ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND ACADEMIC PERFORMANCE AMONG PUBLIC PRIMARY SCHOOL STUDENTS IN DEBRE-TABOR TOWN, AMHARA REGIONAL STATE, NORTH-CENTRAL ETHIOPIA, 2018.

BY TIGIST ENYEW (BSC)

A RESEARCH THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING IN SCHOOL OF NURSING AND MIDWIFERY

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DECLARATION

I, the undersigned Msc student, declare that I have submitted my original work. This thesis has not been presented for a degree in this or another university and that all sources of materials used for this thesis have been fully acknowledged.

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ABBREVIATIONS

BAZ Body Mass Index for Age Z-score

EDHS Ethiopian Demographic Health Survey

EFA Education for All

ESDP Education Sector Development Program

GTP Growth and Transformation Program

HAZ Height for Age Z-score

IQ Intelligence Quotient

MDG Millennium Development Goals

NGOs Non Governmental Organizations

NEP Nutrition Education Program

PSLCE Primary School Leaving Certificate Examination

SBP School Breakfast Program

UN United Nation

UNICEF United Nations Children's Fund

USDA United States Department of Agriculture

UNESCO United Nations, Educational, Scientific and Cultural Organization

WAZ Weight for Age Z-score

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ABSTRACT

Background: - Despite the great struggle to prevent malnutrition it is still a major global burden which mainly affects children. Under-nutrition is a fundamental factor which resulted in delayed cognitive development and under achievement of academic performance later in children's life at school. Studies revealed that the extent of under-nutrition in Ethiopia is established well but evidences about its relationship with educational achievement of school age children are insufficient.

Objective: To assess the relationship between nutritional status and academic performance among public primary school children in Debre-Tabor Town, Amhara Regional State North-Central Ethiopia, 2018.

Method: - An institution based cross-sectional study was conducted. Simple and systematic random sampling techniques were used to select a total of 399 study participants at Debre-Tabor Town. The nutritional status was assessed using anthropometric measurement of WHO 2007 reference as Height for Age Z-score (HAZ), Weight for Age Z-score (WAZ) and Body Mass Index for Age Z-score (BAZ). Academic performance was assessed by calculating two semesters overall subjects average score. Descriptive statistics, Pearson's correlation test and linear regression were used for statistical analysis. Data were analyzed using SPSS version 24 and nutritional status was analyzed using WHO AnthroPlus version 1.0.4 (5-19 years).

Result:-The prevalence of stunting, wasting, underweight and overweight was 22%, 32.4%, 24.3% and 1.3% respectively. The mean academic performance for study participants was 71.65(±12.63 SD). There was statistically significant positive relationship between academic achievement and HAZ. Age of child and absenteeism were associated negatively while head of house, attending preschool and breakfast habit associated positively with educational achievement of the study participants.

Conclusion:-The prevalence of under-nutrition among study participants was high. Children not having breakfast and those absent from school perform poor in academic performance. The relationship between HAZ and academic achievement was positive and statistically significant. Therefore there should be nutritional interventions during prenatal, young infant periods and at school to enhance children's long term nutritional status and their educational achievement. Students should be encouraged to eat breakfast and attend classes regularly.

Key Terms: Nutritional status, Academic performance, primary school, child

1. INTRODUCTION

1.1. Background

Child malnutrition is one of the most serious societal health problems in the world with the highest prevalence in Ethiopia (1). Primary school children who are suffering from malnutrition has under achievement of academic performance which potentially affect their excellence of life in the future (2). Children are well thought-out the greatest national source of any country for the development of the nation (3).

Malnutrition remains as a key crisis in adolescents' school performance due to inappropriate eating practices (4). Despite the progress that has been made by the Millennium Development Goals (MDG) and Education for All (EFA) goals, 58 million primary school age children are out of school worldwide due to diverse reasons (5). Schooling provides knowledge and skills for children to accomplish something in life and associated with increased incomes, reduced poverty and improved health (6).

Ethiopian elementary education is free with first and second cycles lasting for 8 years. Children in second cycles seated for Primary School Leaving Certificate Examination (PSLCE) which determines succession to secondary school (7). Elementary schooling is enormously grave for the development of nations which provide an average highest public returns to investment for the state with a dynamic financial growth (8).

Appropriate nutrition is significant for maximizing intelligence, learning and cognitive performance (9). Food insecurity leads to undernourishment which is resulted in poor educational achievement (10). Enhanced nutrition has an affirmative impact on academic success in which well-nourished children prepared more to learn and present at school and class in order to take the advantage of educational opportunities (11).

Primary education is an instrument in order to meet United Nation Education, scientific and Cultural Organization (UNESCO) goal "quality education and lifelong learning for all by 2030" and "end poverty by 2030". In addition it is one of the most potential approach to realize Ethiopia's current Gross Transformation Program (GTP) development vision to become a middle income economy by 2025 (8).

Under-nutrition is detrimental for the academic achievement of school age children which will resulted in a cyclic food insecurity and scarcity (12).

So nutritional intervention is important for children attending primary school since it enhance efforts to reduce levels of malnutrition and supplement better academic achievement in the preschool years.

1.2. Statement of the problem

Globally more than 450 million children will be affected by stunting in 2025 when compared to the 2010 data (13). Globally around 38% of undernourished children depart primary school without learning how to read, write and do simple arithmetic skills (6). All country is facing a serious public health confront from malnutrition in which 1 in 3 people is malnourished and an estimated 45% of deaths of children under age 5 are linked to malnutrition (14).

Asia and Africa have faced under-five child malnutrition. 56% stunted, 69% wasted and 49% overweight children were from Asia. Africa shares 38% stunted, 27% wasted and 24% overweight children (15)**.** More than 50% of Lambani school children were suffering from malnutrition with significant association of nutritional status with cognitive ability and educational attainment (11). Our continent is suffering from 59.0 million stunted and 14.0 million wasted children. Stunting were highly prevalent in Eastern Africa (24.0%) when compared with Western Africa (19.2%) (15).

Schools face increasing demands to improve core academic performance as it depends on the child's health, nutrition, cognitive development and socio-economic status (4, 16). In many developing countries undernourishment is pervasive that negatively affect the ability of children to learn and put them to perform at a lower level in school (17). Children who are suffering from stunting before 2 years of age will have deficits in cognition and school achievement from the age of 5 years to adolescence (18). Under-nutrition remains being one of the principal barriers to children's growth and development which have negative effect on the educational achievement of learner's (19).

African malnourished school age children are at risk of repeating grades and dropping out of school with an achievement of 0.2 to 1.2 years less in school education (20). More than a quarter of children in sub-Saharan Africa are too thin which is resulted in impaired mental development and low educational achievement (21). In 2025 an additional 11.7 million children will be stunted in sub-Saharan Africa when compared to the 2010 data (13). About 29.3% rural and 22.2% urban school age children in India were underweight while 21.5% rural and 16% urban school age children were stunted (3). The prevalence of malnutrition in rural school aged children was 30.3% for underweight and 27.9% for stunting respectively (22).

Ethiopian Demographic and Health Survey (2016 EDHS) report shows that the prevalence of under five severe malnutrition were 18% for stunting, 3% for wasting and 7% for underweight respectively (23). The Cost of Hunger in Africa (COHA) summary report revealed that more than 2 out of every 5 children in Ethiopia are stunted with 16% repetitions in primary school children and an achievement of 1.1 years less in schooling (24). Although the targets set in Education Sector Development Program IV (ESDP IV) for dropout and repetition rates of 1% in all primary grades were strive, the academic performance in primary school children were touching these targets in which they have achieved poor (25). Even though numerous research findings stated the magnitude and consequences of under-nutrition from different parts of the globe, its relationship with educational achievement requires further investigation with strong study design.

1. 3. Significance of the study

The result of this study provides baseline data for the study area and serves as guidance for the nurse professionals and other health care providers on nutritional status, academic achievement and their relationship. So nurses will consider nutritional status assessment at school in addition to health education regarding hygiene, vaccination for childhood illnesses like measles, trachoma and parasites. It serves as a supplementary data to the regional state in addition to the existing facts. The study also provides information for researchers to conduct further investigations in the school population with strong study design and large sample size. By far this study benefits the zonal and regional education and health office policy makers and planners to intend appropriate nutritional interventions through SFP and NEP at school in order to deal with the impact of malnutrition on academic performance among primary school children.

2. LITERATURE REVIEW

2.1. Introduction

Academic performance in primary school children is crucial for the future of Ethiopian nation which is affected by several factors such as nutrients taken, frequency of diet, socio-demographic and economic conditions and parental education and support. This literature review is done to assess the current nutritional status, academic achievement and their relationship in primary school children students. Different literatures have been reviewed based on the findings which are reliable with the research variables and objectives of this study from the global, Africa and Ethiopia aspect. The literature reviewed shows the prevalence of malnutrition, academic performance and the relationships between nutritional status and academic performance.

2.2. Over view of nutritional status from global perspective

The current global data shows that an estimated of 155 million (22.9%), 52 million (7.7%) and 41 million (6.0%) under five children are stunted, wasted and overweight respectively. This problem will be resulted in a marked difficulty of learning in primary school children (15). An estimated of 167 million children the vast mass in sub-Saharan Africa will be living in extreme poverty (6). Asia is a residence to the majority of children under-five suffering from stunting (87 million), wasting (35.9 million) and severe wasting (12.6 million) (15). The prevalence of any form of malnutrition in Southern India primary school children was 60.2% with 32% stunting, 50% wasting and 34% underweight respectively (2). In India the prevalence of stunting, underweight and wasting found to be the highest in the age group 5-6 years, 11-12 years and 7-8 years respectively which is an indicative that children attending primary school are at high risk for under nutrition (26). In Malaysian primary school children 10.7% and 18.1% of the children were underweight and overweight (obese) respectively (27). The prevalence of stunting, underweight and wasting in Kenyan school aged children were 24.5%, 14.9% and 9.7% respectively (28). A study from Nigeria reveals that the prevalence of under nutrition in public primary school, private primary school and state pilot primary school were 18.5%, 10.5% and 9.0% respectively (29). The prevalence of underweight and stunting in Egypt occurred as 10% and 53.2% respectively (30).

Ethiopian under five children who are suffered from stunting, wasting and underweight were 38%, 10% and 24% respectively. Among the stunted children 46% of them were found in the regional state of this study area (23). School aged children who are suffering from stunting will have reduced cognitive capacity and higher risk of repeating grades in school and dropping out of school (20). A study in Bahir Dar shows that out of 2372 elementary school children 24.8% of the students were underweight (31).

In Sidama the prevalence of wasting was 28.2% which was significantly higher among female children (31.10%) than male children (24.20%) (1). In Eastern Ethiopia, Harar the prevalence of stunting among school aged children was 8.9% in which 2% were severely stunted (32). According to a study in Southwest Ethiopia the prevalence of stunting, wasting and underweight were 20.6%, 12.7% and 14.3% respectively (21).

2.3. Nutritional status and academic performance

Worldwide more than 60 million undernourished primary school aged children are out of school (6). USA school-age children who have a proper balanced diet will have better intelligence ability, maximized cognitive capability and better educational achievement (10). A statistically significant relationship was found between overweight and educational underachievement of spelling and arithmetic tasks which indicate the negative effect of inadequate nutritional intake on school performance (33). Studies from United Kingdom shows that there is a strong association between breakfast consumption and educational achievement in primary-school children (34). Students perform 74.6% for written, 79.7% for reading and 78.0% for arithmetic tests. This was lower achievement which show a statistically significant relationship with malnutrition (33). Food insecurity has been found to be negatively associated with poor academic achievement, intellectual wellbeing and cognitive development in school-aged children (12). The academic performance in most Brazilian children were low in which overweight children had a worse outcome in writing and arithmetic skills (33). The academic achievement of school aged children were increased in students who have participated in the United States Department of Agriculture (USDA) School Breakfast Program (SBP) (35). In Santiago, Chilean adolescent students who had unhealthy nutrients were perform low academically which shows significant association between diet and educational achievement (36). The finding in Turkish reveals that malnutrition is not the sole factor why students have very poor academic performance (37).

Energy consumption and protein intake has an overt positive relationship with the academic achievement of Tripura's primary school children in india (38). A research done in Lambani School children show that wasted and stunted children have scored 4.44% for B, 2.96% for C and 0.74% for B+ grade respectively. None of them were scored A+ and A- grades which indicates the positive and highly significant association between nutritional status and academic achievement (11). Another study in Indian school age children revealed that underweight was found higher among girls (5.7%) than boys (3.5%) with poorer educational achievement in boys (23.8%) than girls (18.6%). Educational underachievement was seen in 31.5% of obese, 30.0% of underweight and 22.9% of overweight children respectively (39).

There was considerable relationship between under-nutrition and low educational performance of Lambani school children (11). Stunting and underweight showed a significant positive associations with Tamil, Mathematics and overall subject average marks while thinness related with Mathematics and overall subject average marks only (2). In Philippines the prevalence of stunting increased from 30.3% to 33.4% in 2015 when compared with the 2013 data and resulted with 15% of grade repetitions (40). Children having frequent breakfast had perform well in IQ test scores while those who occasionally have breakfast perform low (41).

African school aged children who were stunted before the age of five will have reduced cognitive competence and underperformance in school with reiterate grades. Among the 7 to 16% of all grade repetitions in stunted school aged children, the mass (90 %) take place in primary school (7). The prevalence of malnutrition in Nigerian public primary school children was 38.0% for underweight and 37.0% for overweight (29). A study conducted in Zimbabwe grade seven learners reveals that having frequent meals and receiving a regular breakfast, lunch and dinner have positive effects on children's learning achievement (19). A study in Morocco rural school children shows that the prevalence of malnutrition was significantly more frequent among boys than girls in which stunting was 12.2% and wasting was 12.3% among boys. This study also reveals 30.1% of girls and 38.7% of boys rated as poor for mathematics and 17.1% of girls and 37.3% of boys rated as poor to average. This finding concludes that school performance is determined by various factors which are dependent on child and parental characteristics (4). A research done in Nigeria showed that weight jointly with height was a strong likely forecaster of academic performance in children when

compared to other variables with a weak relationship between nutritional status and academic performance (42).

Undernourishment is a key public health problem which affect the large number of school children's wellbeing, development and educational achievement (43). In Ethiopia the likely grade level achieved by stunted school age children were lower than from that of who did not suffer from childhood under nutrition. The highest repetition in under nutrition school children by grade level were grade one (38, 713) grade two (25,508), grade five (19,563) and grade four (19,449) respectively (24). A study in Adama, Ethiopia found that 15.6% stunted 21.3% underweight, 3.3% overweight and 1.0% obese adolescent girls. This study reveals that the prevalence of wasting, stunting and low dietary diversity were higher among government school children when compared to those from private school children (44). In contrary a research done in South Gondar, Ethiopia shows that nutritional status as measured by BMI did not show an association with academic performance (45).

A study done at Goba town, Oromia found that there was a statistically significant positive correlation between stunting and mathematics score among school aged children. However, both wasting and underweight have no statistically significant association with academic performance (17). A study at Hawa Gelan, Southwest Ethiopia found a significant correlation between underweight, stunting and academic performance. Both stunted and underweight students were less likely to achieve good academic performance when compared to students having no stunting and normal weight respectively (21). Another study in Gurage Zone, Ethiopia revealed that underweight and stunting had negative association with academic performance of primary school children but wasting did not associated (46).

2.4. Academic performance and socio-demographic /economic status

Students in the age group of 16 with unhealthy diets were perform less in language tests and mathematics tests (36). A research finding reveals that sex and learning approach were both strongly related to school performance and breakfast skipping was associated with lower school performance (47). Males were more affected by malnutrition than females which resulted in low educational performance of males than females (2). A study from Nigeria found that girls perform academically better (66.39% ± 16.05%) than boys (63.45% ± 17.45 %) (42)**.**

Socio demographic factors including sex, absenteeism, and distance from school, grade attended, parental socio economic status and parental involvement in their children's schooling were found to be significantly associated with primary school children's academic performance (21, 45, 46). Students, who were female, attend 2^{nd} cycle and have educated parents been more likely to achieve good academically. In addition students from high income (>2000 ETB) households were 2.85 times more likely to achieve good academically when compared to students from low income (<1000 ETB) households. Students who have no parental support were less likely to achieve good academically when compared to those who have parental support (21). Studies from North-Central Ethiopia and South Central Ethiopia reveals that sex significantly impact school performance in which males performed 2.39 times better than females in academic performances (45, 46). A study done at Goba town found that age and wealth index was positively associated with average score of all academic subjects of the previous semester. But variables including residence, maternal education, paternal education, diet diversity, meal frequency, breakfast habit, sex of the child, occupation, attendance of preschool program and family size were not significantly associated with academic performance (17).

In general the academic achievement of primary school children is affected by several factors as the different reviewed literatures illustrate. The principal issues raised in many findings were nutritional status, socio-demographic and economic characteristics and academic performance.

2.5. Conceptual framework

The networking of the variables was developed after reviewing literatures (11, 21, 30). The relationship of the variables reveals that nutritional status, child and parental socio-demographic and economic characteristics are the independent variables which affect the academic performance of primary school children whereas academic performance is the dependent variable.

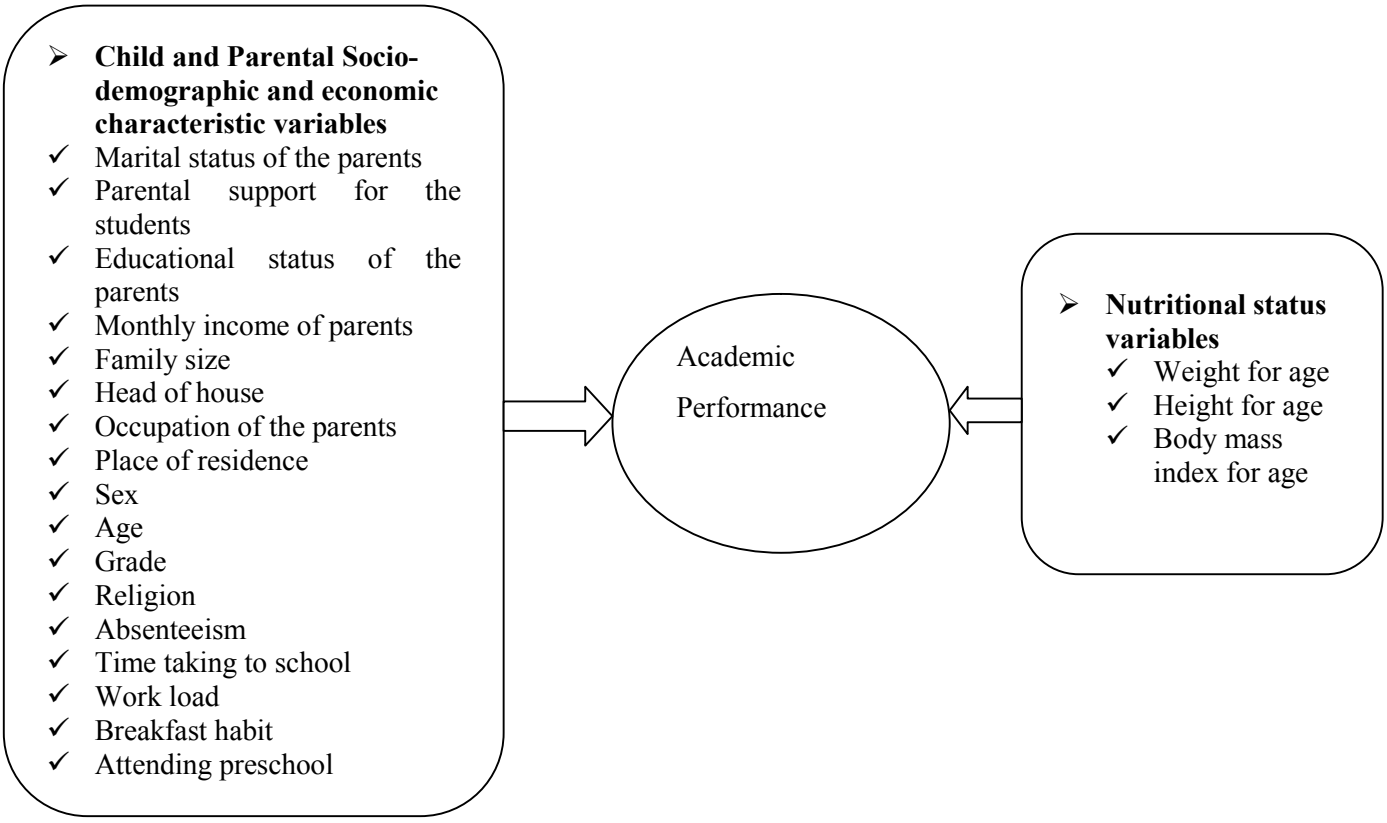


Figure 1:-A conceptual framework shows the interaction between nutritional status and academic performance

3. OBJECTIVES OF THE STUDY

3.1. General objectives

- To assess the relationship between nutritional status and academic performance among public primary school children in Debre-Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018.

3.2. Specific objectives

- To investigate the nutritional status among public primary school children in Debre- Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018.
- To examine the school performance among public primary school children in Debre- Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018.
- To determine the relationship between nutritional status and school performance among public primary school children in Debre- Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018.
- To determine the socio-demographic and economic predictors of school performance among public primary school children in Debre- Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018.

4. METHODS

4.1. Study area

The study was conducted in Debre Tabor Town, North-Central Ethiopia. Debre-Tabor Town is located 665kms North-Central Ethiopia of Addis Ababa which is the capital city of Ethiopia and 74kms of Bahir Dar Town which is the capital city of Amhara Regional State. The 2017 population projection shows that the total population of the study area was 96,973 of which 49,753 were males (48). As information obtained from the town education sector, the town has two preparatory schools, fourteen elementary schools of which seven governmental and nine Kindergarten schools. The total population of public primary school children was 6,935 of which 3,408 were males.

4.2. Study design and period

An institution based cross-sectional study was conducted from March 30 to April 30, 2018.

4.3. Source population

The source population was all children who are enrolled at all public primary schools in Debre-Tabor Town.

4.4. Study population

All children who have attended their primary education in the selected public primary schools of Debre-Tabor Town and those who full fill the inclusion criteria.

4.5. Eligibility criteria

4.5.1. Inclusion criteria

All primary school children in the selected public primary schools aged above 7 years and below 14 years and those who have at least two semester total subject average score during the study period were included.

4.5.2. Exclusion criteria

Those children who were unable to communicate and have critical health problems during the study period were excluded from the study.

4.6. Sampling

4.6.1. Sample size determination

The sample size was calculated using single population proportion formula by considering at 95% confidence level, 0.05 margin of error and average academic performance of 62.25% in the study area (45). The required sample size was 399 after adding 10% of non response rate.

$$\mathbf{n} = \left[\frac{\left(\mathbf{z}\frac{\alpha}{2}\right)^2 \mathbf{p(1-p)}}{\mathbf{d^2}}\right] \text{Equation 1}$$

Where: n= required sample size, $z\frac{\alpha}{2}$ = critical value for normal distribution at 95% confidence level which equals to 1.96 (Z value at alpha=0.05), P= average academic performance = 0.6225 and d= an absolute precision= 0.05

$$\mathrm{n} = \left[\frac{(1.96)^2 \mathrm{x}\ 0.6225(1-0.6225)}{(0.05)^2}\right]$$

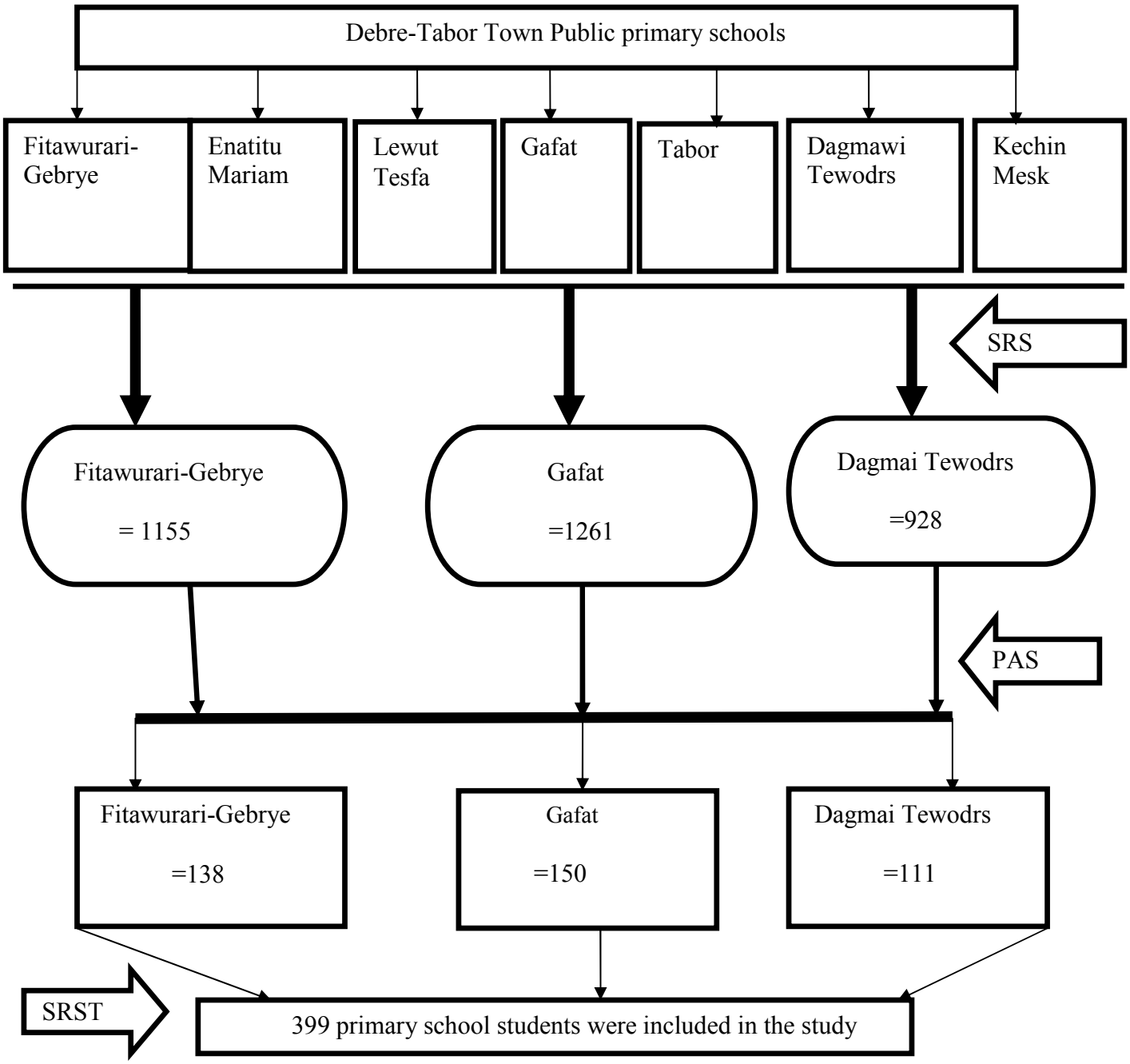
n=361.12 ~ 362

After adding 10% of non response rate, the required sample size was 399 public primary school children.

4.6.2. Sampling procedure

Simple random sampling technique was used to select three schools from the seven public primary schools and proportional allocation to each selected schools were done based on the number of students. Therefore 138 students from Fitawurari-Gebreye, 150 students from Gafat and 111 students from Dagmawi Tewoderos public primary schools were included. Finally those proportionally allocated study participants were selected using systematic random sampling technique to pool the final sample size. (K_{GPS}= 1261/150 = 9, K_{FGPS}= 1155/138= 9 and K_{DTPS}= 928/111= 9). After selecting the first sample by lottery method, study participants were selected in every ninth interval from the schools roster list of grade two to grade eight students.

Where:- GPS: Gafat primary school, FGPS: Fitawurari Gebrye primary school and DTPS; Dagmawi Tewodros primary school.



Where:- SRS: Simple random sampling, PAS: Proportional allocation for size and SRST: Systematic random sampling technique

Figure 2: A schematic presentation of the sampling procedure

4.7. Data collection instrument and procedure

A structured questionnaire was administered to assess the children's parental socio-demographic and economic status which is adapted from previous studies (17, 45). The nutritional status was assessed using anthropometric measurement indices of the WHO standard reference 2007 as HAZ score ≤ -2SD (stunted), WAZ score ≤ -2SD (wasted) and BAZ score ≤ -2SD (underweight) or thin), BAZ ≥ +1SD (overweight) and BAZ ≥ +2SD (obese). Obesity is not the concern of this study because the current finding and several findings evidenced that the problem is not seen in the study area and most of the Ethiopian regional states (17, 21, 43, 45). The child's height and weight was measured with meter and digital weight scale while the academic performance was assessed by calculating the two semesters overall subjects average score from the individual child's grade report of school roster. Six trained Health extension workers and two trained BSc nurses under the supervision of the principal investigator were recruited to collect data and supervise the data collection process respectively.

Consent was obtained from their parents and informed assent was obtained from children for their authorization to get their anthropometric measurements. The quality of data was ensured through training of data collectors after explaining the objectives of the study and recruiting data collectors who are Health Extension Workers and BSc nurses. An English version of the questionnaire was translated into Amharic to collect data and back to English by another person to check its consistency for the analysis. A pre-test was done on 5% of the school children and their caregivers at Woreta Town public primary school children which is the nearby woreda in South Gondar, Ethiopia. During the data collection process communication was taken immediately before proceeding the next day data collection for any mistakes made.

4.8. Anthropometric measurements

The children's body weight was measured to the nearest 0.1kg with light closing and bare foot using a digital weighing scale by trained data collectors. The child stood with both feet in the center of the scale after checking the weight measurement scale indicator against zero reading after weighing every child. This means that the scale reads zero when no weight is placed on it. Their height was measured using meter to the nearest 0.1cm without shoes in a standing position. Child stood on flat surface with feet flat, together and against the wall. Legs, arms and shoulders were straight, at sides and level respectively. The completeness and consistency

of the data collection was checked before the study participants leave. The overall activities were monitored by the principal investigator.

4.9. Study variables

Dependent variable

- Academic performance

Independent variables

- Child nutritional status (WAZ, HAZ and BAZ),
- Child and their parent socio-demographic and economic characteristics (age, sex, religion, occupation, educational and marital status of parent's, parental support for the students, monthly income of parents, head of house, breakfast habit, absenteeism, time taking to school, work load to the child, family size and attending preschool).

4.10. Operational definition

Nutritional status: is the child's state of the body which is determined by anthropometric measurement indices as stunted, wasted, underweight or overweight based on the WHO standard reference 2007 (49).

Anthropometric measurements: is the nutritional status measurement method of primary school children to identify whether they are stunted, wasted underweight or overweight.

Malnutrition: is a poor nutritional status of primary school children which is expressed in anthropometric indices when the Z-scores for the WHO standards of 2007 are less than or equal to minus two (Z-scores $\leq$ -2SD) or more than plus one for BAZ (z-score $\geq$ +1 SD).

- **Stunting:** indicates the nutritional status of the study participants when their height for age z-score is less than or equal to minus two (HAZ $\leq$ -2SD) for the WHO standard reference 2007.
- **Well nourished:** indicate children's nutritional status which is measured as HAZ greater than minus two standard deviation (HAZ> -2 SD) to the WHO reference 2007.
- **Underweight:** indicates the child's nutritional status among the study participants which is measured as body mass index for age z-score less than or equal to minus two (BAZ$\leq$-2SD) of the WHO standard reference 2007.
- **Wasting:** is the nutritional status of primary school children aged 7-10 years and expressed in weight for age z-score less than or equal to minus two (WAZ $\leq$ -2SD) of the WHO standard reference 2007.
- **Overweight:** is the school age children nutritional status which is measured in terms of body mass index for age z-score greater than or equal to plus one (BAZ $\geq$ +1 SD) of the WHO standard reference 2007.

Academic performance: is the child's two semester's average score result of the total subjects obtained from the individual child's semester grade report and considered as good if it is more than the mean academic performance and poor if less than the mean academic performance.

Primary school children: - Children who attend primary school and are in the age group of 7-14 years as set by ESDP IV (25).

4.11. Data processing and analysis

Data was checked for completeness, coded, entered, cleaned and checked using Epi-Data 3.1 and analyzed using SPSS version 24. The nutritional indicators HAZ, WAZ and BAZ were calculated from measurements using WHO AnthroPlus version 1.0.4 software and compared with the WHO references 2007 data. The anthropometric indices measurement below-2 standard deviation (-2SD) of the WHO median for WAZ, HAZ and BAZ were considered as wasted, stunted and underweight respectively. Child was considered as overweight for BAZ above +1 SD from the WHO reference median.

A descriptive analysis was conducted to get summary data on frequencies, means and standard deviations of the child and their parental socio-demographic and economic characteristic variables. Pearson's correlation test was performed to assess the relationship between nutritional status and academic performance of the study participants. Linear regression was performed to determine the socio-demographic and economic predictors of academic performance. The statistical significance was declared at Pvalue ≤ 0.05.

4.12. Ethical consideration

Ethical clearance was obtained from the ethical review board of Addis Ababa University, School of Nursing and Midwifery. A formal written letter was given to Debre-Tabor Town Education Sector, Health bureau and to the respective primary schools and health centers. After a detail explanation of the purpose of the study for the selected schools, a written consent was obtained from the parents of the participant children and informed assent was obtained from children for their authorization to get their anthropometric measurements. The study participants were informed that they have the right to refuse participation at any time. Codes were given to the study participants in order to keep their confidentiality.

4.13. Dissemination of Results

The result of this study was submitted and disseminated to Addis Ababa University, School of Nursing and Midwifery. It will be also disseminated to the zonal education and health office of Debre-Tabor Town and other stake holders. After public defense and incorporation of comments, attempt will be made to publish the paper in reputable, peer reviewed journals.

5. RESULT

5.1. Socio-demographic and economic characteristics of the study participants

A total of 399 public primary school children were enrolled with 100% response rate. Out of these participants, (52%) were males and (48%) were females with mean age of 12 (±1.9 SD) and 11.8 (±1.8 SD) respectively. Majority of the study participants (73%) were in the age group 11-14. The large proportion of the participants (62%) was from second cycle (5-8 grades). Most of the children were Orthodox Christian (96%), from urban (99%) and married families (73%). Majority of the participants, (42%) were headed by both father and mother. More than half of the participants, 56% were from a family size of less than five.

Majority of the participants were from no formal education mothers (45%), government employee fathers (37%), monthly income of >2000 ETB (62%) and house wife mothers (55.4%). More than half of the study participants, 55% have attended preschool. The vast majority of participants were from family support of child education (81%) and no work load at home (90%). Regarding breakfast, almost all of the participants (97%) ate breakfast and more than half, 55% of them ate breakfast always. Most of the participants, 97% travels for less than 30 minutes to go to school with an average time of 14.4 (± 8.4 SD) for males and 15.3 (±8.8 SD) for females respectively. Most of the participants, (71%) were absent from school and 86% of them absent from the school for less than 5 days. (Table 1)

Table 1:- Socio-demographic and economic characteristics of study participants in Debre-Tabor Town, North-Central Ethiopia, 2018, (N=399).

Characteristics	Categories	Frequency	Percent
Grade	2nd- 4th	153	38
	5th- 8th	246	62
Age	7-10	107	27
	11-14	292	73
Sex	Male	209	52
	Female	190	48
Religion	Orthodox	383	96
	Other	16	4
Marital status of family	Married	291	73
	Divorced	85	21
	Widowed	7	2
	Other	16	4
Head of house	Father	129	32
	Mother	88	22
	Both	167	42
	Other	14	4
Total family member	< 5	222	56
	> 5	177	44
Place of residence	Urban	396	99
	rural	3	1
Child living with	Father	32	8
	Mother	82	21
	Both	264	66
	Other	20	5
Mother's education	No formal education	178	45
	Primary	106	27
	Secondary	57	14
	College	51	13
	Other	7	1
Occupation of father	Farmer	29	7
	Government employee	147	37
	Non government employee	13	3
	Self employed	133	33
	Daily laborer	53	13
	Other	24	6
Monthly income of family	< 1000 ETB	62	16
	1000- 2000 ETB	91	23
	> 2000 ETB	246	62
Occupation of mother	House wife	221	55.4
	Government employee	60	15
	Daily laborer	37	9.3
	Self employed	73	18.3
	Other	8	2
Child attend preschool	Yes	218	55
	No	181	45
Work load at home	Yes	40	10
	No	359	90
Family support	Yes	322	81
	No	77	19
Breakfast habit	Yes	386	97
	No	13	3
Breakfast eating frequency	Always	212	55
n= 386	Sometimes	174	45
Time taking to school	< 30 minutes	389	97
	> 30 minutes	10	3
Absenteeism	Yes	285	71
	No	114	29
Number of absenteeism days	< 5 days	246	86
n= 285	5 days	13	5
	> 5 days	26	9

5.2. Nutritional status of primary school children

The anthropometric assessment of the study participants revealed 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. (Table 2)

Table 2:-The prevalence of stunting, wasting, underweight and overweight of study participants in Debre-Tabor Town, North -Central Ethiopia, 2018, (N=399 for HAZ & BAZ, N=105 for WAZ).

Nutritional indicator	Frequency	Percent
Wasting	34	32.4
Stunting	88	22
Underweight	97	24.3
Overweight	5	1.3

5.3. Academic performance of primary school children

The mean academic performance for primary school children was 71.65 (±12.63SD). It was 72.02 (±11.57 SD) for males and 71.24 (±13.73 SD) for females. Study participants in the age group 7-10 perform well (76.61±11.81SD) academically when compared with those 11-14 years (69.84±12.45 SD). Children from high monthly income parents were perform better (72.91±12.34 SD) than those from low (69.53±14.46 SD) income parents. Educational achievement was poor for those who absent for more than five days (69.42±12.61 SD) when compared to those absent for five days (73.34±12.21 SD). Children who were overweight perform better (73.70±9.75 SD) academically when compared with those underweight (70.87±15.84 SD). Well nourished children perform better (72.22±13.05 SD) academically when compared with stunted children (69.65±11.18 SD). Study participants who ate breakfast sometimes perform poorly (70.04±13.54 SD) when compared with those ate always (72.54±11.36 SD). (Table 3)

Table 3 :- Descriptive result for academic achievement of study participants in Debre-Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018, (N= 399).

Variable	Category	Mean	Standard Deviation	Frequency	Percent	Minimum	Maximum	95% CI Lower Bound	95% CI Upper Bound
Age	7-10	76.61	11.81	107	27	49	97	90	125
	11-14	69.84	12.45	292	73	6	97	274	309
Sex	Male	72.02	11.57	209	52	48	97	189	228
	Female	71.24	13.73	190	48	6	97	171	210
Monthly income	< 1000	69.53	14.46	62	16	6	97	49	77
	> 2000	72.91	12.34	246	62	7	97	227	265
Child attend	Yes	73.60	10.99	218	55	49	97	198	237
preschool	No	69.31	14.04	181	45	6	97	162	201
Family support	Yes	72.13	12.83	322	81	6	97	306	337
	No	69.65	11.66	77	19	49	94	62	93
Eating frequency	Always	72.54	11.36	212	55	47	97	193	231
	Sometimes	70.04	13.54	174	45	6	97	155	193
Absenteeism	Yes	70.81	12.50	285	71	6	97	267	302
	No	73.77	12.76	114	29	49	97	97	132
Number of	5 days	73.34	12.21	13	5	57	90	7	21
absenteeism days	> 5 days	69.42	12.61	26	9	52	90	18	37
Height for age z-	Stunted	69.65	11.18	66	17	50	94	52	81
score	Well nourished	72.22	13.05	311	78	6	97	294	326
Body mass index	Underweight	70.87	15.84	73	18	6	97	59	89
for age z-score	Overweight	73.70	9.75	5	1	58	83	2	11

5.4. Relationship between nutritional status and academic performance

There was a statistically significant positive relationship between academic achievement and HAZ of the study participants. This positive relationship indicates that as children become well nourished their height for age z-score increases positively to the appropriate growth and development stage. This in turn resulted with enhanced educational achievement. (Table 4)

Table 4:-Pearson Correlation between nutritional indicators and academic performance of study participants in Debre-Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018, (N=399).

Nutritional Indicators	Academic performance Average semesters score	
	Pearson's coefficient (r)	P-value
Height-for-age (HAZ)	0.130**	0.009
Weight-for-age (WAZ)	0.097	0.323
Body mass index -for-age (BAZ)	0.000	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

5.5. Socio-demographic predicting factors of academic performance

In the bivariate linear regression model, variables including head of house, occupation of father, age of child, grade attended by child, child attending preschool, breakfast habit, absenteeism and monthly income were significantly associated with the academic performance of school age children. After controlling confounding factors in the multiple linear regression model, age of child, head of house, attending preschool, breakfast habit and absenteeism were variables that significantly associated with educational achievement of the school age children. Age of the child and absenteeism were variables that have a statistically significant negative association. Variables including head of house, attending preschool and breakfast habit have a statistical significant positive association with educational achievement. An increase of child age by a unit of year decreases mean academic score by 5.07 (B= -5.07, 95.0% CI: -7.86, -2.28). A unit change in eating breakfast increases mean academic score by 7.61 (B=7.61, 95.0% CI: 0.97, 14.24). A unit increase in absenteeism decreases academic achievement by 3.89 (B= -3.89, 95.0% CI: -6.55, -1.25). A unit change in attending preschool increases academic achievement by 3.03 (B= 3.03, 95.0% CI: 0.53, 5.52) and being father for head of house increases academic performance by 4.52 (B= 4.52, 95.0% CI: 1.95, 7.09). (Table 5)

Table 5:-Factors associated with academic performance of study participants in Debre-Tabor Town, Amhara Regional State, North-Central Ethiopia, 2018, (N= 399).

Variable	Category	B(95.0% CI)	t-test	P-value
	(Constant)	67.18 (59.37,74.99)	16.91	0.000
Age	11-14 years	-5.07 (-7.86, -2.28)	-3.69	0.000
Head of house	Father	4.52 (1.95, 7.09)	3.45	0.001
Breakfast habit	Eat breakfast	7.61 (0.97,14.24)	2.25	0.025
Absenteeism	Absent	-3.89 (-6.55, -1.25)	-2.89	0.004
Attending preschool	Attend preschool	3.03 (0.53, 5.52)	2.38	0.018

6. DISCUSSION

This study attempted to assess the relationship between nutritional status and academic performance and to determine the socio-demographic and economic predictors of academic performance among public primary school children in Debre-Tabor Town, Amhara regional state North-Central Ethiopia.

The overall prevalence of any form of malnutrition for the current study was 56% which is higher than the finding of Hawa Gelan in 2017 in Oromia, Ethiopia (34.6%) (21). However this finding is less than the finding in Sri Lanka in 2015 (60.2%) (2). This variation could be due to difference in the children's health status as recurrent illnesses and childhood diseases compromise their health condition and immunity which in turn affect their nutritional status. In addition early life malnutrition is responsible for nutritional status difference among school age children since chronic malnutrition starts early in the uterine life.

The finding of this study revealed that the prevalence of stunting was 22% which is higher than a finding in Oromia, Ethiopia (20.6%), Harar, Ethiopia (8.9%), Adama, Ethiopia (15.6%), India (18.5%) and Brazil (1.7%) (21, 32, 33, 44, 50). In contrary this finding was less than the findings of Fogera, Ethiopia (37.2%), Kenya (24.5%), Egypt (53.2%) and Lambani, India (37%) (11, 28, 30, 43). The higher prevalence of stunting could be early life malnutrition in the young infant period which is a sensitive period for nutrient deficiencies. This disparity could be due to imbalance in composition of diets with essential nutrients like proteins, carbohydrates, fats, vitamins and minerals. This macro and micro nutrients are vital for body makeup, immunity and cognitive development of children.

The prevalence of wasting in this study was 32.4% which was almost similar with a finding in India (33.3%) (26). However this finding was higher than a finding in Fogera, Ethiopia (30.7%), Hawa Gelan in Oromia, Ethiopia (12.7%), Sidama, Ethiopia (28.2%) and that of Kenya (9.7%) (1, 21, 28, 43). The finding of wasting in this study was lesser when compared with a finding in Sri Lanka (50.4%) (2). The discrepancy in acute malnutrition might be difference in children's health status, nutrient composition (balanced diet), diet size and frequencies of meal. Acute conditions like diarrhea and upper respiratory problems are also key factors for children's acute malnutrition since it reduces their appetite and impede their immunity. Children from low socio-economic status face problems on having regular breakfast, lunch and dinner which resulted in wasting.

In this finding the prevalence of underweight was 24.3% which was almost similar with a finding in Bahir Dar, Ethiopia (24.8%) and the regional state of the study area (24%) (23, 31). This finding was higher than the findings in Adama, Ethiopia (21.3%), Oromia, Ethiopia (14.2%), Kenya (14.9%) and that of Lambani, India (14.66 %) (11, 21, 28, 44). In contrary this finding was lesser than findings in Fogera, Ethiopia (59.7%) and Sri Lanka (33.7%) (2, 43). The inconsistency might be due to differences in socio- economic status and cultural beliefs about foods. Children from rural areas are more at risk for malnutrition than urban children. Additionally meal frequencies affect children's nutritional status in which children having regular meals at morning, lunch and night will have better status than those having any of the three meals.

The prevalence of overweight in this study was 1.3%. This result is less than a finding in Adama in 2016, Ethiopia (3.3%), Nigeria in 2013 (37%), Malaysia in 2014 (18.1%) and that of Brazil in 2014 (22%) (27, 29, 33, 44). This disparity might be due to variation in individual nutrient intake and food preferences. Genetic makeup of the children also plays a role in their nutritional status. In addition differences in socio-economic status could be the reason as Ethiopia is a lower income country. Lower income countries are at risk of food insecurity which affects children's diet composition, diet size and frequency of meal.

In this study the mean academic performance for study participants were (71.65±12.63 SD) which is a higher achievement when compared with a study done in Hawa Gelan in Oromia, Ethiopia (67.2% ±15.4% SD), Tach-Gaynt, South Gondar, Ethiopia (62.25%), Hawassa, Ethiopia (35.1 ± 4.1SD), Sri Lanka in 2015 (<40%) and Nigeria (66.19 ± 17.00 SD) (2, 21, 42, 45, 51). The variation could be difference in assessment of academic performance, learning methods, learning resources accessibility, tutors given and grading or scoring systems. Additionally differences in children's psychology like stress, emotions and their physiology like health status contributes for this discrepancy.

In this study males perform better (72.02±11.57 SD) academically when compared with female students (71.24±13.73 SD). This finding is consistent with a research finding in North-Central and South Central Ethiopian that males have performed 2.39 times better than females in academic performances (45, 46). In contrary findings in Nigeria, Morocco, India and Asia revealed that girls have better educational performance than boys (2, 4, 39, 42). The disparity could be due to the difference in capability of learning among the students. Learning capacity

is influenced by the children's thinking skill, attention, reasoning and memory which are linked with their cognitive development.

In this study primary school children from high monthly income parents were perform better (72.91±1234 SD) than those from low (69.53±14.46 SD) income parents. Educational achievement was poor for those who absent for more than five days (69.42±12.61SD) when compared to those absent for five days (7.343±12.21 SD). Children who were overweight perform better (73.70±9.75 SD) academically when compared with those underweight (70.87±15.84 SD). Well nourished children perform better (72.22±13.05 SD) academically when compared with stunted children (69.65±11.18 SD). Study participants who ate breakfast sometimes perform poorly (70.04±13.54 SD) when compared with those ate always (72.54±11.36 SD). Students in the age group 7-10 perform well (76.61±11.81SD) academically when compared with those 11-14 years (69.84±12.45 SD).

The result of this finding shows that there was a statically significant positive relationship between HAZ and academic achievement (p-value=0.009) which is in line with the finding done in Goba town and Hawa Gelan in Oromia, Ethiopia and Sri Lanka (2, 17, 21). It is also consistent with a finding in Morocco in 2016 (4). This indicates that as children become well nourished their height for age z-score increases to the appropriate growth and development stage. This in turn resulted with positive educational achievement. Long term nutritional status is influenced by protein energy deficiencies that results from under-nutrition during the rapid growth periods of young infants and early in the uterus when the pregnant mother is undernourished.

Children who get appropriate nutrients composed with proteins, fats carbohydrates, vitamins and minerals in the rapid growth spurt period of young infancy and through their school age life will grow physically and mentally to their appropriate age. This proper growth and development will have positive effect on children's academic performance. Appropriate nutrients are important for children to be prepared for learning, attend classes regularly and participate in school learning activities. As children engaged in school learning activities their academic performance maximized to a better achievement. So the similarity indicates that long term nutritional status in these study area has significant positive bond with educational achievement of school age children.

To conclude children who have better nutritional status grow in height to their appropriate age and perform better academically. This positive relation might linked to cognitive development of the children which is important for learning, reasoning, critical thinking and memory. Therefore healthy nutritional practices should be practiced by pregnant mothers in prenatal periods to enhance long term nutritional status which start in the uterus. Young infancy is a period where rapid growth and development of brain takes place. Essential nutrients should be supplemented in this critical nutrient deficiency period to enhance children's health, physical growth and mental development to the expected growth and development stage. This will resulted with affirmative educational achievement of children later in their school age life.

In this finding WAZ and BAZ did not show a statistical significant relationship with academic performance of the study participants which is consistent with a finding in Tach-Gynt, South Gondar, Ethiopia, Gurage Zone, Ethiopia and Goba town, Ethiopia (17, 45, 46). However this is not consistent with the finding in Oromia, Ethiopia and Sri Lanka in which both WAZ and BAZ had significant positive associations with learning achievement (2, 21). This discrepancy could be variation in nutrients taken by children which have either synergistic or antagonistic effects with each other. In addition deficiencies and imbalances in macro and micro nutrients may cause the variations in children's nutritional status and its relation with their educational achievement. The problem can be improved by food supplementation with high protein energy diets and micro nutrients which are vital for children's cognitive development, learning interest and improved educational achievement.

In this study age of child and absenteeism have a statistically significant negative association with educational achievement. Predictors including head of house, attending preschool and breakfast habit associated positively with educational achievement of the school age children. In this study monthly income did not show significant association with academic performance which is opposing to Hawa Gelan finding that study participants from high monthly income households perform 2.85 times better than those from low monthly income households (21). In this study breakfast habit and attending preschool were significantly positively associated with academic performance. This finding is conflicting to the finding in Goba town, Oromia that breakfast habit and attending preschool did not show significant association (17). Variables including sex of the child, residence, maternal education, paternal education, parental occupation and family size were not significantly associated with academic

performance which is parallel to the finding of Goba town in Oromia, Ethiopia (17). Absenteeism was significantly associated with school age children's academic performance which is parallel to the finding of Tach-Gynt in South Gonar, Ethiopia (45)**.**

This study revealed that as age of child increases by a unit of year in children aged 11-14 years their educational achievement decreases by 5.07 when compared to those aged 7-10 years (B: -5.07, 95% CI: -7.86, -2.28). These variations could be due to more attention for pubertal period changes rather than learning and attending classes as age increases from 7-10 years to 11-14 years. Adolescence is a period where secondary physiological characteristics are seen which occupied children's attention not to focus on learning and attending classes. The academic performance of study participants who have eaten breakfast increases by 7.61 unit change when compared with those who have not eaten breakfast (B: 7.61, 95% CI: 0.97, 14.24). This could be the positive effect of breakfast as it replaces energy loss in children who spent most of their time on different recreational activities. It also makes students alert and active to learn, participate and attend classes. A unit changes in absenteeism decreases the academic performance of students by 3.89 when compared to those who have not absent (B: -3.89, 95% CI: -6.55, -1.25). This could be due to the negative effect of absenteeism in which students miss important opportunities like lectures and class exercise solutions from their teachers, group discussions with their classmates and other school populations.

Attending preschool enhances academic performance by 3.03 unit change when compared with those who have not attend preschool (B: 3.03, 95% CI: 0.53, 5.52). This might be the opportunity that children who have attend preschool could have better awareness about school environment, enhanced communication skill and better social interaction which prepared them for learning and attending class.

7. STRENGTHS AND LIMITATIONS OF THE STUDY

7.1. Strength

The study draws the sample from a large population and it includes grade two to grade eight primary school children which provides better inference for the relationship between nutritional status and educational achievement of school age children.

7.2. Limitations

The study design does not show the causal relationship between nutritional status and academic performance. This study does not include grade one students since two semester average educational achievement was taken. The study does not assess the clinical and biochemical nutritional status of the students which are essential for growth and development of mind. It also does not assess the children's dietary diversity, food frequency and young infancy period nutritional status like exclusive breast feeding and weaning practices which might be one of the determinants of educational achievement of school age children. In addition the study does not include private primary school children which might be a supplement for inference about nutritional status and academic performance relationship among school age children. The study did not assess the children's cognition which has a bearing on their educational achievement.

8. CONCLUSION

The present study revealed that the prevalence of under-nutrition among school age children is high in the study area with an overall prevalence of any form of malnutrition 56.14%. The prevalence for each nutritional indicator was 22% for stunting, 32.4% for wasting, 24.3% for underweight and 1.3% for overweight. The mean academic performance of the study participants were 71.65±12.63 SD. Study participants who have breakfast, from monthly income of >2000 ETB, well nourished and overweight perform better academically when compared with those not have breakfast, from <1000 ETB, stunted and underweight respectively. Males and those in the age group of 7-10 years perform well academically than females and 11-14 years children (72). A significant positive relationship was seen between HAZ and academic achievement of the study participants. In this study age of child, head of house, attending preschool, breakfast habit and absenteeism were variables that significantly associated with educational achievement of the study participants.

9. RECOMMENDATIONS

1. Zone health and education bureau

- The zonal health and education bureau should work in collaboration with other organizations (NGOs) to combat malnutrition and to strengthen the positive effect of nutrition on educational achievement of primary school children.
- They should implement nutritional interventions through school feeding programs (SFP).
- Debre-tabor town health office should encourage nutritional education programs (NEP) at the household level to improve children's nutritional status since nutritional intake enhances children's physical growth and mental development. As children equipped physically and mentally they become prepared for learning with better educational achievement.
- Debre-tabor town education office should incorporate NEP in primary schools in order to prevent under-nutrition and its consequences on knowledge, skill and productivity of children for the future of the country economy growth.
- The zonal health and education bureau have to seek funding opportunities in order to strengthen nutritional interventions at school.
- They should get involved in strengthening of preschool programs for toddlers as it is a tool for better educational achievement of children later in their school age.

2. Schools and teachers

- They should encourage students to have breakfast before they come to school.
- Teachers should motivate children to attend regular class since students who attend class rarely perform low in academic performance.
- They have to motivate and encourage female students to learn, participate and attend classes for their better academic performance.
- They have to discuss with the parents of the study participants regarding their breakfast habit, class attendance and academic performance.

3. Researchers

- The majority of studies done in primary school children nutritional status and educational achievement relationship were cross-sectional which does not show the causal effect of one on the other. Therefore researchers should conduct further study with strong study

design to investigate the true relationship between nutritional status and academic achievement of school age children.

- Scholars should carry out further research by incorporating dietary diversity and food frequency habits of children in addition to anthropometric nutritional assessment tools.
- They are also recommended to perform further study with qualitative methods to get better clue on nutritional status and educational achievement of primary school children.
- Further study should be conducted on why males perform better than females, overweight children perform well than underweight and why academic performance decrease as age of children increase by a unit of year.

4. Parents and children

- Parents should encourage their children to take regular breakfast before going to school since having breakfast makes children alert and stay active for participation in learning activities.
- Both the parents and children should participate in NEP to get information about healthy eating habits and its importance.
- Children should practice healthy eating behaviors in order to be active and participatory in their learning with better educational achievement.
- Parents should engage in motivating children to go to school and attend regular class for better educational achievement.

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11. APPENDIX

A. Questionnaires

Questionnaire ID: ----------

Part I. Demographic and socioeconomic characteristics of children and their parents

Sr. no	Question	Response	Skip
101	Grade	_____	
102	Age	_____years	
103	Sex	1. Male 2. Female	
104	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Other (specify)_____	
105	What is your current marital status?	1. Married 2. Divorced 3. Widowed 4. Other specify_____	
106	Who is head of your house?	1. Father 2. Mother 3. Both 4. Other(specify)_____	
107	How many people reside within your home?	1. < 5 2. > 5	
108	Where is your place of residence?	1. Urban 2. Rural	
109	With whom is the child living?	1. Father 2. Mother 3. Both 4. Other than parents	
110	What is mother‘s educational status?	1. Uneducated 2. Primary 3. Secondary 4. College 5. Degree 6. Other (specify)_____	
111	What is occupation of father?	1. Farmer 2. Government employee 3. Non-governmental employee 4. Self-employed 5. Daily laborer 6. Other specify_____	
112	Monthly income	1. < 1000 2. 1000-2000 3. > 2000	In Ethiopian birr

113	What is occupation of mother?	1. House wife 2. Government employed 3. Non-government employed 4. Daily laborer 5. Self-employed 6. Other specify_____	
114	Did your child have much work load at home/ out of home?	1. Yes 2. No	
115	Did you support/encourage your child education?	1. Yes 2. No	
116	Did your child have breakfast?	1. Yes 2. No	
117	If yes, for the above question how frequent your child ate?	1. Always 2. Sometimes	Skip to
118	How long your child walk to home?	1. < 30 minutes 2. > 30 minutes	
119	Did your child have been absent from school?	1. Yes 2. No	
120	If yes, for the above question how many days your child absent from school?	1. Less than 5 days 2. More than 5 days	

Part II: Anthropometric measurement

Sr. no	**Weight measurements(kg)**			**Height measurements(cm)**		
1	1st	2nd	average	1st	2nd	average
2						

Part III: Academic performance

Sr. no	**Academic record**		
1	Previous semester average score of total subjects	Current semester average score of total subjects	Both semesters average score of total subjects
2			

B. መጠይቆች፡- አማርኛ ቅጽ

የጥያቄ መለያ ቁጥር ----------

ክፍል አንድ፡- የልጆች እና ወላጆቻቸው ማህበራዊ እና ኢኮኖሚያዊ ሁኔታዎች

ተ.ቁ	ጥያቄ	መልስ	ዝለል/ይ
101	ክፍል	_____ክፍል	
102	ዕድሜ	_____ዓመት	
103	ፆታ	1. ወንድ 2. ሴት	
104	ሃይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮቴስታንት 4. ሌላ(ይግለጹ)_____	
105	አሁን ያለው የጋብቻ ሁኔታ ምንድነው?	1. ያገባ/ች 2. የተፋታ/ች 3. የሞተበት/ባት 4. ሌሎች (ይግለጹ) _____	
106	የቤታችሁ ሀላፊ ማን ነው?	1. አባት 2. እናት 3. ሁለቱም 4. ሌሎች (ይግለጹ)_____	
107	በቤትዎ ውስጥ ስንት ሰዎች ይኖራሉ?	1. ከ 5 በታች 2. ከ 5 በላይ	
108	የመኖሪያ ቦታዎ የት ነው?	1. ከተማ 2. ገጠር	
109	ልጅዎ የሚኖረዉ/የምትኖረዉ ከማን ጋር ነው?	1. ከአባት 2. ከእናት 3. ከሁለቱም 4. ሌላ (ይግለጹ) _____	
110	የእናት የትምህርት ደረጃ ምን ይመስላል?	1. ያልተማረች 2. አንደኛ ደረጃ 3. ሁለተኛ ደረጃ 4. ኮሌጅ 5. ዲግሪ 6. ሌላ (ይግለጹ) _____	
111	የአባት ሥራ ምንድነው?	1. ገበሬ 2. የመንግስት ሠራተኛ 3. መንግስታዊ ያልሆነ ድርጅት ሰራተኛ 4. በግል የሚሰራ (ነጋዴ) 5. የቀን ሰራተኛ 6. ሌሎች የተገለጹ _____	
112	የወር ገቢያችሁ ስንት ነዉ?	1. ከ 1000 ያነሰ 2. ከ 1000 -2000	በኢትዮጵያ ብር

		3. ከ 2000 በላይ	
113	የእናት ስራ ምንድነው?	1. የቤት እመቤት 2. የመንግሥት ሰራተኛ 3. መንግሥታዊ ያልሆነ ድርጅት ሰራተኛ 4. የቀን ሰራተኛ 5. በግል የሚሰሩ 6. ሌላ ዝርዝር _____	
114	ልጅዎ በቤት ውስጥም ሆነ ከቤት ውጭ የስራ ጫና አለበት /አለባት?	1. አዎ 2. የለም	
115	ለልጅዎ ትምህርት ድጋፍ አድርገውያውቃሉ ?	1. አዎ 2. የለም	
116	ልጅዎ ቁርስ ይበላል/ትበላለች?	1. አዎ 2. የለም	ወደ ዝለል
117	ከላይ ለተጠቀሰው ጥያቄ መልስዎ አዎ ከሆነ ልጅዎ ምን ያህል ጊዜ ይበላል/ትበላለች?	1. ሁልጊዜ 2. አንዳንድ ጊዜ	
118	ልጅዎ ከቤት ወደ ት/ቤት ለመሄድ ስንት ጊዜ ይወስድበታል?	1. ከ 30 ደቂቃዎች ያነሰ 2. ከ 30 ደቂቃዎች የበለጠ	
119	ልጅዎ ከትምህርት ቤት ቀርቶ/ታ ያውቃል/ታውቃለች?	1. አዎ 2. የለም	
120	ከላይ ለተጠቀሰው ጥያቄ መልስዎ አዎ ከሆነ ልጅዎ ከትምህርት ቤት ስንት ቀናት ቀረ/ች?	1. ከ 5 ቀናት በታች 2. ከ 5 ቀናት በላይ	

ክፍል ሁለት:- የሰውነት ልኬት

ተ.ቁ	የክብደት ልኬት (በኪሎ ግራም)			የቁመት ልኬት (በሴንቲ ሜትር)		
1	1 ኛ	2 ኛ	አማካይ	1 ኛ	2 ኛ	አማካይ
2						

ክፍል ሶስት፡- የትምህርት ውጤት አፈፃፀም

ተ.ቁ	የትምህርት አፈፃፀም ውጤት		
1	ያለፈዉ ግማሽ ዓመት የጠቅላላው የትምህርት አማካይ ውጤት	የዓሁኑ ግማሽ አመት የጠቅላላው የትምህርት አማካይ ውጤት	የሁለት ግማሽ አመት የጠቅላላው የትምህርት አማካይ ውጤት
2			

C. Supporting materials used

Material	
WHO AnthroPlus Software Manual for assessing growth of the world's children and adolescents	