ADDIS ABABA UNIVERSITY

FACULITY OF MEDICINE

DEPARTMENT OF COMMUNITY HEALTH

EFFECT OF INTESTINAL PARASITIC INFECTION AND NUTRITIONAL STATAS ON ACADEMIC PERFORMANCE OF SCHOOL CHILDREN IN ARB-GEBEYA TOWN, T/GAYINT WOREDA, S/GONDAR, ETHIOPIA

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A THESIS SUBMITTED TO THE SCHOOL OF GRADUATES, ADDIS ABABA UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUERMENTS FOR THE DEGREE OF MASTERS IN PUBLIC HEALTH IN DEPARTMENT OF COMMUNITY HEALTH

JULY, 2007

ADDIS ABABA, ETHIOPIA

ACKNOWELDEMENT

Above all I thank the Almighty God and his mother.

I would like to acknowledge AAU and the graduate studies for financing the study.

My sincere and deepest gratitude goes to Prof. Ahmed Ali and Dr. Abera Kumie for their unreserved assistance and relevant guidance.

My special thanks go to Ato Simegnew Mebratu (head master of the school), and the whole staff of “Tatek Lesira” school of Arb-Gebeya Town for their assistance and co-operations in the data collection process.

My thanks as well go to Ato Bayou Abebe, Head of the health center, and his staff for their willingness in all aspect of this study.

The list contains many to whom I would like to thank, including my families, the study participants, the data collectors and others for their unpreserved and sincere contribution for this study.

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LIST OF ACRONYMS

ARTI	Acute Respiratory Tract Infection
BMI	Body Mass Index
CDC	Center for Disease Control
DCH	Department of Community Health
HAZ	Height for Age z-score
IPI	Intestinal Parasitic Infection
KG	Kindergarten
NCHS	National Center for Health Statistics
NGO	Non Governmental Organization
PEM	Protein Energy Malnutrition
SD	Standard Deviation
USA	United States of America
WAZ	Weight for Age z-score
WHO	World Health Organization
WHZ	Weight for Height z-score

ABSTRACT

Back ground:-There are many reasons for children to under perform at school, such as, medical problems including Intestinal parasitosis, below average intelligence, specific learning disability, attention deficit, hyperactivity disorder, emotional problems, a poor socio-cultural home environment, psychiatric disorders, or even environmental causes

Objective: - The objective of this study was to assess the effect of Intestinal parasitic infection on academic performance of school children in Arb-Gebeya Town, T/Gayint Woreda, S/Gondar, Ethiopia.

Methods: - A cross sectional survey was conducted in school children for assessment of the effect of Intestinal Parasitic Infection on Academic Performance in Arb-Gebeya Town. Sample sizes of 601 school children from grades 5th -8th were assessed using standardized, closed ended and coded questionnaire. In addition, physical examination, parasitological laboratory examinations and anthropometric measurements were conducted to assess the nutritional status of the school children.

Result: - Out of 601 students who had stool examination, 216 of them had at least one parasite. Therefore, the overall Intestinal Parasitic Infection (IPI) rate (prevalence) was 216(35.9%). Of those, the dominant parasite was *amoeba* 80(13.3%), followed by ascaris 50(8.3%). The presence of double infection was only 8(1.3%) and other parasites were only 15(2.5%). Students who had parasitic infection were less likely to achieve higher academic performance than those who hadn't (OR 0.58, 95% CI 0.41-0.83). The prevalence of under weight (BMI below the 5^{th} percentile) in the area was 30 (5%), 481 (80%) had normal weight (BMI between the 5^{th} and 85^{th} percentile), 60 (10%) were at risk of overweight (BMI value between 85^{th} and 95^{th} percentile). Thirty (5%) of students were overweight. There was no any significant difference in being in a state of under weight between male (4.7%) and female (5.5%). Nutritional status didn't show any association with academic performance(X^2=6.046, P-value 0.109).

Conclusion: - Presence of Intestinal parasitic infection could affect school performance negatively. But the presence of one or more intestinal parasites did not indicate any effect or association with school performance. Underweight, overweight and obesity were less prevalent. Nutritional status has no any effect on academic performance in the study. Thus, it needs further investigation employing other techniques and study designs.

1. INTRODUCTION

1.1 Background

Academic underachievement has been a persistent area of concern for educators, parents, and students for at least in the past 35 years. Today, there is no problem more perplexing or frustrating than the situation in which a bright child cannot or will not perform at an academic level corresponding with his or her intellectual ability (1). There are many reasons for children to under perform at school, such as, medical problems, below average intelligence, specific learning disability, attention deficit hyperactivity disorder, emotional problems, a poor socio-cultural home environment, psychiatric disorders, or even environmental causes (2).

Many children of lower socioeconomic status drop out from their school due to different reasons. In fact, poverty and academic underachievement are the two major reasons for drop out. Socioeconomic and cultural factors play a role in this. Stress builds as the level of education increases and by the time some of these children reach high school, they develop unpredictable difficulties. These emotional and behavioral disorders can be seen in up to 20% of school going children (3).

There are many negative effects of intestinal parasites on school children: Health problems such as malnutrition/anemia, growth retardation, diarrhea and vomiting/nausea, intestinal obstruction and poor concentration at class, high absenteeism/lower attendance, high repetition and drop out rates, and poor academic performance (4). Helminth infections are important causes of morbidity and mortality in many developing countries. An estimated 1,471 million cases of infection with *Ascaris lumbricoides*, 1,200 million cases of infection with *hookworm*, 1,049 million cases of infection with *Trichuris trichiura*, and 200–300 million cases of schistosomiasis occurred worldwide (5).

School age children in developing countries bear the greatest health burden due to helminth infections. According to a World Bank report, morbidity due to helminth

infections accounts for an estimated 20% of the disability-adjusted life years lost due to infectious diseases in children less than 14 years old. Among the well-described morbidities associated with helminth infection in children are under-nutrition, anemia, and failure to achieve genetic potential for growth (5, 6). Intestinal parasitic infections are among the major disease of public health problems in sub Saharan Africa. Apart from causing mortality and morbidity, infection with intestinal parasites has been associated with stunting of linear growth, physical weakness and low educational achievement in school children (7).

Poor nutrition in school children seriously compromises their health and learning capacity and there is disturbing evidence that the nutritional status among school children is deteriorating. In previous generations, anemia, rickets and poor growth were associated with low socio-economic status. However, current radical changes in lifestyle among both poorer and better-off strata in industrialized countries mean that personal preference about foods, fashion, physical activity levels and the media are now driving the nutritional patterns of school children more than the availability of food itself (8).

Nationally, only 3 per cent of Ethiopia's schools have clinics serving students. About 75 per cent of the population suffers from some form of communicable disease. Primary school children have to walk long distances and through difficult terrain to attend school often in crowded classroom, inadequate trained teachers, school materials. Four out of ten children will not reach their full educational potential (9). Playgrounds are basically nonexistent in Ethiopia, though play have a significant role in the primary years of life and help children develop socially, emotionally and intellectually (9). Educational factors are too much to list that could affect student's school academic performance, but few were listed in the above introduction. Therefore, the rational of this study is to identify the determinant factors that could affect student's performance in school. Moreover, the study will give relevant ideas that the policy makers may deal with the students' problem to alleviate educational interferences.

1.2 Literature review

There is ample evidence that better health improves academic performance. Throughout the world, there are many examples indicating that school-based treatment of medical problems results in improved academic performance (10). Currently, school health described as a complete assessment and descriptions of environment, services, and education that affects school health conditions worldwide is unavailable (10).

School health program is defined with respect to environment, services and education. *Environment consists of: P*hysical, biological, psychological and social; a healthy organizational culture within the school; productive interaction between the school and community of which it is a part (10). *Services include*: Preventive, curative, and referral services; nutritional and food safety services; counseling, psychological and social services; safe water and sanitation services and health promotion services for staff. *Education includes*: academic skills and knowledge development; health and nutrition education; life skill education; staff education through training and development of school personnel (10). There are different factors that affect school academic performance.

Intestinal parasitic infection

In one school, Jamaican children who were treated for moderate *whipworm* infections raised their test scores, which had lagged by 15%, from the level of uninfected children. School food programs also have a marked effect on attendance and school performance (10). A clear illustration of detrimental effects of helminthes infection on educational performance was provided in Jamaican school children aged 9-12 years (11). Treatment of *T. trichiuia* infection was followed by significant improvements in the result of tests of auditory short-term memory and scanning and retrieval of long-term memory. Nine weeks after treatment, previously infected children performed as well as uninfected children. Absenteeism was more frequent among infected than uninfected children; the heavier the intensity of the infection the greater the absenteeism, to the extent that some children attended school for only half as much time as their uninfected peers (11).

Infections with intestinal worms and *Schistosoma* species are widespread and common among school-age children in the United Republic of Tanzania (12). School aged children are vulnerable to Iron deficiency anemia exacerbated by parasitic infection because typically they harbor heaviest worm loads in communities (12). A base line survey of 466 children in Muheza, Tanga, and Korogwe districts in Tanzania suggested that 87% of school children aged 8-14 years were infected with at least one of the helminth species examined (Intestinal Nematodes and *S. haematobium*) (12). The most common parasites were *hookworm* (61%) and *S. haematobium* (59%) and many children (37%) were infected with both of these; in only 17% of children were both of these parasites absent (12). The incidence of intestinal parasitism among the public elementary school children in Baguio City Philippines was determined for the school year 1983-1984 (13). Of the 369 children studied, 68.29% harbored parasites. Ascaris was the most common parasite seen with an incidence of 42.65%. Trichuris was seen in 35.71% and hookworm in 0.27%. Multiple infections were found in 20.23%. The ages of the children surveyed ranged from 10-16 years. Children free of parasitic infections obtained higher grades than the infected group. This difference was of statistical significance. The teachers in charge of the treated group noted a significant improvement in school performance following treatment (13).

A study among school children in rural areas close to southeast of Lake Langano, Ethiopia showed that, out of 259 students surveyed for Intestinal parasites, 83.8% had one or more parasites, and *hook worm* was the leading 60.2% followed by *shistosoma mansoni*, 21.2%(14). The prevalence of infections with more than one parasite (poly parasitism) was higher in students from Kime (more than or equal to three parasites per student is about 67%) than from Langano Society of International Missionaries school (more than or equal to three parasites per student is about only 23.5%) (14). A cross-sectional survey on intestinal parasites was conducted in Jiren, Elementary and secondary school, Jimma town from a total of 301 students, the prevalence of parasites were 68.4%,

A*scaris lumbriciodes* was the leading (52.2%) followed by *Trichuris trichiura (*18.6%) (15).

A country wide (Ethiopia) survey of *Giardiasis*, using formal-ether concentration method, among school children and residents showed that the overall prevalence rates of 8.9% and 3.1%, respectively. The corresponding rate for non-school children (5-19 years of age are more significantly infected than their non-school counter parts ($p<0.005$) (16).

A cross-sectional study of Intestinal helminthic infection was conducted among 150 children in Lake Awassa area, south Ethiopia under the age of 15 engaged in fishing, and fishing processing works (17). The overall prevalence for at least one helmenthic infection was 92.7% and the most prevalent parasites were *Ascaris lumbricoides*, 76% (17). Another cross sectional study to estimate the prevalence of intestinal parasites has been conducted in 1996 in south Wollo in the towns of Kombolcha, Bati, and Mekaneselam (18). From a total of 698 students who participated in the study, 43.6% of them were positive for various intensities. *Shistosoma mansoni*, 24.9% was the commonest followed by A*scaris lumbricoides*, 18.3% and *Trichuris trichiura* (4.4%). These figures presented the overall prevalence of parasites in the three localities (18).

Nutritional status

Strong evidence exists that poor growth is associated with delayed mental development and that there is a relationship between impaired growth status and both poor performance and reduced intellectual achievements (19). Growth retardation in early childhood is also associated with significant functional impairment in adult life and reduced work capacity, thus affecting economic productivity (19). The major areas of nutritional problems of primary school age children in developing countries are Protein-Energy Malnutrition (PEM), micro nutrient deficiencies, and short term hunger (19).

The composition and timing of school meals and their nutritional value play a role in educational achievement (20). In USA (United States of America), a study of a school breakfast program found that children of low income parents who received breakfast at school scored higher on tests of basic skills and were less likely to be tardy or absent than were children of low income parents who did not receive breakfast at school (8). Studies conducted in India and Jamaica found that provision of school meals-lunch and breakfast had a significant effect on students' performance in school (8). In conflict-ridden areas of Sri Lanka, a quarter of the children were stunted or too short for their age, and nearly one in three were severely wasted, that is, far too thin for their height (21).

A household survey study to assess changes in body mass index (BMI) among 50 000 adolescents aged 10 to 19 years living in the Poorest and Richest Regions of Brazil in 1975, 1989, and 1997 showed that adolescents of rich (southeast) and poor (northeast) regions showed a substantial increase in BMI (22). In the southeast, the prevalence of overweight, defined by international age- and gender-specific BMI cutoffs, for both genders reached 17% in 1997, whereas in the northeast, the prevalence tripled, reaching 5% among boys and 12% among girls. Older girls living in urban areas in the southeast showed a decrease in prevalence from 16% to 13% in the latter 2 surveys. For all boys and for young girls, the BMI values for the 85th percentile in 1997 were much higher than the 95th percentile values in 1975 (22).

A study to determine the prevalence of overweight and at-risk-for-overweight in school children from Baltimore City based on International Obesity Taskforce reference values showed for BMI-for-age, 20.7% of girls and 17.2% of boys were overweight (BMI > 95th percentile) and 15.3% of girls and 14.1% of boys were at-risk-for-overweight (BMI between the 85th and 95th percentiles) (23).

A study on nutritional status of Malaysian school children showed that, the prevalence of under nutrition and micronutrient deficit problems is markedly low (21). Underweight and stunting in children from urban primary schools is generally below 10%. However, the magnitude is significantly higher – from 25% to 50% in children from rural schools and low-income households in urban schools (21).

School academic performance was compared among primary school pupils of different nutritional and health status in Nsukka, Enugu State of Nigeria for assessment of their health and nutritional history (24). Two hundred eighty five (73.1%) of the pupils selected, participated in the final studies. There was predominance of malnutrition among the pupils. Only 28.9% of the pupils were of normal weight for height (using Z scores). Forty seven percent were mildly underweight, 20.1% were moderately underweight, while 4.0% were severely underweight. Overall nutritional status (using weight for age Z scores) significantly affects school performance ($p<0.05$). Only 26.0% of the pupils were of normal height for age, the rest being stunted (24).

Two hundred sixty seven primary school and 190 secondary school students in Nigeria were chosen randomly from the lists of the co-educational schools in a large metropolitan area. Two hundred and sixteen were males and 241 were females. Weight-for-age and height-for-age measurements were done to assess obesity. The over all prevalence of obesity based on weight for age was 3.2% for males and 5.1% for females. In addition, 9.3% of the males and 7.9% of the females were classified as over weight (25). In a study of Prevalence and severity of malnutrition and age at menarche in western Kenya of 928 randomly selected adolescent school girls aged 12–18 years, the overall prevalence of stunting and thinness was 12.1% and 15.6%, respectively. Of the total, two percent were severely stunted. The prevalence of stunting and thinness decreased with age and mean height for age *z*-scores converged towards the median of the United States (US) reference curve (20).

A community based cross sectional anthropometric study was conducted to assess the nutritional status of children less than five years of age in North Western Ethiopia. One thousand four hundred and twenty two children were enrolled in the study. Stunting which is expressed by height for age below-2 standard deviation (SD) was seen in 43% of the children. The prevalence of wasting which is expressed by weight for height below -2 SD was 9%. The highest percentages of stunting and wasting were found in the age group 12-23 months (26). The study to assess the nutritional status of school age children in Addis Ababa school age children using the 5^{th} percentile of the National Center for Health Statistics (NCHS) reference data, the prevalence of thinness was 28.4% for boys and 20.4% for girls: the average being 24%. The prevalence of stunting ($<3^{rd}$ centile) was 13.8% for boys and 6.2% for girls with an average of 9.8% for both sexes. The prevalence of over weight was 3.3% (27). A Demographic and Health Survey conducted in 2000 found that 55 per cent of Ethiopian children under the age of five are stunted due to malnutrition.

Socio-economic status

In the United States, low-income children scored significantly lower on achievement tests than higher-income children before they participated in a school breakfast program (28). It has been recognized that children from poor socio-economic status families have higher chances of poor school performance. Malnutrition due to poverty coupled with low education and status of parents adversely affects their cognitive development. Such children also have higher chances of experiencing, right from their pre-school years, parental attitudes which do not motivate them to study and an unsatisfactory home environment which does not encourage learning (witnessing domestic violence, family stressors, adverse life events)(28).

Psychosocial problem

A study done in China in 1987 to determine the academic outcomes of families with siblings and without among 1,460 school children and their parents in urban and rural areas showed that those without siblings had higher academic scores than those with siblings among urban children, but these advantages were not evident among rural

children (29). Maintaining and supporting the psychological health of students and staff are as important as addressing physical health. Mental health problems such as suicide and depression and other stress-related disorders affect large number of young people. Children and adolescents with emotional problems exhibit their impairments in a variety ways (10). They may fail academically, be rejected socially and have a poor self image. They may have difficulty relating to peers and adults and may lack respect for the laws of their country (10). In Rawalpidi District in Pakistan through the school mental health program, students' work together to promote their mental health. Evaluation of the program showed that students improved their grades, increased their attendance and decreased their drop out rates (10).

A study conducted in Dessie, Ethiopia, to assess differential vulnerabilities of preparatory school adolescents to a psychosocial problem with reference to their living arrangement and parental attachment showed that approximately a quarter of the students included in the study reported feeling of sadness which made them stop performing some regular activities (30). The study revealed that lower family connectedness and having a living arrangement separate from both biological parents (or living with friends, relatives or alone) were associated with increased odds of having a depressive symptom after controlling for observed covariates (30).

Physical health/Fitness of the school children

Traditionally, physical education is closely associated with education and focuses on the development of motor and sports skills (10). There is evidence of linking physical education to improved academic performance. The Trois Rivieres study in Canada demonstrated significant gains in academic performance among primary school children as a result of increased time spent on physical education. School based clinics show evidence of improving students' knowledge about how to be effective consumers of health services, reducing substance abuse, and lowering hospitalization rates (10).

1.3 Statement of the problem

School failure is a real problem. As such, it has attracted the attention of researchers in psychology, sociology, and education. They have identified numerous factors that are associated with academic success or failure which ranges from individual aspects of learning, such as behavior problems or cognitive deficiencies, to family factors, social issues such as poverty and cultural differences.

Health care providers often advise parents and teachers that children can learn at optimal levels only if they are healthy. Children need to be healthy in order to learn at their highest potential. When it comes to chronic diseases and academic performance, an association was found between the child's health and school attendance, and in some cases diseases also affected academic achievement, which would not come as a surprise to most parents. Intestinal parasitic infection with one or more species of worms, results from contact with surfaces, food or anything contaminated with human or animal feces**.** The infection, particularly common in the tropics, reduces a person's work capacity, lowers concentration and causes abdominal pains and digestive problems (7). Worms can consume 0.05 cubic centimeters of blood per day (7). With a lifespan of five to six months, they are a major cause of malnutrition that can make learning difficult.

With regard to poor nutrition, we know that short-term hunger results in impaired attention in school-age children, which leads to decreased academic performance. Poor nutritional intake over time increases a child's susceptibility to illness, which results in increased absenteeism (21). Long-term poor nutrition and protein-energy undernutrition, including Kwashiokor and Marasmus, result in cognitive and social-emotional impairment, with little improvement upon nutritional recovery (28). Some children simply do not get enough to eat. When children do not consume enough food, it can affect a child's ability to learn.

The effect of health and nutritional problems on academic performance is not yet fully studied in Ethiopia. Therefore, the purpose of this study was to examine the roles of those factors on educational performance among school children.

2. OBJECTIVES

2.1. General objective:

To assess the effect of Intestinal parasitic infection on academic performance among school children

2.2. Specific objectives:

-To assess the magnitude of Intestinal parasites among school children.

- To assess the effect of intestinal parasitic infection on academic performance

-To assess the nutritional status of school children.

- To assess the effect of nutritional status on academic performance.

3. METHODS

3.1 Study area and population- The study area was in south Gondar Zone of Tach-Gayint Woreda, Arb-Gebeya Town, which is 760 Km North-West of Addis Ababa. It is one of the 10 Woredas in the South Gondar Administrative Zone of the Amhara Regional State. The Woreda has a population of 109,982. The Town has nearly 4,282 population. The Town has only one High School and one Junior Secondary school. There is no private school and Kindergarten (KG) in the Town.

3.2 Study design- A cross-sectional survey was carried out for the assessment of the effect of Intestinal Parasitic Infection on academic performance of school children in Arb-Gebeya Town, Tach-Gayint Woreda, South Gondar.

3.3 Sample and sample size determination-Sample size (n) was determined based on the assumption of 50% proportion (P) of factors influencing on academic performance. The expected margin of error (d) was 4% and with 95% confidence interval ($Z\alpha/_2$) and with a single design effect (31).

Sample size (n):

$$n=(Z\alpha/_2)^2 * P(1-P)/d^2$$

$$n=(1.96)^2 *0.5(1-0.5)/(0.04)^2 = 600.25$$

$$n=601$$

3.4 Source population- The source population were school children.

3.5 Study population- School children from grade 5^{th}-8^{th} were selected randomly for the purpose of interview, anthropometrical measurement, physical examination, laboratory/parasitological examination and assessment of school performance.

3.6 Sampling procedures

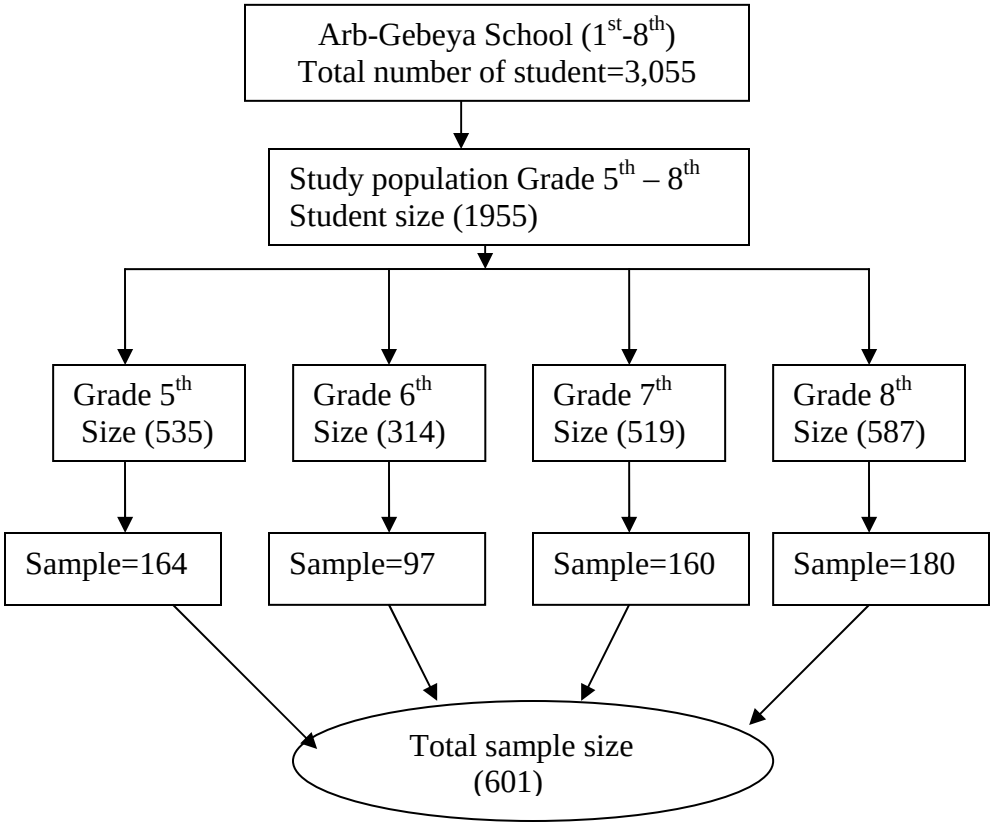
It was a single stage sampling method, which was selected from a single school.

The sample size was stratified to each grade (5^{th} – 8^{th}) according to number of students in each grade proportionally. The study subjects were selected using random sampling methods from students list or roster.

Exclusion criteria-

1. All students below grade 5 were excluded to avoid response bias.
2. Students who were treated recently for anti-helmenthes treatment were excluded.

3.7 Sampling frame work



3.8 Data collection tools

A. Interviews on socio demographic, socio economic status and psychosocial variables.

This interview was done by four data collectors who completed grade 12th and trained for this purpose. Standardized, closed ended and coded questionnaire with a few open ended questions was prepared in English and was translated to Amharic, which is the local language of the study population. Then, the questionnaire was translated back into English to check and correct any inconsistencies or distortions of words or concepts.

B. Reviewing documents or records

This was used to gather information from school about the student's grade report, grade averages, and days of absenteeism from the school. Reviewing documents or records was done by the principal investigator.

C. Anthropometrics measurements

Anthropometric measurements were done by two nurses from the health center trained for this purpose. The principal investigator gave training for nurses and checked the correctness of the measurement and gave corrections as soon as possible during data collection process.

Measurement of weight- Body weight was recorded using a beam balance with non-detachable weighing scale with light clothing.

Height measurement- Height was measured using a calibrated wall-mounted Stadiometer and a modified tape measure with out shoes in standing position (32).

D. Medical History or physical examination

The examination was done by two nurses from the Health Center based on standard procedures guided by standardized, close ended and coded format (check list) for presence or absence of symptoms or diseases like eye discharges, goiter, edema, scabies, cataract, any body abnormalities and others.

E. Parasitological examination

Students were asked to bring about two grams of stool sample with a plastic stool container. Diagnosis of parasites' ova or egg in the stool was done by two laboratory technicians of the health center. A direct saline suspension (wet mount) technique was used for the stool examination.

3.9 Variables:-

- Age and sex
- Height & weight
- Socioeconomic status
- Intestinal parasitic infection
- Medical history and physical health
- Nutritional status
- Psychosocial variables
- Academic performance
- Absenteeism
- Grade repetition

3.10 Operational definition

Academic performance – It is a school level summary measure based on the percentile ranking of student scores on the standard of school achievement test.

High score – a score above mean of the students' grade.

Low score – a score below mean of the students' grade.

Absenteeism – Students' non-attendance during school hour from school.

Repeating – students' failed to pass the last academic year achievement test (failed to pass the last calendar year examination)

3.11 Data quality management-

The quality of data was ensured through training of data collectors, supervisor, and pre testing of questionnaire, using appropriate standard techniques and recruiting professionals (one Health officer, two nurses, and two laboratory technicians) to each activity. Supervisors checked on daily basis the data collection process. There was a meeting with data collectors every day after completion of the daily data collection process to check data inconsistencies. The principal investigator monitored or maintained the over all activity.

3.12 Data analysis procedures-

The coding of data, entry and cleaning was carried out using Epi 6.04 and the analysis part was carried out using SPSS 13.0 version. Ten percent (10%) of the questionnaires were double entered for data cleaning. All the data obtained from the study population were entered, cleaned and analyzed by the investigator. The evaluation of student's academic performance was made by addition of grades of a semester and then divided by the number of subjects taken (semester average).

3.13 Ethical consideration

Ethical approval was obtained from the Ethical Committee of the Faculty of Medicine, Department of Community Health. Informed verbal consent or permission was obtained from the Woreda Education and Health departments. Due to difficulty of meeting the student's family, the investigator discussed the ethical issues with the school master. The study has no harm to the students as well as to their families; therefore the involvement of parents was not a prerequisite for this study. The freedom of pupils to participate or not participate in the study was explained. The students' privacy during the interview, stool collection, and anthropometric measurements was maintained and the data obtained from them were kept confidential. Free treatment for those who had Intestinal Parasitic Infection (IPI), Scabies and other illnesses were provided with the cooperation of the Woreda health center and health department.

3.14 Dissemination of results

The finding of the study will be disseminated to different stakeholders such as: the health and educational departments of the Woreda, Zonal health and educational departments and other relevant offices.

4. RESULTS

A total of 601 study subjects, from grade 5^{th} -8^{th} were enrolled in the study. The response rate was 100%. All 601 students participated using different study tools such as questionnaire, anthropometric test, physical and stool examination.

Socio demographic characteristics of the study participants

All the study participants were from Arb-Gebeya Town School. The participants were from grade 5^{th} -8^{th} only (Table 1). Out of 601 participants, 363(60.4%) and 238(39.6%) of them were male and female, respectively. The majority of the students were between 10-14 years of age 440(73.2%), 150(25%) were 15-19 years and 11(1.8%) were ≥20 years of age. Five hundred forty eight (91.2%) of the participants were Orthodox Christians, and 50(8.3%) were Muslim by their religion. All students were from Amhara ethnic group. Just over fifty percent (53.4%) of the students were from the neighboring areas, while the rest were residents of the Town. Regarding time to travel to the school 391(65.1%) make it in about half an hour, while 210(34.9%) needed more than 30 minutes to reach the school.

Table1. Demographic characteristics of students of Arb-Gebeya Town school children, March, 2007 (n=601)

Socio demographic variables	n	%
Grade:-5th grade	164	27.3
6th grade	97	16.1
7th grade	160	26.6
8th grade	180	30
Sex:- Male	363	60.4
Female	238	39.6
Age category:- 10-14 years	440	73.2
15-19 years	150	25
≥20 years	11	1.8
Religion:- Orthodox	548	91.2
Muslim	50	8.3
Others	3	0.5
Ethnic :- Amhara	601	100
Residence:- Urban	280	46.6
Rural	321	53.4
Time resumed to travel to school:-		
≤30 minutes	391	65.1
>30 minutes	210	34.9

Socio demographic status of parents of the study participants

Among the 601 fathers, 195(32.4%) and 406(67.6%) were illiterate and literate, respectively (Table 2). Three hundred seventy (61.6%) of mothers were illiterate and 231(38.4%) were literate. Out of 601 fathers about more than half 389(64.7%) of them were farmers, and 137(22.8) of them were government employee by their occupation. Regarding mothers about 555(92.3%) of them were house wives, and 35(5.8%) of them were teachers by their occupation.

Table 2. Educational and Socioeconomic status of parents/guardians of Arb-Gebeya town school children, March, 2007 (n=601).

Socio economic status	**n**	**%**
Father education		
Illiterate	195	32.4
Literate	406	67.7
Mother education		
Illiterate	370	61.6
Literate	231	38.4
Father Occupation: Farmer	389	64.7
Gov't employee	137	22.8
Merchant	34	5.7
Others	41	6.8
Mother Occupation: House wife	555	92.3
Gov't employee	35	5.8

Merchant	4	0.7
Others	7	1.2

Socio economic status of parents and guardians of the study participants

Out of 601 study participants, 324(53.9%) and 11(1.8%) had access to Radio and TV set respectively (Table 3). Five hundred twenty three (87%) of households lived in their own house, while the rest lived in rented houses. Three hundred sixty one (60%) and 240(40%) of the participants lived with the family of ≤5 and >5 persons per house respectively. Fifty four (9%) and 430(71.5%) of the participants had access to sanitation facilities such as tap water and latrine, respectively. The major sources of fuels used during the night were kerosene 588(97.8%) and others (electricity, candle, etc) were only 13(2.2%). The majority of the study participants, 510(84.9%) preferred to study at home, 34(5.7%) at school and the rest 57(9.5%) at open field.

Table 3. Socioeconomic status of parents/guardians of Arb-Gebeya Town school children, March, 2007 (n=601)

Socioeconomic variables	**n**	**%**
Availability of Radio:- Yes	324	53.9
No	277	46.1
Availability of TV:- Yes	11	1.8
No	590	98.2
House owner ship:- Our own	523	87
Rent	78	12.9
Family size:-≤5 persons	361	60
>5 persons	240	40

Availability of water tap:- Yes	54	9
No	547	91
Availability of latrine:-Yes	430	71.5
No	171	28.5
Type of fuel sources:- Kerosene	588	97.8
Others	13	2.2
Preference place to study		
At home	510	84.9
At school	34	5.7
At open field	57	9.5

Psychosocial condition of the study participants

Almost all of the study participants 597(99.3%) and 596(99.2%) had good relationship with their peers and their families, respectively, while 91(15.1%) of them had ever been bullied by one of their families (Table 4). Only 55(9.2%) of the students had ever been punished at school for different reasons, and 33(5.5%) of participants' family had ever quarreled with each other while the study participants studying at home.

Table 4. Psychosocial variables of the students among Arb-Gebeya town school children, March, 2007.

Psychosocial variables	**N**	**%**
Good relation with peer		
Yes	597	99.3
No	4	0.7
Good relation with family		
Yes	596	99.2
No	5	0.8
Have you ever been bullied by one of your family? Yes	91	15.1
No	510	84.9
Have you ever been punished at school?		
Yes	55	9.2

No	546	90.8
Do your families quarrel with each other?		
Yes	33	5.5
No	568	94.5

Nutritional status of the study subjects

The Body Mass Index (BMI)-for-age of the students was calculated according to the Quetelet's Index nutritional evaluation tools used for adults that were adopted to adolescents by CDC, 2000(33). According to the Quetelet's index, the mean and standard deviation of the BMI-for-age were calculated as 16.49 and 2.08, respectively. The prevalence of underweight (BMI value below the 5th percentile) in the area was 30(5%) in all age group, 481(80%) of them had normal weight (BMI between the 5th and 85th percentile), 60(10%) of them were at risk-of-overweight (BMI between 85th and 95th percentile) and 30 (5%) of them were overweight (BMI above the 95th percentile) (Table 5). There was no any significant difference for underweight between male (4.7%) and female (5.5%), and all underweight students were between the ages 10-14 years old. But, females were more overweight (6.7%) than male (3.9%).

Table5. Distribution of BMI and Percentiles values of the students among Arb-Gebeya Town school children, March, 2007.

Age(years) (%)	Under wt		Normal wt		Risk of Over wt		Obese		Total	
	M	F	M	F	M	F	M	F	M	F
10-14	17	12	217	167	4	14	2	7	240	200
(%)	7.1	6	90.4	83.5	1.7	7	0.8	3.5	100	100

15-19	-	1	77	18	28	8	9	9	114	36
(%)		2.8	67.5	50	24.6	22.2	7.9	25	100	100
>=20	-	-	2	-	4	2	3	-	9	2
(%)			22.2		44.4	100	33.3		100	100
Total	17	13	296	185	36	24	14	16	363	238
(%)	4.7	5.5	81.5	77.7	9.9	10.1	3.9	6.7	100	100

N.B:

- 5^{th} percentile(BMI=13.78)
- 85^{th} percentile(BMI=18.87)
- 95^{th} percentile(BMI=20.44)
- Minimum BMI: 10.28 and
- Maximum BMI: 24.00
- Mean and SD BMI: 16.49 and 2.08
- Median BMI: 16.15

The educational statuses of their father were significantly associated at ($p< 0.001$) with nutritional status of the students (Table 6). While, residence (whether been in the town or rural), mothers' educational status and status of Intestinal parasitic infection were significantly associated at ($p< 0.05$). But sickness status and Grade performance (grade score) were not significantly associated with nutritional status of the students.

Table 6. Distribution of nutritional status among Arb-Gebeya Town school children in 2007.

Variables	Nutritional status (%)				
	Under wt	Normal wt	Risk of Over wt	overweight	X^2 (P-value)
Residence: Town	15(5.4)	236(84.3)	16(5.7)	13(4.6)	11.023
Rural	15(4.7)	245(76.3)	44(13.7)	17(5.3)	(0.012)
Father education:					
Illiterate	9(4.6)	139(71.3)	29(14.9)	18(9.2)	20.145
Literate	21(5.2)	342(84.2)	31(7.6)	12(3)	0.000
Mother education:					
Illiterate	22(5.9)	279(75.4)	44(11.9)	25(6.8)	13.853
Literate	8(3.5)	202(87.4)	16(6.9)	5(2.2)	0.003
Sickness status: Yes	6(4.1)	122(82.4)	13(8.8)	7(4.7)	0.797
No	24(5.3)	359(79.2)	47(10.4)	23(5.1)	(0.850)
IPI: yes	9(4.2)	169(78.2)	30(13.9)	8(3.7)	6.867
no	21(5.5)	312(81)	30(7.8)	22(5.7)	(0.076)
Grade score:					
Below average	15(4.4)	264(77.6)	42(12.4)	19(5.6)	6.046
Above average	15(5.7)	217(83.1)	18(6.9)	11(4.2)	(0.109)

Academical performance of the study subjects

Five hundred forty (74.9%) of the students had ≤ 5 days of absenteeism from their school and 151(25.1%) had >6 days absenteeism with in the last semester (Table 7). Those who had repeated last academic year were 59(9.8%). The students' last semester average grade (score) was a minimum of 34.1 and a maximum of 90.1. The mean and standard deviation of the students' grade were 62.25 and 9.53, respectively. Generally students who had below mean score were 340(56.6%) and 261(43.4%) had above mean score.

Table 7. Academic related variables of the students among Arb-Gebeya town school children, March, 2007.

Academic performance variables	**n**	**%**
Absenteeism from the school:		
≤5 days	540	74.9
>6 days	151	25.1
Class repeated last year? Yes	59	9.8
No	542	90.2
Grade score[@]: Below mean	328	54.6
Above mean	273	45.4

@=>Minimum=34.1 Mean=62.25

Maximum=90.1 SD=9.53

The health status of the study participants

One hundred forty eight (24.6%) of students had sickness since September, 2006. Of these sicknesses, common cold and diarrheal (IPI) diseases were the leading causes of illness which accounted for 76(51.4%) and 36(24.3%), respectively (Table 9). Students who were treated for their sicknesses were 21(14.2%) and the rest 127(85.8%) had no access of any treatment. Some of the most common health problems manifested in the study group were difficulty of hearing 3.8%; difficulty of vision 8.8%; presence of night blindness 5.8%; purulent eye discharge 21.8%; conjunctival pallor 17.5%; goiter 18.5%; and scabies 11%.

Table 8. Physical health status of students among Arb-Gebeya Town, school children, March, 2007 (n=601)

Health status of the respondents variables		n	%
Is there any sick ness?	Yes	148	24.6
	No	453	75.4
Type of diseases(N=148)	Diarrhoea/IPI	36	24.3
	TB/ARTI	7	4.7
	Malaria	4	2.7
	Otitis media	4	2.7
	Common cold	76	51.4
	Others	21	14.2
Have had any treatment? (N=148)	Yes	21	14.2
	No	127	85.8
Difficulty of hearing:-	Yes	23	3.8
	No	578	96.2
Difficulty of vision:-	Yes	53	8.8
	No	548	91.2
Night blindness:-	Yes	35	5.8
	No	566	94.2
Purulent eye discharge:-Yes(No)		131(470)	21.8(78.2)
Conjunctival pallor:- Yes(No)		105(496)	17.5(82.5)

Goiter:- Yes(No)	111(490)	18.5(81.5)
Scabies :- Yes (No)	66 (535)	11(89)

Intestinal parasitic infection of the study subjects

Out of 601 students who had stool examination, 216 had at least one parasite. The overall Intestinal Parasitic Infection (IPI) rate (prevalence) was 216(35.9%) (Table10). Of those, the dominant parasite was amoeba 80(13.3%), followed by ascaris 50(8.3%). The presence of double infestation was 8(1.3%) and other parasites were 15(2.5%).

Table 9. Parasitological examination and laboratory results of students of Arb-Gebeya Town, school children, March, 2007

Intestinal parasitic infection	**n**	**%**
Parasites in stool :- Yes	216	35.9
No	385	64.1
Types of parasites :Giardia	47	7.8
Ascaris	50	8.3
Amoebiasis	80	13.3
Teaniasis	10	1.66
Strongyloides	6	0.99
Entrobiasis	8	1.33
Double infection	8	1.33
Other	15	2.5

Relation of socio-demographic characteristics with school performance

The effects of different variables were tested for their association with academic performance Binary Logistics analysis (Table 11). Male students had better performance twice than female (OR 2, 95% CI 1.44-2.84). Students who had lived in town had performed better than the rural living students (OR 1.61, 95% CI 1.16-2.23). Access to radio had privileged students for better academic performance (OR 1.61, 95% CI 1.16-2.23). Students who had lived in the family of less than or equal to five persons in their home had achieved better performance 1.42 times than greater than five families in their house (OR 1.42, 95% CI 1.02-1.97). Father and mother educational status had no association with academic performance (OR 0.87, 95% CI 0.61-1.22) and (OR, 1.01, 95% CI 0.72-1.61), respectively. Distance of home from the school affected academic performance. Those who had traveled less than or equal to 30 minutes daily had achieved academically better than students traveled greater than 30 minutes (OR 1.69, 95% CI 1.19-2.38). Students who had ≤5 days of absenteeism from the school were 1.53 times higher in their academic performance than those with >5 days (OR 1.53, 95% CI 1.05-2.24). Students who had eye discharge had achieved academically less than those who hadn't eye discharge (OR 0.62, 95% CI 0.41-0.92). Presence of intestinal parasites affected academic performance. Those who had intestinal parasites achieved less than who hadn't (OR 0.62, 95% CI 0.44-0.88). But the presence of each parasite and nutritional status had no association with academic performance (Table 10).

Table 10. Distribution of variables by school performance (average score) of school children in Arb-Gebeya Town, 2007.

Variables	Number of students (%) per average grade score		
	Above average(n)	**Below average(n)**	**OR (95% CI)**
Sex: Male	182(50.1)	181(49.9)	2(1.44-2.84)
Female	79(33.2)	159(66.8)	1.00
Residence: Town	139(49.6)	141(50.4)	1.61(1.16-2.23)
Rural	122(38)	199(62)	1.00
Radio: Yes	160(49.4)	164(50.6)	1.7(1.23-2.36)
No	101(36.5)	176(63.5)	1.00
Family size: ≤5	169(46.8)	192(53.2)	1.42(1.02-1.97)
>5	92(38.3)	148(61.7)	1.00
Father education:			
Illiterate	80(41)	115(59)	0.87(0.61-1.22)
Literate	181(44.6)	225(55.4)	1.00
Mother education:			
Illiterate	161(43.5)	209(56.5)	1.01(0.72-1.61)
Literate	100(43.3)	131(56.7)	1.00
Walk distance:			
≤30 minutes	187(47.8)	204(52.2)	1.69(1.19-2.38)
>30 minutes	74(35.2)	136(64.8)	1.00
Absenteeism:≤5 days	207(46)	243(54)	1.53(1.05-2.24)
>6 days	54(35.8)	97(64.2)	1.00
Eye discharge: Yes	45(34.4)	86(65.6)	0.62(0.41-0.92)
No	216(39)	254(61)	1.00
IPI: Yes	78(36.1)	138(63.9)	0.62(0.44-0.88)
No	183(47.5)	202(52.5)	1.00
Types of parasites			
Giardia	21(47.7)	23(52.3)	1.00
Ascaris	8(16)	42(84)	0.21(0.08-1.55)
Amoebiasis	36(48)	39(52)	1.01(0.48-2.13)
Teaniasis	3(30)	7(70)	0.47(0.11-2.05)
Strongyloides	3(50)	3(50)	1.10(0.20-6.03)
Entrobiasis/pinworm	1(12.5)	7(87.5)	0.16(0.02-1.38)
Double infection	3(37.5)	5(62.5)	0.66(0.14-3.09)
Others	3(20)	12(80)	0.27(0.07-1.12)
Nutritional status:			
Underweight	15(50)	15(50)	1.73(0.62-4.85)
Normal weight	217(45.1)	264(54.9)	1.42(0.66-3.05)

Risk of Over wt	18(30)	42(70)	0.74(0.29-1.87)
Overweight	11(36.7)	19(63.3)	1.00

Adjustment of the confounding variables such as sex, residence, availability of Radio, family size, number of days of absenteeism, distance of home from the school, presence of purulent eye discharge and presence of Intestinal Parasitic Infestation was done using Multivariate Logistics analysis. Males were performed better (2.39 times) that of females in academic performances (OR 2.39, 95% CI 1.66-3.45) (Table 13). Students who had radio access were (1.51 times) higher in their academic performance than those who hadn't (OR 1.51, 95% CI 1.03-2.21). The number of days of absenteeism from the school affected academic performance. Students who had less than five days of absenteeism were (1.52 times) higher in their academic performance than those with greater than five days of absenteeism (OR 1.52, 95% CI 1.01-2.23). Students who had a complaint of purulent eye discharge performed less academically than those who hadn't any purulent eye discharge (OR 0.59, 95% CI 0.39-0.91). Students who had Intestinal parasitic infestation was less likely to achieve higher academic performance than who hadn't (OR 0.58, 95% CI 0.41-0.83). Even though, presence of Intestinal parasites was significantly associated with academic performance, none of each parasite was specifically associated with performance.

Table11. Factors affecting academic performance of Arb-Gebeya Town school children, 2007.

Variables*	School performance (grade score) of school children		
	Above average	Below average	Adjusted OR (95% CI)
Sex: Male	182	181	2.39(1.66-3.45)
Female	79	159	1.00
Residence: Town	139	141	1.09(0.70-1.72)
Rural	122	199	1.00
Radio: Yes	160	164	1.51(1.03-2.21)
No	101	176	1.00
Family size: ≤5	169	192	1.39(1.37-1.97)
>5	92	148	1.00
Walk distance:			
≤30 minutes	187	204	1.43(0.93-2.19)
>30 minutes	74	136	1.00
Absenteeism:			
≤5days	207	243	1.52(1.01-2.23)
>5days	54	97	1.00
Eye discharge:			
Yes	204	86	0.59(0.39-0.91)
No	92	254	1.00
IPI: Yes	78	138	0.58(0.41-0.83)
No	183	202	1.00

*Adjusted for different variables

5. DISCUSSION

The overall Intestinal parasitic infection rate of Arb-Gebeya Town School children was 35.9%, the most frequent infection being *ameoba,* followed by *Ascaris lumbricoids*. The result found in this study was much less prevalent compared to other studies 83.8% in Lake Langano (14); 68.4% prevalence in Jiren Elementary and Junior Secondary school in Jimma (15); 43.6% prevalence in South Wollo, Ethiopia (18); 68.29% prevalence in Baguio City, Philippines (13). The prevalence of poly-parasitism (more than one parasite) in the study was 8(1.33%). This was too low in prevalence as compared to in south Ethiopia, Langano, prevalence of infections with more than one parasite (poly-parasitism) was higher in students from Kime School about 67% than from Langano Society of International Missionaries school about only 23.5%) (14).This low prevalence of Intestinal parasitic infection could be due to the De-worming program in the Woreda that had been given recently. The method employed for laboratory was the wet mount or direct saline technique. This single technique has high probability of missing of ova of parasites. The implication leads to a low probability of detecting parasites resulting low prevalence of Intestinal parasites.

Even though, each parasite alone did not show any significant association with academic performance, the presence of all Intestinal Parasites together affected school performance. The possible reason that each parasite alone could not show any significant association with academic performance may be due to low prevalence of each parasite. The available studies were difficult to compare because others used different age range, methods of classification, sample sizes, socio cultural and geographical back grounds in their studies. But the study supported and found similar with our finding conducted in Philippines that the presence of parasites affect academic performance among the public elementary school children in Baguio City, Philippines determined for the school year 1983-1984. Of the 369 children studied, 68.29% harbored parasites. Children free of parasitic infections obtained higher grades than the infected group. This difference was of statistical significance. The teachers in charge of the treated group noted that a significant

improvement in school performance developed following treatment (13). Other studies, in Jamaica had also found similar results. In one school of Jamican children who were treated for moderate *whip worm* infections raised their test scores, which had lagged by 15%, up to the level of uninfected children (10). Other similar study in Jamican children aged between 9-12 years showed that treatment of *T. trichiura* infection was showed by significant improvements in the result of tests of auditory, short term memory and scanning and retrieval of long-term memory. Nine weeks after treatment, previously infected children performed as well as uninfected children (11).

Five percent of Arb-Gebeya Town School children were underweight using BMI-for-age, meanwhile, the prevalence of risk of overweight and obesity among the school children were 10% and 5% respectively. The finding in Arb-Gebeya Town school children was similar with the result that had been conducted in Nigerian 267 primary school and 190 secondary school students. Two hundred sixteen were males and 241 were females. The overall prevalence of obesity based on weight for age was 3.2% for males and 5.1% for females (24), which was similar to our study (Overweight: male (3.9%) and female (6.7%)). The risk-for-over weight statistics was too low in Arb-Gebeya Town (9.9% male and 10.1%) as compared to a study to determine the prevalence of at-risk-for-overweight in school children from Baltimore City based on International Obesity Taskforce reference values showed for BMI-for-age, 14.1% of boys and 15.3% of girls were at-risk-for-overweight (BMI between the 85th and 95th percentiles) (23). Another study that could support our finding was conducted in a Brazil household survey study *to* assess changes in body mass index (BMI) among 50,000 adolescents aged 10 to 19 years living in the Poorest and Richest Regions of Brazil in 1975, 1989, and 1997 showed that: adolescents of rich (southeast) and poor (northeast) regions showed a substantial increase in BMI. In the southeast, the prevalence of overweight, defined by international age- and gender-specific BMI cutoffs, for both genders reached 17% (It was 5% in Arb-Gebeya Town school children)in 1997, whereas in the northeast, the prevalence tripled, reaching 5% among boys and 12% among girls. But, it was far from other similar studies found in Nigerian primary school, in which mild underweight was 47%, severe underweight was

4% and the overall nutritional status significantly affects school performance ($p<0.005$) (24).

Nutritional status has no association with academic performance ($X^2 = 6.046$, p-value = 0.109). It is known that the adolescents' anthropometric indices or references are inadequately developed and the technique is newly adopted. Because of this there were no recently conducted researches in Ethiopia to compare the result with others. Even though very few were conducted in developed country, it is very unlikely to compare, due to socio cultural, economical and geographical disparities among them.

Students who had lived in the family of ≤5 persons per home showed good performance 1.416 times than who had lived in the family of >5 persons (OR 1.39, 95% CI 1.37-1.97). The finding in Arb-Gebeya Town school children was similar to the study conducted in China to determine whether the academic outcomes with siblings and without siblings. The results of the survey was in 1987 of 1,460 school children and their parents and teachers in urban and rural areas of Changchun, a large Industrial City in Jilin Province in North-eastern China, contain many findings similar to those of surveys in West. Among urban children, those without siblings have higher academic scores than those with siblings, but these advantages are not found among rural children (29).

The presence of eye discharges could affect students' academic performance compared to those who hadn't eye discharge in their eyes. The possible implication could be those who had eye discharges could not attend the lesson had been given.

Male students could perform better than female in the study area. The implication could be females were not encouraged to participate as male in the area and have many responsibilities in home than males else. Females have many external influences than male as well.

6. STRENGTH AND LIMITATION

Strength of the study: The study is the only study in that administrative area, which had assessed the effect of intestinal parasitic infection on academic performance of school children. The method was relatively cheap and appropriate technology that could be done by the health center set up only. The study did not need any special training, sophisticated material and technology. The study used multiple tools/techniques for data collection to get uniform or consistent results. Training and thorough supervision helped to minimize the risk of missing data.

Limitation: The methods employed and comparison tools used are not well developed for 10-24 years age category. No standards of academic performance evaluation tools. Lack of reference materials for comparing some of the results found in the study. The standard used to compare nutritional status of adolescents was not much suitable. The laboratory technique employed was not more appropriate for few helminthes. It was better if concentration and other techniques were used for helminthes. Intensity of parasites was not investigated. Socio economic status were not included, because difficult to seek appropriate information due to recall biases and littleness of their age. There was a problem of recalling their illness and type of the disease which had manifested.

7. CONCLUSION AND RECOMMENDATION

Conclusion: -

- Even though the prevalence of Intestinal Parasites in the area was low, It was affected school performance in Arb-Gebeya town school children.
- Undernutrition was less prevalent in Arb-Gebeya school children.
- Nutritional status has no any effect on academic performance in the study. Thus, it needs further investigation with other techniques (eg. Dietary methods) and study designs.
- Living with in a large size family could be the cause of poor academic performance.

The over all study result is difficult to generalize to the national level, but it has its own indication to that administrative area and other similar geographical locations.

Recommendations:-

- De-worming program has to be encouraged with the collaboration of Woreda health office and other stakeholders. The program has to work specially on students.
- Students' health status affects their enrolment, and retention, therefore, health initiatives or clubs in school should be introduced and should focus on primary disease prevention.
- Health education on personal hygiene and sanitation has to be delivered.
- Awareness should be created on the negative impacts of Intestinal parasitic infestation on academic performance.
- Family planning education has to be given for their families and the families have to attend in near by health service deliveries.

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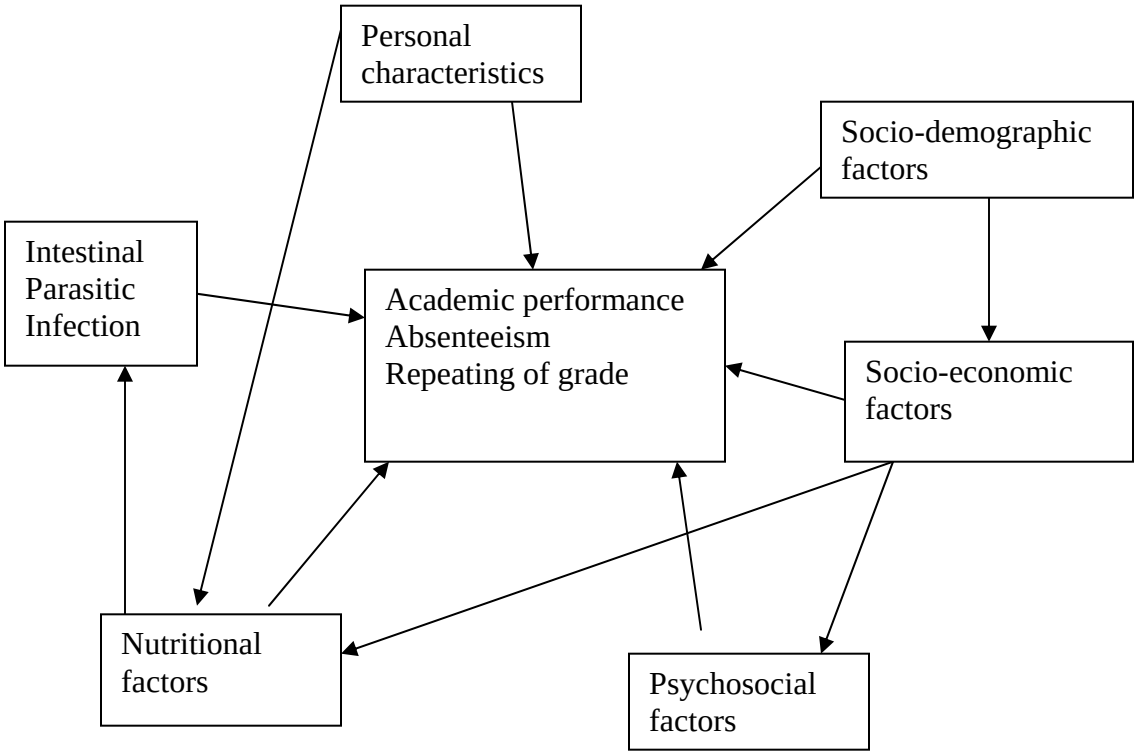
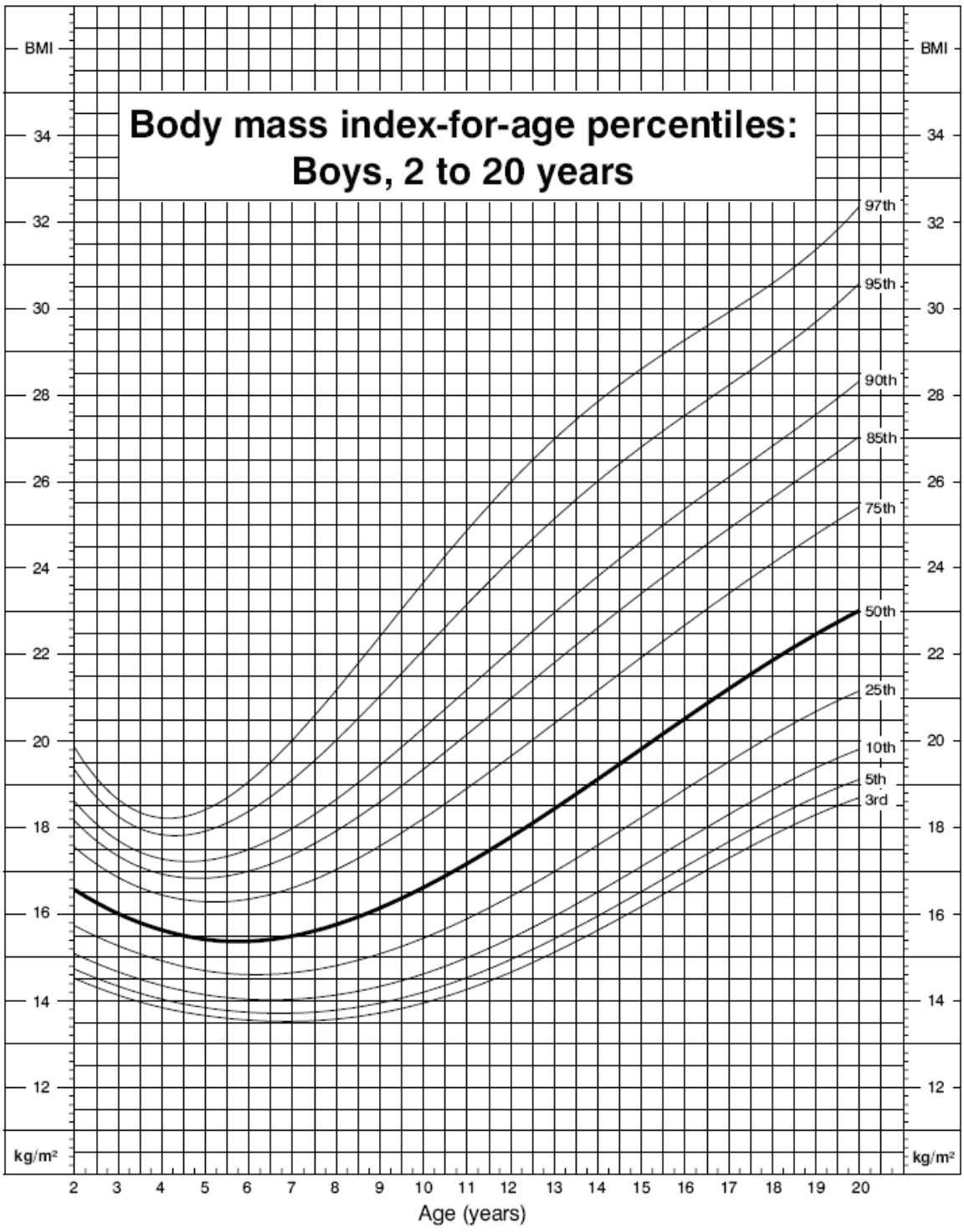
9. ANNEXES

ANNEX I. Conceptual frame work

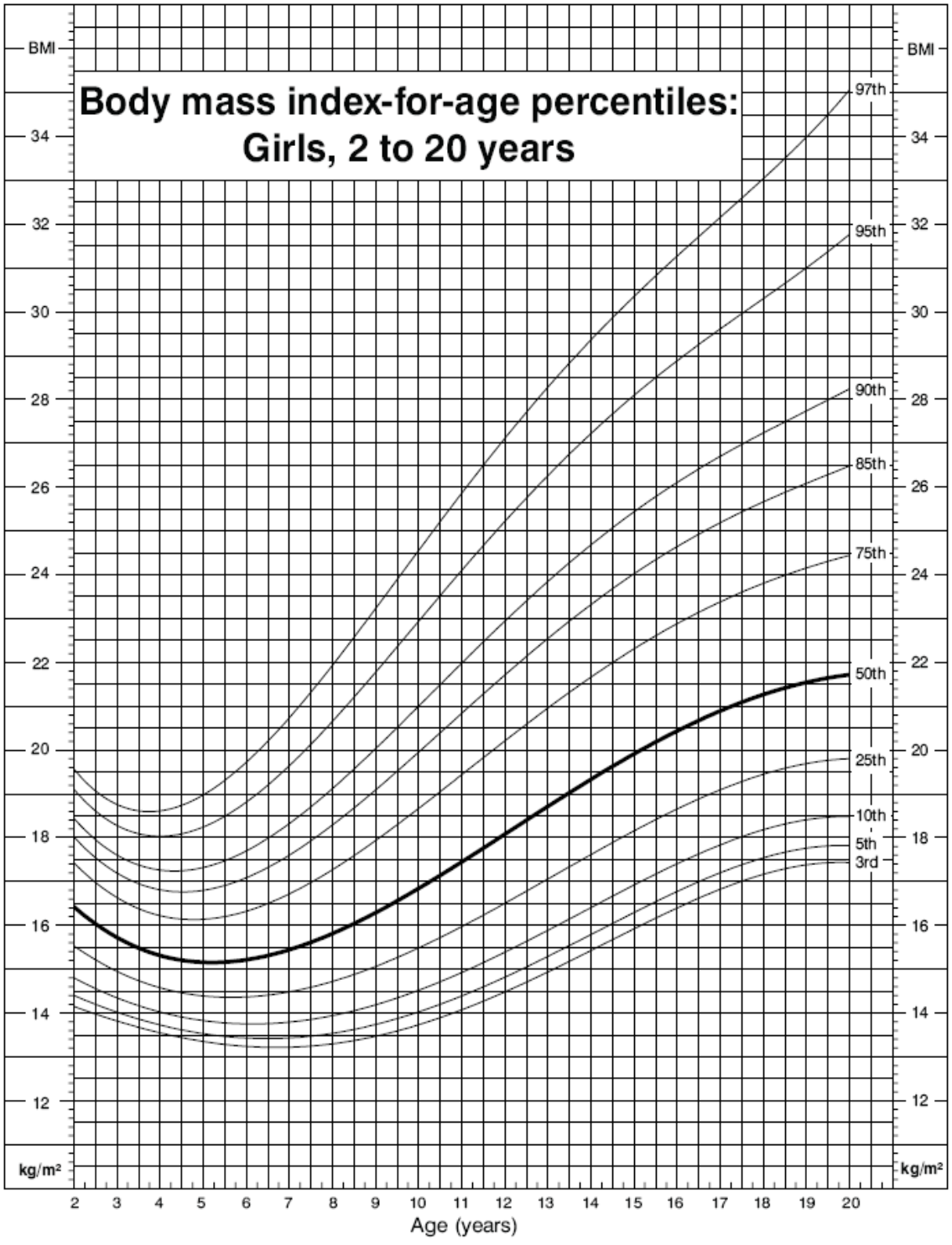


Annex II CDC BMI Chart



SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC



SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC

Annex III. Letter of consent

Addis Ababa University, Faculty of Medicine, Department of Community Health

Questionnaire to assess the effect of Intestinal Parasitic Infection and other determinant factors on academic performance of school children in Arb-Gebeya Town, Tach-Gayint Woreda, South Gondar, Ethiopia.

VERBAL CONSENT FORM BEFORE CONDUCTING INTERVIEW

Greeting!

How are you, I am_____ I am working in the research Team of the Addis Ababa University, Medical Faculty, Department of Community Health. I would like to ask you a few questions about your personal backgrounds, your socioeconomic status, and psychosocial factors. We will have carried out physical examination, measuring weight and height and finally stool examination for you. This will help us to improve students' academic performances based on your answers to our questions. Your name will not be written in this form and will never be used in connection with any information you tell us. All information given by you will be kept strictly confidential. Your participation is voluntary and you are not obligate to answer any question you do not wish to answer. If you feel discomfort with the interview, please feel free to drop it any time you want. This interview will take about 30 minutes. Could I have your permission to continue?

1. If yes, continue the interview.
2. If no, skip to the next participant by writing reasons for his/her refusal.

_____

Informed consent Certified by: Respondent's Name _____Signature_____

Interviewer: Code_____Name_____signature_____

Date of interview _____Time started _____Time completed_____

Result of interview: 1. Completed 2. Respondent not available 3. Refused 4. Partially completed

Checked by: Supervisor: Name _____ Signature_____

Annex IV. Questionnaire

Identification number _____

Pupil's name_____

I. QUESTIONNAIRE FOR INDIVIDUAL IDENTITY

Sr.No	Question	Response	Skip to
101	Grade and section	__ __	
102	Age	__ __ years	
103	Sex	1. Male 2. Female	
104	Religion	1. Orthodox Christian 2. Muslim 3. Others(specify)_____	
105	Ethnicity	1. Amhara 2. Tigre 3. Others(specify)_____	

II. SOCIOECONOMIC AND EDUCATIONAL STATUS OF PARENTS /GARDIANS OF THE STUDENT

Sr No.	Question	Response	Skip to
201	Residence	1. Town 2. Rural	
202	Do you have radio?	1. Yes 2. No	
203	Do you have TV set?	1. Yes 2. No	
204	Whose property is the house in which you live?	1. Our own 2. Rent 3. I do not know	

205	How many rooms does your house have?	_____	
206	How many persons live in your house?	_____	
207	Is your home comfortable for studying?	1. Yes 2. No	Skip to
208	If no, for the above question, what is the reason?	1. Crowded ness of room 2. Have no separate room 3. Problem of insect infestation 4. Others (specify)_____	
209	Where do you prefer to study?	1. At home 2. At school 3. At open field	
210	What type of fuel source you use to study during night?	1. Kerosene 2. Electricity 3. Candle 4. Others (specify)_____	
211	Do you have tap water in your house?	1. Yes 2. No	
212	Do you have latrine?	1. Yes 2. No	
213	What is your father's educational level?	1. Unable to write & read 2. Able to write & read 3. Grade 1-6 4. Grade 7-12 5. Grade 12+1 6. Grade 12+2 7. Degree and above	

214	What is your mother's educational level?	1. Unable to write & read 2. Able to write & read 3. Grade 1-6 4. Grade 7-12 5. Grade 12+1 6. Grade 12+2 7. Degree and above	
215	What is your father's occupation?	1. Teacher 2. Farmer 3. Merchant 4. Other gov't employee 5. Private employee/NGO 6. Daily laborer 7. Unemployed 8. Other (specify)_____	
216	What is your mother's occupation?	1. House wife's 2. Teacher 3. Farmer 4. Merchant 5. Other gov't employee 6. Private employee/NGO 7. Daily laborer 8. Unemployed 9. Other (specify)_____	

III. PSYCHOSOCIAL AND BEHAVIORAL CHARACTERISTICS OF THE STUDENT

S.No	Question	Response	Skip to
301	Do you think you have good relation ship with your peers?	1. Yes 2. No	
302	Do you think you have good relation ship with your families?	1. Yes 2. No	
303	Have you ever been bulled by one of your families?	1. Yes 2. No	
304	Have you ever been punished at school?	1. Yes 2. No	Skip to
305	If yes, to for above question what was the reason?	1. Disagreement with teachers 2. Disagreement with students 3. Violating the rules of the school 4. Others (specify)_____	
306	Do you study at night?	1. Yes 2. No	Skip to
307	If no, for above question what might be the reason behind?	1. Lack of light sources 2. Uncomfortable environment 3. Family discouragements 4. Work load from family	
308	Have you had much workload at home/out of home?	1. Yes 2. No	
309	Do your families' support/encourage your education?	1. Yes 2. No	
310	Do you have a shortage of educational materials?	1. Yes 2. No	
311	Do your family quarrel each other, while you are at home?	1. Yes 2. No	Skip to

312	If yes, how frequent they did?	1. More than once a week 2. Once a week 3. More than once a week 4. Once a month 5. Others(specify)_____	
313	Could their quarrel have disturbed you?	1. Yes 2. No	Skip to
314	If yes, how much severely being disturbed?	1. Less 2. Moderate 3. Severely 4. Very severely	
315	Do you have a break fast?	1. Yes 2. No	Skip to
316	If yes, for above question how frequent you ate?	1. Always 2. Some times	
317	Do you have brothers/sisters who are student with your school or another?	1. Yes 2. No	
318	Do you have brothers/sisters who have joined college/university?	1. Yes 2. No	
319	How long you walk to your home?	_____ Minutes	

IV.MEDICAL HISTORY AND PHYSICAL EXAMINITION OF THE STUDENT

Sr.No	Question	Response	Skip to
401	Have you been sick since last September?	1. Yes 2. No	Skip to
402	If yes, for above question, what type of disease?	1. Diarrhea/IPI 2. Tuberculosis/ARTI 3. Malaria 4. Scabies	

		5. Other (specify)_____	
403	Have had taken treatment for the above cases?	1. Yes 2. No	
404	Do you have difficulty of hearing?	1. Yes 2. No	
405	Do you have difficulty of vision?	1. Yes 2. No	
406	Do you have night blindness?	1. Yes 2. No	
407	Does the student have a purulent eye discharges?	1. Yes 2. No	
408	Does the student have conjunctival pallor (paleness)?	1. Yes 2. No	
409	Does the student have goiter?	1. Yes 2. No	
410	Does the student have abdominal distention?	1. Yes 2. No	
411	Does the student have edema (excess fluid) in his body parts?	1. Yes 2. No	
412	Does the student have scabies?	1. Yes 2. No	
413	Does the student have gross body defects?	1. Yes 1. No	

V. ANTHROPOMETRIC MEASURMENTS OF THE STUDENT

501. Weight __ __. __ in Kg, 502. Height __ __ __ in Cm

VI.DIRECT STOOL EXAMINATION

Identified parasites	Parasites seen	No of eggs/larvae per slide
Ascaris lambricoides		
Entameba histolitica		
Giardia lamblia		
Hookworm		
Strongyloides		
Taenia saginata		
Thrichuris trichiura		
Others (specify)____		

Annex v. Amharic questionnaire

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YKJ'U ›"}"/‹" eK ÓKcv© vI`ÃI/i MÖÃpI/I ðMÒKG<:: Ÿ²=G< Ò` u}ÁÁ² ¾Ö?" U`S^&lSƒ" ¡wÅƒ "Ç=G<U ¾cÑ^
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¾TÃðMÑ<ƒ" ØÁo "ÉƒSMe/i ›ƒÑÅÉU/ÏU:: unK SÖÃl H>Åƒ LÃ ¾TÃS‹I/i ŸJ' nKSÖÃl" Ts[Ø }‹LKI/ÁKi::
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1.›- ŸJ'&nKSÖÃl" ÃkØK<
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102	ÉT@	----------	
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104	HÃT•ƒ	1. *`„Ê¡e ¡`eƒ" 2. eMU" 3.K?L (ÃÖke)	
105	wH@`	1. ›T^ 2. ƒÓ_ 3. K?L(ÃÖke)----------	

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202	_Ç=Ä ›L‹G<;	1.›- 2.¾KU	
203	,K?y=»" ›L‹G<;	1.›- 2.¾KU	
204	¾Uƒ•\uƒ u?ƒ ¾T" '¨<;	1.›- 2.¾KU	
205	uu?ƒ ¨<eØ e"ƒ J"‹G< '¨< ¾Uƒ•\ƒ;	----------	
206	¾Uƒ•\uƒ u?ƒ KØ"ƒ ›S‹'ƒ ›K¨<;	1.›- 2.¾KU	¾KU "K< ¨Å ØÁo lØ` 207 }hÑ`

207	"M}S† U¡"Á~ U"É" ¨<;	1.Övw/¾}Ú"'k uSJ'< 2.KØ"ƒ ¾}K¾ ¡õM eKK?K¨< 3.}vÃ" }""i 'õdƒ eLK¨< 4.K?L(ÃÖke)-----	
208	KTØ"ƒ ¾x U`ÝI/I ¾ƒ ¨<;	1.Ÿu?ƒ 2.ƒUI`ƒ u?ƒ 3.T@Ç LÃ	
209	T T KTØ"ƒ ¾UƒÖkS<uƒ ¾Sw^ƒ U"ß U"É" ¨<;	1.Ò´/LUv 2.›?K?¡ƒ]¡ 3.hT 4.K?L(ÃÖke)-------	
210	Ÿu? ‹G< ¨<eØ ¾¨<H vD"vD ›L‹G<;	1.›- 2.¾KU	
211	i"ƒ u?ƒ(SìÇÍ) ›L‹G<;	1.›- 2.¾KU	
212	¾›vƒI/i ¾ƒUI`ƒ Å[Í U"É" ¨<;	1.T"uw" Síõ ¾TÃ‹M 2.T"uw" Síõ ¾T>‹M 3.Ÿ 1-6— ¡õM ¾}T[4.Ÿ 7-12— ¡õM ¾}T[5.uc`+õŸ?ƒ ¾}S[k 6.uÇ=ýKAT ¾}S[k 7.Ç=Ó]" Ÿ²=Á uLÃ ¾}S[k	
213	¾ "ƒI/i ¾ƒUI`ƒ Å[Í U"É" ¨<;	1.T"uw" Síõ ¾TÃ‹M 2.T"uw" Síõ ¾T>‹M 3.Ÿ 1-6— ¡õM ¾}T[4.Ÿ 7-12— ¡õM ¾}T[5.uc`+õŸ?ƒ ¾}S[k 6.uÇ=ýKAT ¾}S[k 7.Ç=Ó]" Ÿ²=Á uLÃ ¾}S[k	
214	¾›vƒI/i e^ U"É" ¨<;	1.SUI` 2.Ñu_ 3.'ÒÈ 4.K?L ¾S"Óeƒ e^	

		5.¾ÓM }k×] 6.¾k" c^}— 7.e^ ›Ø 8.K?L(ÃØke)-------	
215	¾ "ƒl/i e^ U"É" '¨< ;	1.¾u?ƒ Su?ƒ 2.SUl` 3.Ñu_ 4.'ÒÈ 5.K?L ¾S"Óeƒ e^ 6.¾ÓM }k×] 7.¾k" c^}— 8.e^ ›Ø 9.K?L(ÃØke)-------	

2. ¾}T]¨<" vl`Ã " Tlu[cv© Ó"–<'ƒ u}SKŸ}

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301	ŸÕÉ™Š Ò` Ø\ Ó"–<'ƒ ›K˜ wKl/i evKl/i;	1.›- 2.¾KU	
302	Ÿu?}cxŠ Ò` Ø\ Ó"–<'ƒ ›K˜ wKl/i evKl/i;	1.›- 2.¾KU	
303	Ÿu?}cx‹l/i u›"Æ ¾HÃM Ønƒ/}î • Å`fwl/i Á¨<nM;	1.›- 2.¾KU	
304	Ÿƒ Ul`ƒ u?ƒ ¨<eØ p×ƒ }kØ}l/i ¨<nKl/i;	1.›- 2.¾KU	›- "K< ¨Å lØ` 306 }hÑ`
305	›- ŸJ' U¡"Á~ U" 'u`;	1.ŸSUl` Ò` }Òß†/eLM}Óvv" 2.Ÿ}T] Ò` }Òß†/eLM}Óvv" 3.¾ƒ Ul`ƒ u?~" lÓ" Å"w }LMô 4.K?L(ÃÖke)------	
306	T T Ö"Kl/i;	1.›- 2.¾KU	›- "K< ¨Å lØ` 308 }hÑ`
307	"LÖ"l/i U¡"Á~ U" 'u`;	1.¾Sw^ƒ Ø[ƒ eLK 2.u?~ eKTÃS‹	

		3.u?}cw eKT>n-S˜/eKTu[˜ 4.u?}cw ¾e^ Ý“ eKT>Áu³w˜ 5.K?L(ÃÖke)----------	
308	Ÿu?ƒ ¨<eØU J’ Ÿu?ƒ ¨<ß e^ Ý“›KwI/i;	1.›- 2.¾KU	
309	u?}cx‹I KƒUI`ƒI/i ÉÒõ(Tu[ ƒ) ÁÅ`Ñ<MHM/hM;	1.›- 2.¾KU	
310	¾ƒUI`ƒ S`Í Sd]Á Ø[ƒ ›Kwl¨Ã/i;	1.›- 2.¾KU	
311	›vƒI/i“ “ƒI/i ›”}/‹ Ÿu?ƒ ¨<eØ ÁKI/i Óßƒ/ßpßp ÃðØ^K<;	1.›- 2.¾KU	¾KU "K< ¨Å lØ` 315 }hÑ`
312	›- ŸJ’ u¾U” ÁIM Ó²?;	1.udU”ƒ Ÿ›”É Ó²? uLÃ 2.udU”ƒ ›”É Ó²? 3.u¨` Ÿ›”É Ñ²? uLÃ 4.u¨` ›”É Ó²? 5.K?L(ÃÖke)---------	
313	¾u?}cx‹I/i ›KSÓvvƒ ›”}”/‹” Ã[wiHM/hM;	1.›- 2.¾KU	¾KU "K< ¨Å lØ` 315 }hÑ`
314	›- ŸJ’ U” ÁIM ƒ[uhKI/i;	1.uSÖ’< 3.u×U 3.Ÿ›pT@ uLÃ ¨ 3.Ÿ›pT@ uLÃ ¨<	
315	¨Å ƒUI`ƒ u?ƒ eƒS×/ß l`e ƒuLKI/i;	1.›- 2.¾KU	¾KU "K< ¨Å lØ` 317 }hÑ`
316	›- ŸJ’ u¾U” Á¡M Ó²?;	1.G<M Ó²? 2.›Mö ›Mö	
317	Ÿ²=I ¨ÃU ŸK?L ƒUI`ƒ u?ƒ ¾T>T` ¨”ÉU/ Iƒ ›K<I/i;	1. ›- 2. ¾K˜U	
318	¢K?Ï ¾T>T` ¨”ÉU/ Iƒ ›KI/i ;	1. ›- 2. ¾K˜U	
319	¨Å ƒUI`ƒ u?ƒ eƒS×/ß e”ƒ Åmn ÃðÏwHM/hM;	----------	

3. IV.MEDICAL HISTORY AND PHYSICAL EXAMINITION OF THE STUDENT

Sr. No	Question	Response	Skip to
401	Have you been sick since last September?	3. Yes 4. No	If no, skip to # 404
402	If yes, for # 401what type of disease?	(specify)_____	
403	Have had taken treatment for the above cases?	3. Yes 4. No	
404	Do you have difficulty of hearing?	1. Yes 2. No	
405	Do you have difficulty of vision?	3. Yes 4. No	
406	Do you have night blindness?	2. Yes 2. No	
407	Does the student have a purulent eye discharges?	3. Yes 4. No	
408	Does the student have conjunctival pallor (paleness)?	2. Yes 2. No	
409	Does the student have goiter?	1. Yes 2. No	
410	Does the student have abdominal distention?	1. Yes 2. No	
411	Does the student have edema (excess fluid) in his body parts?	1. Yes 2. No	
412	Does the student have scabies?	1. Yes 2. No	
413	Does the student have gross body defects?	1. Yes 2. No	

5. ANTHROPOMETRIC MEASURMENTS OF THE STUDENT

501. Weight __ __. __ in Kg, 502. Height __ __ __ in Cm

Declaration

I the under signed, declared that this thesis is my original work, has never been presented in this or any other universities, and that all the resources and materials used for the thesis, have been duly acknowledged.

Name: Amha Admasie

Signature: _____

Place: Addis Ababa, Ethiopia

Date of submission: _____

This thesis has been submitted for examination with my approval as a University advisor

Name: Professor Ahmed Ali

Signature _____

Date_____