ ጃ ቤ ት ም ን አ ይ ነ ት ነ ው? | 1.የ ተ ሻ ሻ ለ<br>2. ከ ፍ ት መ ፀ ዳ ጃ ቤ ት<br>3.በ ሜ ዳ/ ጫ ፎ ላ ይ<br>4.ሌ ላ ይ ጥ ቀ ሱ-------- | |

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| 212 | አብዛኛውን ጊዜ ምግብ ለማበሰል የ ምትጠቅመት የ ሀይል ምንጭ | 1.ኤሌክትሪክ<br>2. እንጨት<br>3. ሌላ ካለ ይጥቀሱ--- | |
| 213 | የ ቤቱ ወለል ከምን የ ተሰራ ነ ወ? | 1. ከአፈር / አሸዋ<br>2. ኮንክሪት<br>3. ሌላ ይጥቀሱ------- | |
| 214 | የ ቤታችሁ ወጩ ከፍል ከምን የ ተሰራ ነ ወ? | 1.ከጭቃ<br>2. ከሲሚንቶ<br>3. ከብሎኬት<br>4. ሌላ ---------- | |
| 215 | የ ቤታችሁ ጣሪያ ከምን የ ተሰራ ነ ወ? | 1.ብረት / ቆርቆሮ<br>2. ፕላስቲክ<br>3. ሌላ ---------- | |
| 216 | ለትራንስፖርት አገ ልግሎት የ ሚሆን ተንቀሳቃሽ ምን አልዎት? | 1.መኪና<br>2.ሞተር ባይስክል<br>3.ባጃጅ<br>4.ጋሪ 5. የ ለኝም | |
| | | | አወ ካሉ ብዛት ይጠቀስ |
| 217 | የ እርሻ ሜሬት አለዎተ? | 1. አዎ 2.የ ለም | |
| 218 | ላወንደሪ አለ? | 1. አዎ 2.የ ለም | |
| 219 | ኮፒተር አለዎት? | 1. አዎ 2.የ ለም | |
| 220 | ሻወር አለ? | 1. አዎ 2.የ ለም | |
| 221 | የ ግድግዳ ሰዓት አለ? | 1. አዎ 2.የ ለም | |
| 222 | ቤታችሁ ሳህኮት አለወ? | 1. አዎ 2.የ ለም | |
| ከዚህ በታች ከተዘረዘሩት የ ቤት እንስሳት ወስጥ የ ቱ አላችሁ | | | |
| 223 | ላም | 1. አዎ 2.የ ለም | |

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| 224 | በሬ | 1. አዎ 2.የለም | |
| 225 | ፈረስ | 1. አዎ 2.የለም | |
| 226 | በቅሎ | 1. አዎ 2.የለም | |
| 227 | ፍየል | 1. አዎ 2.የለም | |
| 228 | በግ | 1. አዎ 2.የለም | |
| 229 | ዶሮ | 1. አዎ 2.የለም | |
| 230 | ጊደር | 1. አዎ 2.የለም | |
| 231 | አህያ | 1. አዎ 2.የለም | |
| 232 | የንብ ቀፎ | 1. አዎ 2.የለም | |

**አካባቢያው ሁኔታዎች**

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| 301 | በቤት ወስጥ የሚጠቀሙት ዋና ውየ ውሃ ምንጭምንድነ ው? | 1. የቧንቧ ውሃ<br>2. የቁሬ<br>3. የገደል<br>4. የምንጭ<br>5. ሌላ ካል ይግለጹ<br>_____ | |
| 302 | የ ማጠጥ ውሃ ዎን ያከማሉ? | 1. አዎ<br>2. አይ የለም | |
| 303 | የላይኛውን ጥያቄ አዎ ከሆነ ሚልስዎ የትኛውን መንገድ ይጠቀማሉ? | 1. በሜኩላት<br>2. በማጣራት<br>3. የወሀ አጋር ሜጨሞር<br>4. ሌላ ካል ይግለጹ<br>_____ | |
| 304 | በቤትዎ ወስጥ ምን ዓይነ ት መፀዳጃ ይጠቀማሉ | 1. መጸዳጃ አልጠቀምም<br>2. ባህላዊ መጸዳጃ<br>3. ጽዱና ነ ፋሻማየ ሆነ<br>5. ሌላ ካል ይግለጹ<br>_____ | |
| 305 | ከመመ ብዎ በፊት እጅዎን በሳማ ይታጥባሉ ወይ? | 1. አዎ<br>2. አይ የለም | |

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| 306 | ላለፉት 1 ዓመታት ታመው ነበር? (ወባ ፣ ትኩሳት ፣ ተቅማጥ ሚከታወክ ፣ የቆዳ በሽታ፣ የጆሮ ኢንፌክሽን) | 1. አዎ<br>2. አይ የለም | |

**ባህሪያዊ ሁኔታዎች**

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| 401 | ብዙ የሥራ ጫና አለዎት? ቤት ወስጥ/ከቤት ውጭ? | 1. አዎ 2. አይ የለም |
| 402 | የ ትምህርት መሟሪያ መጽሀፍ እጥረት አለብዎት? | 1. አዎ 2.አይ የለም |
| 403 | ከትምህርት ሚልስ ለምን ያክል ሰዓት ያነ ባሉ | ..... |
| 404 | ሞባይል ስልክ አለዎት | 1. አዎ<br>2. አይ የለም |
| 405 | እንተርኔት ይጠቀሚሉ | 1. አዎ<br>2. አይ የለም |
| 406 | እንተርኔት ላይ ምን ያህል ጊዜ ያሳልፋሉ | በየ ቀኑ----------<br><br>በየ ሰዓቱ ---------- |
| 407 | ለምን አላማ | 1 ለማህበራዊ ሚዲያ<br>2 ለትምህርት<br>3 ለሁለቱም |
| 408 | መዋለ ህጻናት ትምህርት ወስደዋል? | 1. አዎ<br>2. አይ የለም |

**የአመጋገብ ልዩነት ልምምድ**

እባክዎን ትናንት በቀን ወይም በሌሊት (በቤትም ሆነ ከቤት ውጭ) የበሉትን ሁሉ ይንገሩኝ። ትላንት ለመጀመሪያ ጊዜ ከእንቅልፉ ሲነሱ ያስቡ። በዚያን ጊዜ ምንም ነገር በልተዋል? ከዚያ በኋላ ምን አደረጉ? በዚያን ጊዜ ምንም ነገር በልተዋል? አዎ ከሆነ ይጠይቁ - እባክዎን በዚያን ጊዜ የበሉትን ሁሉ ይንገሩኝ። መርማሪ - ‹ሌላ ነገር አለ?› ተማሪው ‹ሌላ ምንም› እስከሚል ድረስ። ተማሪው እንደ ሾርባ ወይም ወጥ ያሉ የተደባለቁ ምግቦችን ከጠቀሰ ፣ መርምር - በዚያ የተቀላቀለ ምግብ ውስጥ ምን ተጨማሪ ምግብ ነበር? መርማሪ - " ሌላ ነገር አለ? " ተማሪ 'ሌላ ምንም' ቀኑን ሙሉ ምን እንደበላ እስኪያውቅ ድረስ ጥያቄዎችን ይድገሙ።

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| | **የ ምግብ ምድቦች** | መለጫ (በእያንዳንዱ የ ምግብ ቡድን ስር የ ምግብ ዝርዝሮች) | በእያንዲንደ የ ምግብ ቡዴኖች ስር ፣ ቢያንስ በ 24 ሰዓት ክበብ ወስጥ ቢያንስ አንዴ ምግብ ከተጠቀመ አዎ ከተዘረዘረ ምግብ ካልተጠቀመ አይ የ ለም የ ሚሇውን ያክበቡ |
| 501 | ጥራጥሬዎች ነጭ ሥሮች እና ቅጠሎች | ኢንጀራ ፣ ዳቦ ፣ ሩዝ ፣ ኑድል ፣ ገንፎ ፣ ወይም የ ተሰሩ ሌልች ምግቦች ከእህል ፣ እንደ ፣ ጠፍ ፣ በቆሎ ፣ ገብስ ፣ ስንዴ ፣ ማሽላ | 1. አዎ<br>2. አይ የ ለም |
| 502 | ጥራጥሬዎች (ባቄላ ፣ አተር እና ምስር) | ከባቄላ ፣ አተር ፣ ምስር ወይም ለወዝ የ ተሰሩ ማናቸውም ምግቦች | 1. አዎ<br>2. አይ የ ለም |
| 503 | ለወዝ እና ዘሮች | ከለወዝ ፣ ከዘር (ሰሊጥ ፣ ሰሊጥ ፣ ሽምበራ) የ ተሰራ ማንኛውም ምግብ | 1. አዎ<br>2. አይ የ ለም |
| 504 | ሁሉም የ ወተት ዋጽአዎች | አይብ ፣ እርጎ ወይም ሌላ የ ወተት ተዋጽአዎች | 1. አዎ<br>2. አይ የ ለም |
| 505 | የ ስጋ ምግቦች | ጉበት ፣ ኩላሊት ፣ ልብ ወይም ሌልች የ አካል ክፍልች ስጋዎች? እንደ ሥጋ ፣ የ አሳማ ሥጋ ፣ በግ ፣ ፍየል ፣ ዶሮ ያለ ማንኛውም ሥጋ<br><br>ወይም ዳክዬ | 1. አዎ<br>2. አይ የ ለም |
| 506 | **እንቁላልች** | **እንቁላልች** | 1. አዎ<br>2. አይ የ ለም |

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| 507 | ቫይታሚን ኤ የበለፀገ ጥቁር አረንጓዴቅጠል አትክልቶች | ማንኛውም ጥቁር አረንጓዴ ቅጠላማ አትክልቶች (ጎመን ፣ ስፒናች ፣ ሰላጣ ፣ የሜንጌ ቅጠሎች ፣ ሳማ፣ ኮስታጎመን)። | 1. አዎ<br>2. አይየለም |
| 508 | ሌላ በቫይታሚን ኤ የበለፀጉ አትክልቶች እና ፍራፍሬዎች | ካሮት ዱባ ፣ ቢጫየበሰለ ፓፓያ ማንጎ የሆነ ጣፋጭ ድንች | 1. አዎ<br>2. አይየለም |
| 509 | ሌሎች ቅጠላቅጠሎች | በርበሬ ፣ ቲማቲም | 1. አዎ<br>2. አይየለም |
| 510 | ሌሎች ፍራፍሬዎች | | 1. አዎ<br>2. አይየለም |

**የሰውነት ልኬት**

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| 601 | ክብደት በ ኪግ | ልኬት 1<br>ልኬት 2 | |
| 602 | ቁመት በ ሴ.ሜ | ልኬት 1<br>ልኬት 2 | |
| 603 | BMI(ቢኤምአይ) | | |

**የአካዳሚክ አፈጻጸምእና ተሟሪዉየቀረበት አጠቃላይ ሞርጃ ከመዘገብክፍል የተሰበሰበ**

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| 701 | የመጀመሪያ ወሰነ ት/ት አጫይ ወጤት | |
| 702 | የሁለትኛውወሰነ ት/ት አጫይ ወጤት | |
| 703 | አጠቃልይ አጫይ | |
| 704 | በአመቱ ወስጥ የተገኘ የቀሪ ብዛት | |

## IV. DECLARATION

I declare that this thesis is my original work and has not been presented in this or any other University. All sources of materials used for this thesis have been fully acknowledged.

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