Addis Ababa University College of health science, school of public health

Magnitude of anemia and its contributing factor among school age children in Mihur Aklil district, Gurage zone, Ethiopia

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Abbreviation and Acronyms

AOR	Adjusted odds ratio
COR	Crude odds ratio
EDHS	Ethiopian demography and health survey
GPS	Global positioning system
HGB	Hemoglobin
HEW	Health extension workers
IQ	Intelligence quotient
IQR	Inter quartile range
SNNPR	Southern nation's nationalities peoples region
NNP	National nutrition program
NPW	Non pregnant women
RDT	Rapid diagnostic test
SD	Standard deviation
STH	Soil transmitted helminthes
WHO	World health organization

Abstract

Background: Anemia during childhood impairs physical growth, cognitive development and school performance. Identifying the causes of anemia in specific contexts can help to prevent negative consequences of anemia among school age children.

Objective: The objective of this study was to assess the magnitude of anemia and to identify its contributing factor among school children in south Ethiopia.

Methods: Community based cross sectional study was conducted on 516 school age children on their caretakers from March 2016 to April 2016 in Mihur aklil district, Gurage Zone, south Ethiopia. Systematic simple random sampling technique was implemented to select students from 13 primary schools, stool and blood sample were collected in health posts. Information on the families' socioeconomic conditions and the children's health Variables were obtained through interviews with parents or guardians. HemoCue 301 was used to determine hemoglobin level. Direct stool examination using saline smear was used to investigate intestinal protozoa and helminthes. Rapid diagnostic kit was also used for detection of malaria infection. Bivariate and multivariate regression analysis was used to identify contributing factor for the development of anemia. P value below 0.05 was considered for statistically significance.

Result: The overall prevalence of anemia was 21.71% (95% CI: 17.95, 25.07) children residing in mild food insecure households (AOR=5.15, 95% CI: (2.45-10.82), moderate food insecure (AOR=4.47, 95%CI: (1.38-14.48) and severe food insecure (AOR=11.71, 95% CI: (3.49-39.25), and who had Ascaris lumbricods and hook worm parasites (AOR=2.64,95% CI:(1.18-5.92), (AOR=4.75,95% CI:(1.87-12.05) respectively and infected with malaria (A0R=68.13, 95% CI: (7.02- 660). showed strong odds of being anemic than their counter parts.

Conclusion: In conclusion anemia among school age children in this study is of moderate public health significance. The magnitude of anemia was strongly associated with malaria, food insecurity and intestinal parasite. It is recommended to include school age children in de-worming program and strengthen the nutrition specific and sensitive interventions to avert the magnitude of anemia for studied children in the community.

1 Introduction

1.1 Backgrounds

Malnutrition among children in developing countries was far most recognized and is still continued to impair health, quality of life, and survival. It is estimated to account around 35% of Under 5 children's mortality that occurs annually particularly in sub-Saharan Africa. It is a among school age children and commonly reflected in a high prevalence of wasting, stunting, and micronutrient deficiency (1). Micronutrient deficiencies affect nearly two billion people worldwide (2). Among the commonly indicated micronutrient deficiencies such as Iron, Iodine and Vitamin A are most important, including multiple micronutrients deficiencies as a common occurrence (1). Micronutrients, which are needed by the body in a very small amount, has important role in production of enzymes hormones and other substance, they also help in regulating growth activity and cognitive development and growth (3).

Regarding iron deficiencies, about 25% of the world and around close to a half of school age children in low income countries are estimated to suffer from iron deficiency anemia (4). Anemia is defined as decrease in the concentration of circulating red blood cells or in the hemoglobin concentration and a concomitant impaired capacity to transport oxygen. Anemia is the most common indicator used to screen for iron deficiency (5).

Anemia related with iron deficiency is associated with impaired cognitive and intellectual performance, poor motor development and coordination, poor language development, low scholastic achievement of infants, preschool and school age children (6-11). The more severe stages of iron deficiency are associated with anemia (5). And iron deficiency anemia would be considered a public health problem only when the prevalence exceeds 5.0% of the population. And severity of public health problem of anemia expressed as mild, moderate and severe if prevalence of anemia reaches 5-19.9%, 20-39.9% and ≥40% respectively (5).

Anemia is the result of a wide variety of causes that often coexist together. Among School age it could be due to inadequate consumption of Nutrient-rich foods, dietary taboos, lack of access to health care and inefficient utilization of available micronutrients by cause of infections and parasitic infestations among other reasons (12, 13). However, Iron deficiency due to inadequate intake is the most significant contributor to anemia (14, 15).

In Ethiopia, deficiencies in key vitamins and minerals are placed among the major public health problems (16, 19). According to the national survey conducted on the nutritional status of school age children in 2008, anemia reported among less than 10% of the studied children, which indicated that it was mild public health significance problem (17). However, according the federal ministry of health, micronutrient Assessment of Feasibility and Potential Benefits of Food Fortification in Ethiopia, 2011 anemia is estimated to be 24% among children less than 15 years (18). Additionally individual studies conducted in different part of the country, showed even much higher prevalence (16, 20, 21.22).

Since 2013, the government is tiring to address the nutritional issue of school age children mainly indirectly through integrating nutrition sensitive intervention in school, such as school biannual de-warming and wash programs (19). However strategy implemented to prevent or treat anemia should be tailored to local conditions, taking into account the specific etiology and prevalence of anemia in a given setting shoud be explicitly dealt with. Despite it is indicated on the NNP II to conduct a comprehensive and routine nutritional assessment at schools, there is limited national representative finding on the magnitude and factors played for the development of school age anemia, particularly there no information about anemia among school age children in the study area, therefore this study has attempted to fill the prevailing information gap

1.2 Statement of the problem

Micronutrients deficiencies contribute significantly to morbidity and mortality particularly among younger children. Globally the health, mental & physical functions and survival of more than two billion people are affected by micronutrient deficiency. About 25% of in the world and around close to a half of the school-age children in low income countries are estimated to suffer from iron deficiency anemia (1). It has been demonstrated in many studies that anemia is associated with impaired cognitive and intellectual performance, poor motor development and coordination, poor language development, low scholastic achievement of infants, preschool and school age children (4-8).

In Ethiopia more than (24%) 8 million children under 15 years of age suffer from IDA, According to federal ministry of health Micronutrient Damage Assessment Report 2011, the same repodepressed national economic activity of nearly half a billion dollars annually can be attributed to rates of vitamin A deficiency, iron deficiency anaemia and folic acid related NTDs. Almost half these losses are from nearly 50 thousand annual child deaths mainly from vitamin A deficiency. About a quarter of these losses are the NPV of earnings deficits due to anaemia related cognitive deficits in children(18).

Correcting anemia requires an integrated approach based on identifying the magnitude and addressing the contributing factors. Unlike most regions the country, children in the Gurage Zone districts served coffee together with other meal. This may affect the process of iron absorption from the meal taken thus, exposed them for anemia. Additionally most of children not use feet wearing. Furth they tend to keep their shoes in home after they returned from school (personal experience). This might expose them for intestinal helminthes infestation. Therefore, the objective of this study was to investigate the magnitude and contributing factors of anemia among school children in South Ethiopia in expectation of higher prevalence.

1.3 Rationale of the study

It is evident from different studies that school age children around the globe and devoting countries including in Ethiopia suffer from micronutrient deficiencies and Impacting their

health, cognition, and subsequently their educational achievement. Yet, school-aged children are not commonly included in health and nutrition surveys, further the current NNP II not properly addressed in the National Nutrition Program except the nutrition sensitive school wash and de-worming programs which indirect addressing the micronutrient issue of school age children. Another is School feeding program, which only targets food insecure Districts. However, MND could be beyond food security that is nutrition security.

Further an up-to-date overview of their nutritional status across the country is in adequate. As a number of factors are involved in the development of school age anemia, explicit exploration is important for considering on dealing with the issue.

Therefore, conducting this study will reveal the extent of anemia and identify what factors contributed for anemia among school age children in the selected district. And will intern inform NNP-II to address the identified issue by incorporating in SHN program and Nutrition Interventions, be it direct or nutrition sensitive programs targeting school age children in Gurage and similar setting.

2 Literature review

Overview of nutritional status of school age children

It is clear that the health of children, physical growth and development, academic performance and progress in life are determined by their nutritional status (22). However under nutrition during childhood was far most recognized and still continued as one of the reasons behind the high child mortality rate occurring in developing countries. Malnutrition among school age children is major public health concern and is commonly reflected in a high prevalence of wasting, stunting, and micronutrient deficiency (23).

Magnitude of anemia

Anemia is one of the most common and widespread disorders in the world causing a public problem. Anemia affected 25 % of world population. Primarily pregnant women and young children are at greatest risk (25). Geographically, people living in Asia and Africa are at greatest risk, almost two-thirds of preschool-aged children living in Africa are anemic (25). And it is also a public health problem in developing countries among school-age children. It Affects close to half (43.6%) of school age children living in low wealth index countries (25). the highest regional prevalence of iron deficiency is found in Africa. And the highest country prevalence of iron deficiency and iron deficiency anemia is from Cote d'Ivoire, where 59% of rural school age children reported iron deficient and 36% had iron deficiency anemia (26, 27). In a survey of nearly 14,000 rural school children in Africa and Asia, the prevalence of IDA was more than 40% in five African countries (Mali, Tanzania, Mozambique, Ghana, and Malawi). The highest prevalence was seen amongst children aged 7-11 years (28).

In Ethiopia, deficiencies in key vitamins and minerals are emphasized and mentioned as placed the major public health problems according study Stud conducted in Amhara regional state revealed More than two thirds of the school-aged children (79.5%) had at least one MD and 40.5% (multiple micronutrient deficiency) 40.5% had two or more coexisting micronutrient deficiencies (13, 15). According to the national survey of nutritional status of school age children conducted in 2008 reported anemia among less than 10% of studied children (14). However, individual studies conducted in different part of the country showed much higher prevalence than the national survey. A Cross-Sectional Study conducted among school age children in LiboKemkem and Fogera Districts, Amhara Regional State reported 30.9% studied children were anemic (13).

Another Study conducted in south west Ethiopia among school age children identified the magnitude of total anemia was severe public health significant which is 43.7% and IDA was found to be 37.4%(17). Another study conducted in eastern Ethiopia also reported anemia being a moderate public health significant problem which is 27.1 % (18). there study finding done in Addis Ababa among school age children which reported much lower prevalence (5.83%) even from the national survey finding which was done in 2008 (14).

These reviewed studies showed that the prevalence of anemia among school children ranges from 5.8%–43.7%, which indicated that anemia, is a mild to severe public health public health problem not a mild problem as claimed by the national representative survey finding.

Factor associated with anemia

Anemia is the result of a wide variety of causes that often coexist together. Iron deficiency is the most significant contributor to anemia that can be due to insufficient intake of iron rich foods (29). Among the main causes of anemia includes, infectious diseases such as malaria, worm infestation and schistosomiasis are the commonest other includes essential micronutrient deficiencies such as vitamin A, folic acid and vitamin B12 (2).

Dietary intake of bio available and iron rich foods, intake of inhibitors and enhancers of iron absorption

Study conducted factors associated with anemia among Serbian school-age children 7–14 years old defective poultry intake (1.65 [1.01-2.62], p=0.047), lack of fish consumption (1.84 [1.07-3.18], were the dietary factors associated with associated with higher frequency anemia.(12). According a cross sectional study done in south west Ethiopia among school age children not consuming of protein source food [AOR52.30, 95%CI (1.04 - 5.14)], not-consuming

Dairy products, not-consuming discretionary calories were predictors of IDA (17). A study conducted in Kazakhstan, which collected the dietary intake of food rich in Haem iron with enhancer and inhibitors (meat, fish and poultry, and vitamin C) and inhibitors (tea and phytates) consumed in the same meal, identified that higher iron intake of enhancer was significantly associated with a decreased prevalence of anemia (odds ratio, 0.39; 95% confidence interval, 0.16-0.93; P=0.034) (31). Study conducted in Kersa, Eastern Ethiopia, reported that Children who had irregular legume consumption (APR, 1.069; 95% CI, 1.022 -

1.118) were at higher risk for anemia (18). Another study conducted in Ethiopia showed intake of plant food [OR = 3.847, 95% CI (2.068, 7.157)] and intake of animal food [OR = 2.37, 95% CI (1.040, 5.402)] were significantly and independently associated with anemia (17).

Study conducted in Western Uganda excess intake of fiber, inadequate intake of iron, protein, Folate, riboflavin, energy and vitamin A were predictors of anemia (p . 0.001)(32).

Socio-economic status

Several studies which conducted magnitude of anemia and its associated factors revealed that school age children living in family with low income or lower family wealth index associated with anemia. A Study conducted in children in Filtu Town, Somali region, South west Ethiopia found strong association being from a family with low income (AOR = 9.44, 95% CI: 2.88, 30.99)(30), study conducted in Jima also showed association of low family income with anemia [AOR 6.14 95%CI(2.90,12.9)](17). Study conducted in Korea which is focus on the relationship between socio-economic status and anemia reported that, decreasing trend in anemia prevalence as household income increased. Correlation analysis demonstrated in the same study stated that there is a relationship between household income and serum hemoglobin and ferritin levels (P=0.003 and P=0.026, respectively (33). low family income was predictors of anemia (17).

Socio-demographic characteristics of school age children and their care takers

Child age and sex

Study conducted in Egypt among children in non formal education center, anemia was significantly higher among 64% of children in the age group 6-9 year and females were more anemic (34). However, several studies identified among school age children anemia is observed more in boys than girls. Study conducted in eight African and Asian countries showed that more boys than girls were anemic and age in five African countries for children aged 7±11 years (28). Male gender more exposed to anemia (3.22 [1.92-5.42], p=0.000)(12), However study conducted in Jima reported the prevalence of anemia among the age group of 6–11 years was higher (17).

Maternal education status

Study done in Ethiopia also showed the lower mothers' education increases by four times the child being anemic than child with Mother higher the education status of mother [OR = 4.621, 95% CI(1.383,15.439)](17). Study conducted in Korea showed, Children with more educated mothers were less likely to develop anemia (P = 0.0324) and iron deficiency (P = 0.0577) than were those with less educated mothers. This group consumed more protein (P = 0.0004) and iron (P = 0.0012) from animal sources than did the children of less educated mothers, as reflected by their greater consumption of meat, poultry, and derivatives (P < 0.0001) (33).

Malaria infection

According study conducted in Tanzania, Anemia was significantly higher among children not using mosquito nets (p = 0.049); and among those with malaria infection (p <0.001)(35). Study conducted in Kenya also reported Severe malnutrition and interactions between Plasmodium Falciparum were significantly associated with lower Hb. another study reported malaria incidences was associated with anemia among the studied children(32)

Intestinal helminthes and parasite infestation

It is known that school age children harbor the heaviest parasite infestation among all age group (23). And thus, they are very vulnerable to the effects of worm infection which includes nutritional deficiencies which aggravate malnutrition and worsening the rates of anemia. Study conducted in Egypt Parasite infestation were identified as the predicators of anemia among the studied children [AOR51.45, 95%CI (1.23, 5.27)] (34). Parasitic infestation and association with anemia also showed in study conducted in Ethiopia intestinal parasitic infections [AOR51.45, 95%CI (1.23, 5.27)] were predictors of IDA (17). Meta analyses of anti- helminthes treatment RCTs showed a positive effect on ferritin (SMD: 0.16; 95% CI: 0.09, 0.22) (36).

2.1 Conceptual frame work

Based on the adapted conceptual model from UNICEF 1998 model the independent Variables considered as distal factors included in the study were the child's age, sex, utilization of ITN, utilization of Albendazole , current family members in the household, educational status and occupation of parents, wealth index, age of the mother, water source, households food insecurity status and type of waste disposal system of the household. Factors which can directly affect level of anemia as considered proximate factors which includes dietary intake of inhibitors, morbidity status, household dietary diversity, malaria infection, intestinal parasite infestation were included.

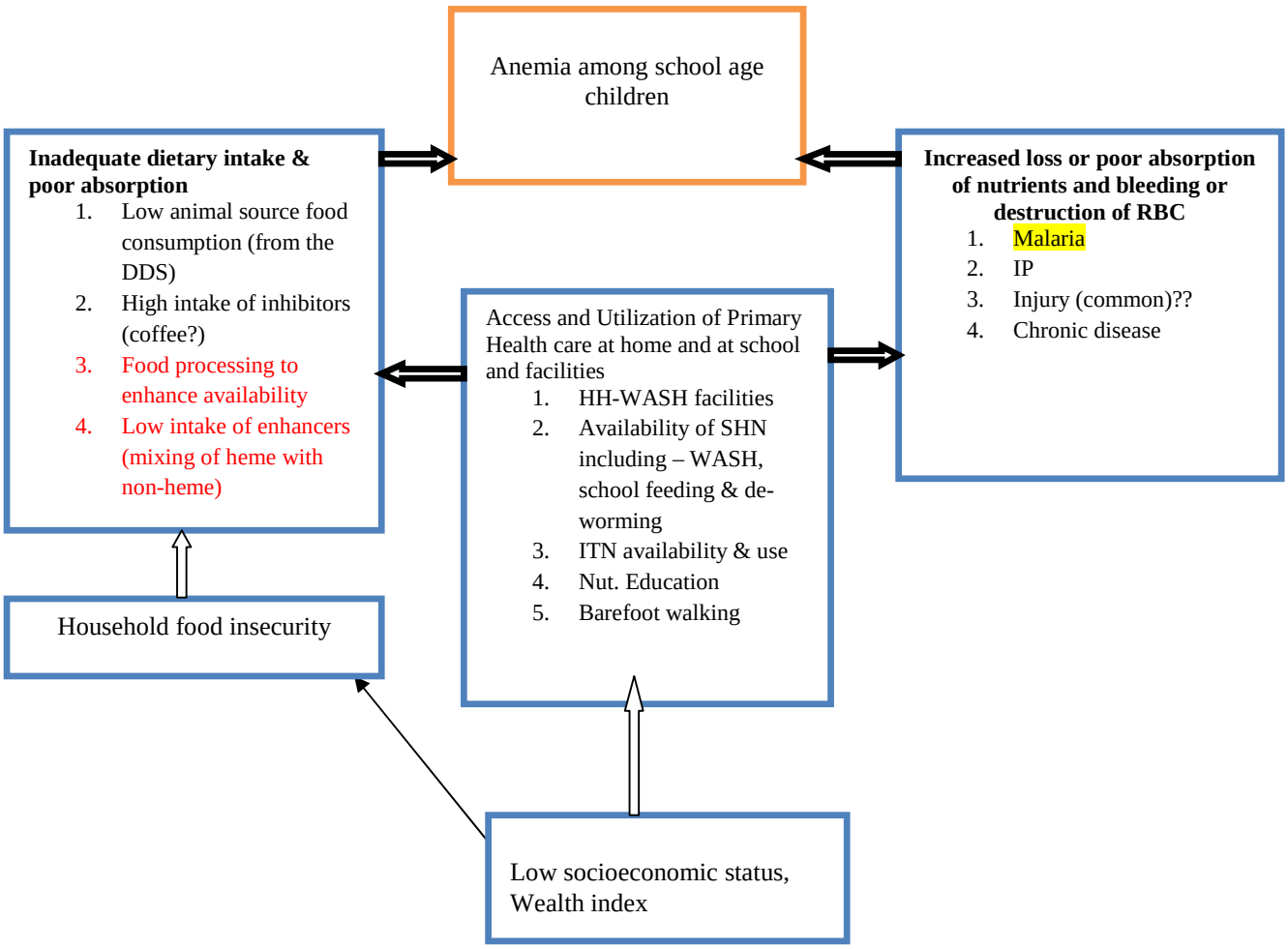


Figure 1:- conceptual frame work for development of school age anemia in Mihur Aklil district, 2016

3 Objective of the study

3.1 General objective

To determine the magnitude of anemia and its contributing factors among school age children in, Mohur Aklil district, Gurage Zone, Ethiopia, 2016

3.2 Specific objective

To determine the level of anemia among school age children in Mohur Aklil district, Gurage Zone

To measure the dietary diversity among HH of school age children

To estimate the HH food security status of families of school age children

To measure the prevalence of intestinal parasitosis and multiple infestation

To determine level of malaria infection.

4. Methods and materials

4.1 Setting and period

The study was conducted from March to April, 2016 in Mihur Aklil district, which is found in southern nation nationalities and regional state (SNNP), Gurage Zone. The woreda covers around 421.2 square kilometer. It is found 210 km far from the capital city Addis Ababa and 52 km from the Zonal city, Wolkite. The district comprises About 22,079 households, and have total of 108,151 populations segregated under 30 kebeles. Agro-ecological Zone, 20 of the kebeles categorized under midlands and 10 of them are highlands. According to the woreda health office there are five government owned health centers each providing primary health care service for about 25000 people and under the health center catchment there are about 5-6 health post each providing basic primary health care service for 5000 people with this five health centers and the 20 health posts, provide health service for more than 85% the total population. Almost all kebeles have health extension workers which gives primary health care services to the people. The livelihood of the study population is mainly dependant on subsistence agriculture and trade as means of living. The District is known by its production of chat and Enset (Enset Ventricosum) mainly by the midlands. Barley and potato produced by the highland communities, which is harvested during the month of November to January. In the study area there is dietary practice serving children with coffee during any time while children having their meal. Children often walk bare foot and keep their shoes in home after school (personal experience). So the study area is choosing in expectation of higher prevalence of anemia.

4.1 Study design

Community and school based cross-sectional study was implemented.

4.3 Population

Target population: All school age children in Mihur Aklil Woreda, Gurage Zone SNNPR

Source population: All school age children found in the primary schools which were found in the geographical tertiary of each selected kebeles providing education service during data collection time in Mohur Aklil Woreda, Gurage Zone , SNNPR

Study population: school age children selected from each school age children, particularly for this study, children those aged between 5 to 10 years old was use

$$n = \left[\frac{\left(Z_1 - \frac{\alpha}{2}\right)^2 \rho(1-\rho)}{d_2} \right]$$

critical value at 95% certainty		P	1-P	Calculated sample	10% non responses rate	Design effect	Final Sample size
Anemia(14)	1.96	27	0.73	303	30	1.5	484.5
Intestinal parasite(18)	1.96	30	0.70	323	32	1.5	516.5

4.5 Sampling procedure

Sample was determined to collect from one third of the total kebeles, because of feasibility and time concern. Thirty kebeles found in the woreda were registered first and then stratification was made based on the Agro-ecological setting as midlands (20kebeles) and highlands (1 0kebeles). Then, again kebeles from each climatic Zone were identified and registered. Seven (midlands) and three (highland) kebeles those have at least one primary schools were selected randomly from each Agro-ecological setting based on the proportion of total number households in each categories. Data were collected from 10 primary schools which were found in the respected ten kebeles. Before data collection students roster was obtained from respected primary schools to constitute sampling frame. The number of students required to be enrolled were further selected proportionally based on the number of Households in each 10 kebeles this done to keep the study community baseness. Finally the required sample size was selected systematically until the number of sample size allocated to each kebele reached. The first case was chosen with random start using lottery method. Sampling interval was different for each school according to allocated sample to each kebele and number of student in the school. Mostly it was every other for schools with small number of students and schools with larger number of school age children sampling interval was every third.

All schools involved in this study were located within the geographic limit of the kebele and students from nearby kebele were excluded from all school we studied. Household interview were started immediately after selecting sample students. During sampling brothers or sisters one of were excluded. Data collectors (health extension workers) completely register the name of the student, the name of the mother or father and the village name for accessing the child household.

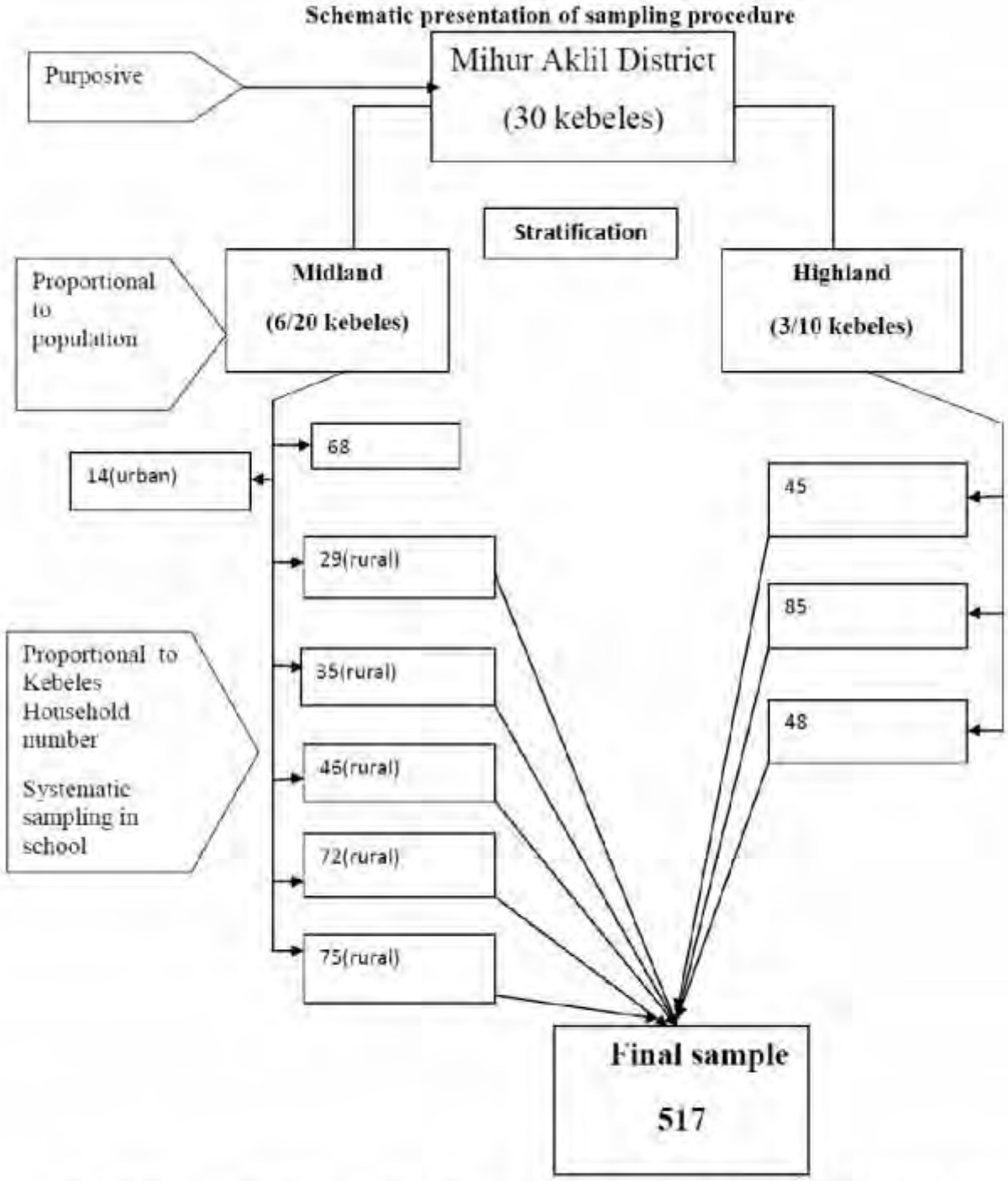


Figure 2 Schematic presentation of sampling procedure done in Mihur Aklil district, Gurage Zone, 2016.

4.6 Data collection method and tools

The questionnaire was included the following items; Socio demographic characteristics of school age children and respective parents such as education, religion, marital status, occupation, family size and others were collected. To determine the socio-economic status Household characteristics such as type of house and construction materials, availability of fixed assets such as radio, television, phone, bed, and chair and other household items, possession of domestic animals, and access to utilities and infrastructure (sanitation facility and source of water) were collected. Household food insecurity was measured using the FANTA tool developed by Food and Nutrition Technical Assistance Project through the Academy for Educational Development (38).To determine Household dietary diversity food groups taken were collected based on 24hr recall.

The geographic locations or elevations of visited households were determined by using a hand held Global Positioning System (GPS) (Garmin GPSMAP®). Local calendar was developed to estimate children year of birth with the help of local residents and data collectors (health extension workers) it was used to check the children age during household interview. Household interviews were conducted by 13 health extension workers (who were trained on the household interview part of the questionnaire.

Fresh Stool sample were collected from 511 students and analysis were done using direct microscopy (saline smear) for determining intestinal parasite infection. The hemoglobin concentration of 512 sample school age children was measured by taking a finger-prick blood sample using a HemoCue (Hb301) analyzer. A prick was made on the tip of the middle finger after the site was cleaned with dry cotton and water. The first 2 drop of blood was cleaned off and the third drop was collected to fill the Microcuvette which is then placed in the cuvette holder of the device (HemoCue Hb 301) for measuring hemoglobin concentration. The displayed hemoglobin value was then recorded.

To determine malarial infection, rapid antigen whole blood test (HRP2/Pldh (pf/PAN) with the trade name *(Care Start™) malaria* was used. sample for the RDT were collected immediately after determining the hemoglobin level, Children with hemoglobin <13.5 g/dl was considered for conducting RDT and presence of fever in the last two weeks. Bio-safety measures was implemented such as use of sterile gloves; alcohol/clean water during collection of specimen as well as safe disposal system were employed (Used gloves and other materials were collected using boxes and transported to health post for proper disposal).

4.7 Data quality assurance

Standardized questionnaire adopted from the Ethiopian Demographic and Health Survey (EDHS) and modified based on reviewed literatures was used. Data collectors (eleven health extension workers trained for two days only the Household part of questionnaire and pretest was done on 5% (26) of the study participants which were not included in the final study. Ambiguous words and errors were corrected. The questionnaire was administered by the local language (Guragugna) by trained data collectors who were fluent in the local language. Blood sample for Hemoglobin and for Malaria test was collected and report of the result were done by principal investigator who is participated in the folic acid supplement assessment nationwide study conducted by Addis Ababa university and world health organization prior to three weeks before this study. And the HemoCue 301 analyzer optical part (reading) were cleaned every morning before collection of the next day sample with standard cleaner which comes together with the analyzer. Stool samples were collected by experienced medical technologist working in one of the five health centers in the district (Techlhaimanote health center). Before determining anemia, hemoglobin level was adjusted to altitude level. and severity of anemia was determined based the level of classification for children 5 to 11year; 11.5 g/dl normal, 11.0–11.4 g/dl mild anemia, 8.0–10.9 moderate, and < 8.0 g/dl severe anemia. (37).

4.8 Data management and analysis

Epi data Version 3.1 was used to enter code and clean prior to analysis. Data were also checked for normal distribution in order to use appropriate statistical parameters. Data was analyzed using stata version 12.0 statistical software. Principal component analysis (PCA) was used to derive a wealth index from information on ownership of the household assets. Principal Components with eigenvalues greater than one were retained to construct wealth index values and then categorized into five relative measures poorest, poor, middle rich richest of socio economic status of households.

Description statistics (mean, frequencies, cross tabulation) were done to describe the study participants. Binary and multivariate logistic regression analyses were done to look for statistically significant contributing factors of anemia. For the logistic regression analysis, initially we have observed the association of each independent variable with the dependent variable using bivariate logistic regression analysis. Those variables with P value 0.20 or less in the bivariate logistic regression analysis and other variables with P value > 0.20 but having scientifically proved public

health importance were included. The adjusted odds ratio (AOR) and 95%confidence interval (95% CI) were computed. P-values less than 0.05 were considered statistically significant.

4.8. Measurement variables

4.8.1 Dependent variables

Level of Anemia among school age children

4.8.2 Independent variables

Socio demographic characteristics of school age children and respective parents such as education, religion, marital status, occupation, family size. Socioeconomic status of the households determined by Household characteristics such as ownership and size of land, type of house and construction materials, availability of fixed assets such as radio, television, phone, bed, and chair and other household items, possession of domestic animals, and access to utilities and infrastructure (sanitation facility and source of water). Household food insecurity, household dietary diversity, presence of intestinal parasite was included.

4.9 Standard and Operational definitions

Midland: between750 meter and 2300 above sea level,

High lands: > 2300 meter above sea level

Low lands: below <750meter above sea level

Anemia: it is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex altitude smoking

School age children**:** the age 5 to 14 years

4.10 Information dissemination

Thesis report was planned to be disseminated using publication on one of the medical journals after manuscript is prepared. And hard copies of the full article will be sent to the Gurage Zone and Mohur Aklil woreda health and education office. Two hard copies of the thesis and one soft copy report were provided to Addis Ababa University.

4.11 Ethical consideration

Ethical clearance and approval was granted by the institutional ethical review committee of Addis Ababa University, school of public health. Informed consent was obtained from the household heads, legal guardian or parents. The purpose of the study first was communicated clearly with Gurage zone health and education bureau and letter was sent to the woreda education and health bureau. Capillary blood collection was performed after obtaining and permission from the woreda education bureau and an oral assent from the children. Privacy and confidentiality were maintained at each step of the study process. Students were aware that participation in the study was voluntary. Those students with any parasitic infection and had anemia during data collection time, were referred to health center by HEWs. Data collected were kept in the health post by the HEWs in a secured place. All waste produced during laboratory investigation was handled in the health post by health extension workers.

5 Result of the study

1 Socio-demographic characteristics household heads and school age children

A total of 517 school-age children (53.29 were male and 46.71% female) had participated in the study making 99.03% response rate. All participants (school age children) were within the age group of 5– 10 years with mean age of 8.15 ± 1.25 Years. Of studied children, about 64% of studied children aged 8-10n years. Most of the children care takers participated in the household interview part of the fuestionaire were females (98.83%). As mother are more engaged in the daily care and preparation of the household meal. From the participated females in the household interview mother's account 462(89.53%) and relatives whom were femals too account 48(9.30%). Most of (74.03%) Caretakers were within the age group of 25-39 with median age 35.32 IQR (29-39). Orthodox Christian and Islam were the two religion expressed by all most all (99.22) of the participants, 57.36 and 41 .86% respectively. Ethnic wise (99.03%) of the study participant belong to Gurage. Most of the care takers 381 (73.83%) participated in the interview and majority of child fathers 340(62.89%) had no formal education. In terms of occupation, 344(66.67%) of mothers and 395 (76.55%) of fathers were farmers. About greater than half (55.23%) of households had living with above six family members (core and extended) during the study period. Relatively Almost equal number 206 (40%) of households categorized under the socioeconomic status classifications of poor and rich. those households categorized under the middle, accounts only 19%. Interms of Agroecologial Zone, grater than half of study participants were from midland and ther rest were from higland area of the district, which is proportional to the number of households in each climatic Zone (Table 2).

Table 2: Socio-demographic characteristics household heads and school age children in Mhur Aklil district, Gurage Zone Ethiopia, 2016

Variables	Frequency	Percentage
Sex (child) n=516		
Male	275	53.29
female	241	46.71
Age (child)		
5-7	182	35.27
8-10	334	64.73
Mean ± Sd	8.15±1.25	
Age (care takers)		
≤ 25	13	2.82
26-35	259	50.19
35-45	184	35.66
>45	60	11.62
Median (IQR)	34(29-34)	-
Educational status of children		
0 (k G)	48	9,30
1	214	41.47
2	254	49.22
Relation-ship		
mother	462	89.53
Father	6	1.16
relative	48	9.30
Ethnicity		
Gurage	511	99.03
Wolene	2	0.39
Oromo	1	0.19
Amhara	2	0.39
Religion		
Muslim	216	41.86
Orthodox	296	57.36
Protestant	4	0.78
mothers formal education		
Yes	135	26.16
No	381	73.84
Fathers formal education		
Yes	176	34.11
No	340	65.89
Mothers occupation		
farmer	351	68.02
housewife	62	12.02
Government employee	12	2.33
Student	5	0.97
Private	86	16.67
Father occupation		
farmer	395	76.55
Government employee	20	3.88
Merchants	94	18.22
Daily laborer	7	1.36

Table 2: cont…Socio-demographic characteristics household heads and school age children in Mhur Aklil district, Gurage Zone Ethiopia, 2016

Variables	Frequency	Percentage
Family size		
1-5	231	44.77
>=6	285	55.23
Wealth index n=515		
poor	207	40.02
middle	103	19.06
richer	206	39.93
Location		
highland	161	31.20
Low land	355	68.80

2 Households type of sanitary facility, Drinking water source and water treatment practice prior to drinking.

About 60% (307) households their main source of drinking water comes from protected springs. Those households utilized piped water inside dewelling or yard and those use public tab for their main source of drinking water, acounted 21.71%. A small percentage, which is 10% of the households treatmented their fechted water before drinking, by adding bishan gari (water guar). Regarding toilet facility Almost all (98%) households have sanitary facility, however, Majority of households 87% latrine is traditional and were not even had slab or covering.

Table 3: Household environment, source of drinking water, water treatment practice, presence and type of latrin facility in Mhur Aklil district, Gurage Zone Ethiopia, 2016

Variables	Frequency	Percentage
Source of water		
Piped water source	**112**	**21.71**
Protected spring	307	59.50
Unprotected spring	43	8.33
Public berhole	45	8.72
No fixed facility	9	1.74
What is done to make the water more safe for drinking		
Nothing done	**456**	**88.37**
Biled	41	7.95
Added bishan gari (water agar)	19	3.68
Type of latrin facility		
Pit latrine with slab	**8**	**1.55**
Traditional pit without slab	451	87.4
(VIP)	44	8.53
No facility/bush/field	13	2.52

3 Illness characteristics of school age children

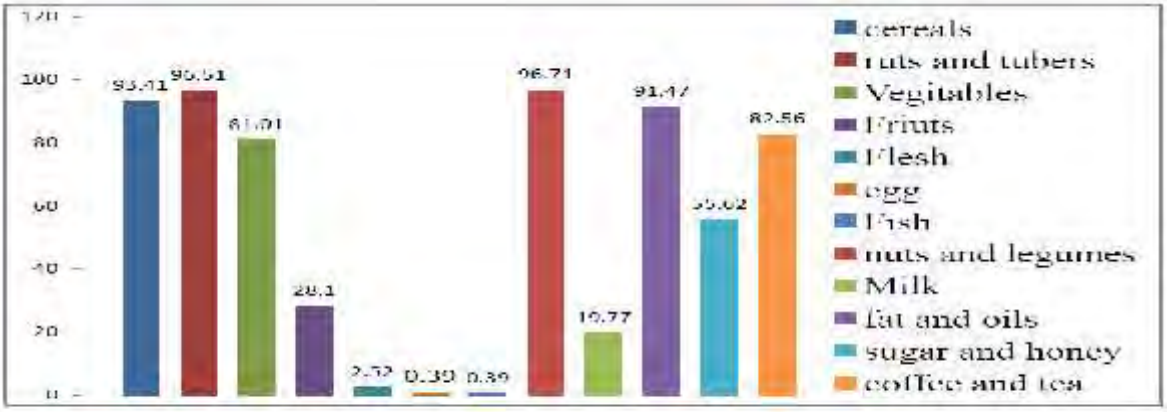
Among few children had illness in the past two weeks during data collection time 31(6.1%), greater than half18 (58.06%) expressed their symptoms as fever. Cough accounts for 13 (41.94%) (Table4). Almost all mothers asked and showed sample albendazole taken from the health center and health post by health HEWS (data collectors) answered 97.48% of mothers answered they had not taken any with in the last 6 months. Children from mid land 230(64.79%) sleep under ITN.

Table 4: Illness characteristics school age children in Mhur Aklil district, Gurage Zone, Ethiopia, 2016

Characteristics	Frequency	percentage
Current illness n=516		
Yes	31	6.01
No	485	93.99
Fever n=31		
Yes	18	58.06
No	13	41.94
Cough		
Yes	13	41.94
No	18	58.06
Fever and cough n=31		
Yes	5	16.13
No	26	83.97
Albendazole taken in the last 6 month		
Yes	13	2.52
No	503	97.48
Household had bed net		
Yes	270	52.33
No	246	47.67
Sleep last night using bed net		
Yes	233	45.16
No	283	54.84

4 Dietary diversity scores and Household food insecurity

Among the 12 food groups 9 categories were eaten by the study participants. Greater than50% of households consumes ≥ 7 food groups and 45.54% consume 4-6 food groups. Foodgroups that enhance iron absorption such as friutes contatining vitamin C or food rich in bioaviliable Iron such as, flesh has the lowest food groups taken by the study participants (figure 3).



Household dietary diversity of school Age children in Mihur Akili District, Gurage Zone, 2016.

Variables	Frequency	percentage
Dietary diversity		
<4	6	1.16
4-6	235	45.54
≥7	275	55.29
Mean ± SD	6.48±1.11	-
Food insecurity status		
Food secured	398	77.13
Mild food insecure	69	13.37
Moderate food insecure	26	5.04
Severe food insecure	23	4.46

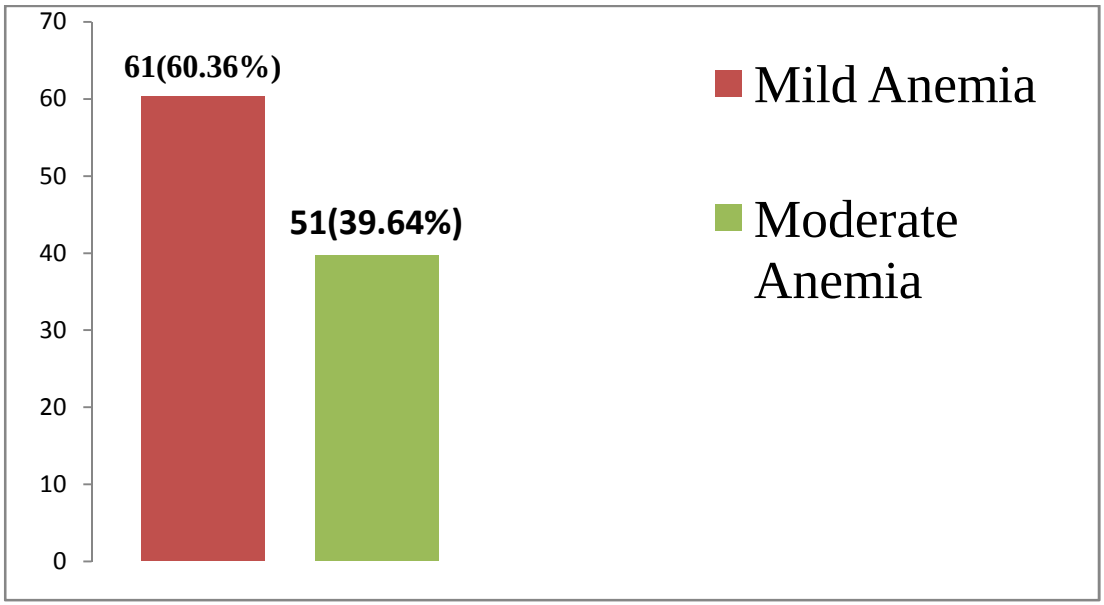
Intestinal and blood parasitic characteristics of study participants

One hundred thirty two (25.88 %) of the children were positive for intestinal parasites. A total of six species of intestinal parasites were identified. Ascaris lumbricoides 65(37.36%) was predominant, followed by hook worm 39(22.41%), Entamoeba histolytica 27(15.51%), Trichuris trichiuria 24(13.79%) and Giardia lamblia 19 (10.92%). A total of 135 (26.47%) of children who's Hemoglobin <13.5 and whohas fever were tested for malaria using rapid diagnostic test (RDT), and among the tested 27 (20%) of children had malaria. However from the total sample malaria only accounts (5.23%). Among the identified specious plasmodium vivax was the dominat 21(4.07%) and plasmodium facliparum infected children were 6 (1.16%), (Table 6).

Table 6: Blood and Stool investigation result of school age children in Mhur Aklil district, Gurage Zone Ethiopia, 2016

Variables n=511	Frequency	percentage
Ascaris Lumbricoids		
yes	60	11.63
no	451	87.40
hookworm		
Yes	36	6.98
No	475	92.05
Trichuris trichiasis		
Yes	12	2.33
No	499	96.71
Ameoba Histoletica		
Yes	17	3.29
No	494	95.74
Gardiasis		
Yes	4	0.78
No	507	98.26
Tape worm (h.nana)		
yes	6	1.16
no	505	97.87
Plasmodium vivax		
Yes	21	4.07
No	109	21.12
98	381	73.84
Plasmodium Falciparum		
yes	6	1.16
no	124	24.03
98	381	73.84

98=sample not collected for RDT, 77=refused stool and blood sample


70
60
50
40
30
20
10
0
61(60.36%)
51(39.64%)
Mild Anemia
Moderate Anemia

The prevalence was higher in males (58.04%) than the female (41.96%) children. Hemoglobin level of children ranged from 8.4 to 15.8 g/dl with mean of 12.58 ± 1.24 g/dl. Majority of anemic school age children (54.95%) aged between 7 and 8. (Table 6)

Table 7: Anemia status of school age children in Mhur Aklil district, Gurage Zone Ethiopia, 2016

Characteristics	Frequency	Percentage
Hemoglobin level <11.5	112	21.71
Yes	400	77.52
No		
Mean ± SD	12.58±1.25	-
Anemic children(sex)		
Male	65	58.04
Female	47	41.96
Age		
5-7	45	40.18
8-10	67	59.82

Factor associated with anemia in school age children

Sociodemographic factors of school age children and their care takers

In the unadjusted regression analysis, variabls with p value < 0.2 were transported to multivariate andalysis. From a number socio-demographic characteristics of School age children and caretakers, few variables such as caretaker education status and households with current family members greater than six were associated with anemia (Table 8). Those children living with mothers or care takers who had lower educational status or who had not taken formal education were five times risk to develop(AOR= 5.98 95CI:(2.13-16.77) anemia than their counter parts (Table 8).

Table 8: Multivariate logistic regression analysis, Association of Anemia and Scio-demographic characteristics of School age children and household heads in Mihur aklil district, Gurage Zone Ethiopia, 2016

Variables	Anemia		COR*(95% CI)	AOR*(95% CI)
	Yes (%)	No (%)		
Sex (child)				
Male	65(58.04)	209(52.25)	1.26(0.82-1.93)	
female	47(41.96)	191 (47.75)	1	
Age (child)				
5-7	45(40.18)	134(33.50)	1	
8-10	67(59.82)	266(66.50)	0.75(0.48-1.15)	
Education status of child				
0(kG)	10(20.83)	38(79.17)		
1	50(23.36)	164(76.64)	1.15(0.53-2.49)	
2	52(20.80)	198(79.20)	0.99(0.46-2.13)	
Caretakers age				
≤ 25	1(0.89)	12(3.00)	1	
26-35	57(50.89)	201(50.25)	3.40(0.43-26.72)	
35-45	34 (30.36)	149(37.25)	2.73(0.34- 21.78)	
>45	20(17.86)	38(9.50)	6.31(0.76-52.12)	
Mothers formal education				
Yes	11 (9.82)	120(30.00)	1	
No	101 (90.18)	280(70.00)	3.93(2.04-7.59)	5.98(2.13-16.77)*
Fathers formal education				
Yes	33(29.46)	143(35.75)	1	
No	79(70.54)	257 (64.25)	1.33(0.84-2.09)	
Mother occupation				
farmer	88(78.57)	260(65.00)	1.41(0.72-2.77)	
housewife	12(10.71	50(12.50)	1	
Government Employee	1 (0.89)	11(2.75)	0.37(0.04-3.22)	
Student	0	5(1.25)		
Private	11(9.82)	74 (18.50)	0.61(0.25-1.51)	

Table 8 cont… Multivariate logistic regression analysis, Association of Anemia and Scio-demographic characteristics of School age children and household heads in Mihur aklil district, Gurage Zone Ethiopia, 2016

characteristics	Anemia		COR*(95% CI)	AOR*(95% CI)
	Yes (%)	No (%)		
Father occupation				
farmer	92(82.14)	301 (75.25)	0.92(0.32-2.59)	
Government employee	5 (4.46)	15(3.75)	Ref 1	
Merchants	13(11.61)	79(19.75)	0.49(0.15-1.59)	
Daily laborer	2(1.79)	5 (1.25)	1.2(0.17-8.24)	
Family size				
1-5	26 (23.21)	205(51.25)	Ref 1	
>=6	86(76.79)	195(48.75)	3.47(2.15-5.62)	2.98 (1.48- 5.98)*
Socio- economic status				
rich	48 (23.53)	156 (76.47)	Ref 1	
middle	24 (23.76)	77(76.24)	1.01(0.57-1.77)	
poor	40 (19.32)	167(80.68)	0.77(0.48-1.24)	
Location				
Midland	58(51.79)	233(58.25)	Ref 1	
High land	54(48.21)	167(41.75)	1.29(0.85-1.97)	

From house hold environmental factor such as drink with protected and unprotected spring, type of sanitary facility such as households with traditional pit with out slab and households with out sanitary facility were associated bivariate logestic regression analysis, however on multivariate logestic regressin analysis, children living in households having pit latrin with out slab and coversing were 2.54 times risker than households uses other type toielet (AOR=2.54 95% ,CI: (1.01-5.91)) (Table 9)

Table 9: Multivariate logistic regression analysis, Association of Anemia and household environment such as source of dirinking water, water treatment practice prior to drinking and type of sanitary sanitary facility in Mihur aklil district, Gurage Zone Ethiopia, 2016

characteristics	Anemia		COR*(95% CI)	AOR*(95% CI)
	Yes (%)	No (%)		
drinkining water source				
Piped water source	16(14.29)	96(85.71)	Ref 1	
Protected spring	74(24.10)))	233 (75.90)	1.9(1.05-3.43)	1.23(0.37-3.89)
Unprotected spring	13(30.23)	30(69.77)	2.6(1.12-6.01)	1.46(0.67-4.11)
Public berhole	8(17.78)	37 (82.22)	1.29(0.51-3.28)	
No fixed facility	0 (0.00)	9 (100)	-	
What is done to make the water more safe for drinking				
Nothing done	99(21.71)	357 (78.29)	1.47(0.42- 5.17)	
Biled	9(21.95)	32 (78.05)	1.5(0.35-6.31)	
Added bishan gari	3(15.79)	16(84.21)	Ref 1	
Type of latrin facility				
(VIP)	3 (6.82)	41(93.18)	Ref 1	
Traditional pit without slab	101(22.39)	350 (77.61)	3.94(1.91-3.00)	. 2.54(1.01-5.91)*
Pit latrine with slab	3(37.50)	5(62.50)	8.2(1.28- 52)	0.98(0.23-1.65)
No fac ility/bush/field	4(30.77)	9(69.23)	6.07(1.15- 32)	

*p<005

School age children who were residing in mild food insecure households are five times in grater risk to develop anemia than their counter parsts (AOR=5.15, 95% CI: (2.45-10.82), further children who were also living I n moderate food insecured households showed a four times higer risk being anemic than those who living in food secured households (AOR=4.47, 95%CI: (1.38-14.48). This study also showed children living in mild and moderate food insecure households showed strong odds of being anemic ,11 times in severe food insecured households and and 4 times inrised risk from children living in moderately food in secured (AOR=1 1.71, 95% CI: (3.49-39.25) (table 10). Childrens hose that were ill of experienced disease symptos fever and cough were showed association with their hemoglobin level.

Table 10: Multivariate logistic regression analysis, Association Anemia with household food insecurity, illness characteristics among school age children in Mihur Aklil district, Gurage Zone Ethiopia, 2016

Variables n=516	Anemia		COR*(95% CI)	AOR*(95% CI)
	Yes (%)	No (%)		
Food insecurity status				
Food secure	50(45.05)	348(85.39)	1	
Mild food	32(28.83)	37(9.14)	6.02(3.44-10.52)	5.15(2.45-10.82)
Moderate	13(11.71)	13(3.21)	6.96(3.05-1 5.86)	4.47(1.38-14.48)
Severe food	16(14.41)	7(1.73)	15.90(6.24-40.58)	11.71(3.49-39.25)
Dietary diversity				
<4	2(1.79)	4(1.00)	0.34(.06-1.94)	1.62(0.20-13.19)
4-6	40(35.71)	232(58.00)	0.85(0.15-4.76)	2.22(0.28-17.29)
≥7	70(62.50)	164(41.00)	1	1
Current illness				
yes	12 (10.71)	19 (4.75)	2.40(1.13-5.12)	0.87(0.26-2.89
no	19(100)	381(79.21)		
fever n=31				
yes	100(89.29)	381(95.25)	1	
no	5 (41.67)	8(42.11)	0.98(0.22- 4.25)	
cough				
yes	5(41.67)	8(42.11)	1.01(0.23-4.40)	
no	7 (58.33)	11(57.89)	1	
De-worming Drug taken				
Yes	5 (4.46)	8(2.00)	0.43(0.14- 1.36)	0.55(0.11-2.74)
No	107(95.54)	392(98.00)	1	
Sleep under the bednet				
Yes	46 (20.09)	183(79.91)	1	
No	66(23.32)	217(76.68)	1.20(0.79- 1.85)	

In terms of intestinal parasitic infection, children infected with Ascaris lumbricods and hook worm parasite, risk of being anemic was incrsed by two fold from ascaris and by four fold due to hook worm infestation than non infected and infected with other parasites (AOR=2.64,95% CI :(1.18-5.92) and (AOR=4.75,95% CI :(1.87-12.05) respectively. Regarding malaria infection, the odds of being anemic among children who were infected with malaria were (A0R=68.13, 95% CI: (7.02-660) times higher than among children who were none infected with malaria (Table 9).

Table 10: Multivariate logistic regression analysis, Association Anemia presence of Intestinal parasite and Malaria among school age children in Mihur aklil district, Gurage Zone Ethiopia, 2016

Characteristics	Anemia		COR*(95% CI)	AOR*(95% CI)
	Yes (%)	No (%)		
Ascaris Lumbricoids				
No	92 (83.64)	356 (89.45)	Ref 1	
Yes	18 (16.36)	42 (10.55)	1.65 (0.91-3.01)	2.64(1.18-5.92)
hookworm				
no	93 (84.55)	379 (95.23)	Ref 1	
yes	17 (15.45)	19 (4.77)	3.64 (1 .82-7.28)	4.75(1.87-12.05)
Trichuris				
No	105 (95.45)	391 (98.24)	Ref 1	
Yes	5 (4.55)	7 (1.76)	2.65 (0.82-8.55)	2.57(0.55-12.0)
Ameoba Histoletica				
No	109 (99.09)	382 (95.98)	Ref 1	
Yes	1 (0.91)	16 (4.02)	0.21 (.02- 1.67)	0.03(0.00-0.75)
Gardiasis				
No	3 (0.75)	395 (99.25)	Ref 1	
Yes	1 (0.91)	109 (99.09)	1.20 (0.12-11.72)	
Plasmodium				
No	49 (44.14)	59 (14.79)	Ref 1	
Yes	19 (17.12)	2 (0.50)	11.43 (2.53-51.54)	68.13(7.02- 660)
98	43 (38.74)	338 (84.71)		
77				
Plasmodium				
no	63 (56.76)	60 (15.04)		
yes	6 (5.41)	0	-	-
98	42 (37.84)	339 (84.96)		
77				

6. Discussions

The overall prevalence of anemia among school-aged children identified in this study is 21.71 % (95% CI: (18.14-25.27)). This study indentified a number of factors which established association with anemia such as, socieiodemographic charcatersics of care takers like maternal education status and current family size (extended and core), households' food insecurity leve, sanitary facility (pit latrine with out slab or covering) intestinal parasite and malaria infection.
The prevalence observed in this study is in agreement with the initial stady expectation against from the national survey finding report 2008 (14). This study showed that anemia among primary school children is a moderate public health problem as classified byWHO (37).

In terms of comparing the magnitude of anemia and contributing factors among school age children of previous studies done in our country and abroad, our study finding is much higher than from the nationlal survey of 2008 and study conducted in Addis Ababa (14, 19 and 39). However, it was lower than some in individual studys conducted in in Filtu town, south west, Estern, Libokumkum and Fogera Ethiopia (13, 17, 18, and 30). The higer prevalence rate from the national study finding, it might be due to, the former study adjusted school age children hemoglobin by measuring the altitude of near by twon from study school, this may not correctly identifay the altitude level of individual households, as this study done where the child actually lived. The level of anemia in our study is even much lower than studies conducted in other African countries, such as studies done in Mali, Tanzania, Mozambican, Ghana and Malawi reported anemia among school age children more than 40% (28). The lower prevalence in our study might be explained by the change made by the exsisting nutritional, punlic health interventions and among other factors may be included.

Dietary intake

Regarding associated factors for development of anemia, according WHO estimated that anaemia resulting from iron deficiency was one of the ten most important factors contributing to the global burden of diseases. Thus, this study tried to look housedholds intake of food groups and tried to measure their household dietary diversity, intake of inhibitors as the study initially calimed there is practice of serving coffee to the children. However, the dietary diversity score generated was not establishe any association with anemia in the persent study. The food groups taken by the households of the student, however, reveled that there is almost zero report of eathing any kind flesh and friutes. Both flesh which is goods source of haem (bioavialiable) iron and fruits, which is

enhancer of iron absorbition in theintestine due to presence vitamin C. in the contrary, majority (80%) of households consume coffee during the study peroid. However nether intake of coffee or low intake of felsh and fruits were not associated with current anemia in this study. In contrary to this study, Study study done in Moroco showed that intake of legumes and cerial based diet was associated with anemia (40). Study done in Ethiopia also identified not consuming protein, irregular consumption of legumes and diary products was associated with anemia (17,18). Study done in abrod Serbian further also strengthen the former findings, defective poultry intake and lack of fish consumption associated with anemia(12).dispite the nill consumption of formerly discussed food groups, the dietary dieversity score did not associated with anemia. This can be explained by the study participants consumes household dietary consumption instade of individual (the school age) dietary consumption and other dietary factors which maight played.

Mother educational status

This study revealed children living with those care takers had no formal education were five fold (AOR=5.98 95 CI: (2.13-16.77)) exposed for anemia than children whose care takers were had formal education. This finding is in harmany with A facility based cross-sectional study which was conducted in Jimma University Specialized Hospital reported that Children with illitrate mothers two times pron to develop anema than children had educated mother (AOR=2.38, 95% CI: (1.27 - 4.46) (41). However Study done in estern Ethiopia reported that paternal education was one of the associated factors (18). The findig of maternal education status as predictors of anemia among school age children in several studies, can be explained by as majority of cases mothers are more engaed in the houdehold activites be it prepartioion of food and care of child. Thus more educated mothers were less likely to develop anemia ($P = 0.0324$) and iron deficiency ($P = 0.0577$) than were those with less educated mothers. This group consumed more protein ($P = 0.0004$) and iron ($P = 0.0012$) from animal sources than did the children of less educated mothers, as reflected by their greater consumption of meat, poultry, and derivatives ($P < 0.0001$)as study finding from Koria (33).

Child age and sex

This study identified that a greater portion (58.04%) of male children were affected by anemia. It is showed among almost 60% children aged 5-8 years. This finding is in contrst with Study conducted in Egypt among children in non formal education center, anemia was significantly higher among 64% of children in the age group 6-9 year and females were more anemic (34). However, several studies identified among school age children anemia is observed more in boys

than girls. Study conducted in eight African and Asian countries showed that more boys than girls were anemic and age in five African countries for children aged 7±11 years (28). Male gender more exposed to anemia (3.22 [1.92-5.42], p=0.000)(12), However study conducted in Jima reported the prevalence of anemia among the age group of 6–11 years was higher (17).

Socioeconomic status and household's food insecurity

Several studies which conducted magnitude of anemia and its associated factors revealed that school age children living in family with low income or lower family wealth index associated with anemia. Despite 40% of households in this study categorized under poor wealth index, association is not established. This is in contrast to A Study conducted in children in Filtu Town, Somali region, South west Ethiopia found strong association being from a family with low income (AOR = 9.44, 95% CI: 2.88, 30.99)(30), study conducted in Jima also showed association of low family income with anemia [AOR 6.14 95%CI(2.90,12.9)](17). Study conducted in Korea which is focus on the relationship between socio-economic status and anemia reported that, decreasing trend in anemia prevalence as household income increased. Correlation analysis demonstrated in the same study stated that there is a relationship between household income and serum hemoglobin and ferritin levels (P=0.003 and P=0.026, respectively (33). low family income was predictors of anemia (17). The difference could be due to anemia among the diference wealth index group had no defference.

However, the study revealed children residing in mild food insecure households were five times, children residing in moderate food inscured households four times (AOR=5.15, 95% CI: (2.45-10.82), moderate food insecure (AOR=4.47, 95%CI: (1.38-14.48) and in severe food insecure households elven times (AOR=11.71, 95% CI: (3.49-39.25) strong odds of being anemic then their counter parts prone to develop anemia than children who were living in food secured one.

Malaria infection

As malaria is one of the major causes of deasese that affect school age children (23). Thus it is indicated as one of factors contributing for anemia among school agechildren. According study conducted in Tanzania, Anemia was significantly higher among children not using mosquito nets ($p = 0.049$) and among those with malaria infection ($p < 0.001$) (35). The finding from Tandzania is similar with this study; from anemic children who were not sleep undr bed net were 58.92 %. Study conducted in Kenya also reported Severe malnutrition and interactions between Plasmodium Falciparum were significantly associated with lower Hb. another study reported malaria incidences was associated with anemia among the studied children(32)

Intestinal helminthes and parasite infestation

It is known that school age children harbor the heaviest parasite infestation among all age group (23). And thus, they are very vulnerable to the effects of worm infection which includes nutritional deficiencies which aggravate malnutrition and worsening the rates of anemia. The current study find that school age children infected with particularly Acaris Lumburicoids and hook worm were two and four fold odds of being aneic than children noninfected and infected with other intestinal parsite (AOR=2.64,95% CI:(1.18-5.92) and (AOR=4.75,95% CI:(1.87-12.05) respectively. The current finding is in agreement with Study conducted in Egypt Parasite infestation were identified as the predicators of anemia among the studied children [AOR51.45, 95%CI (1.23, 5.27)] (34). The same finding also observed another stdy in Ethiopia (30, 42). However, among the common parsite involved in anemia, Trichuris trichuria were not associated this difference might be due to the low frequency in this study.

Strength of the study

Strength

- This study had almost 100% response rate and
- Had t include all investigation modalities to identify contributing factors for Anemia. Such as stool examination, haemoglobin investigation, dietary diversity score, food insecurity
- Individual households were measured for altitude.

Limitation

The current study might lose some of the specific characteristics of school aged children who were at their home. Since data were collected from school and enrolment of school was 89%.

It would have been better to collect school age children dietary diversity rather than household to measure the food groups, intake of inhibitors, and iron rich food intake, because of this the study will not address clearly the initial hypothesis of study.

Malaria test was conducted for school age children with hemoglobin level <13.5 in order to overcome the shortage of malaria rapid diagnostic test kits. This might caused the low frequency of Malaria, which may reduce the association.

The laboratory investigation method we used to identify the presence of stool parasite were direct saline smear which may provide not provide excellent detection rate.

The questionnaire lack some of the important variables which healp the study more complet such as level of barefoot walking, practice of hand washing and precense of dewarming program in studied school, mixing of foods with haem iron and non haem iron.

Conclusion and recommendation

Conclusion

In conclusion, anemia among school age children in the study area is a moderate public health problem. And relatively lower than some previous studies done in Ethiopia. It is also lower from the the initial expectation. Care takers had no formal education, family size (currently living extended and core) grater than six, utilization traditional pit latrin with out salb and cover, children from food indecured households, infected with ascararis lumbericoids and hook worm were the associated factors for school age anemia.

Recommendation

By taking in to account the results of this study, the following recommendations are forwarded

Health extension workers

- As nutrition is one of the health service package included in the extension programs. HEWs should be strengthened
- Should monitor the sanitary facility situation and education should be provided .
- community based nutrition education on dietary modification of eating good source of iron rich foods, increase vitamin C rich foods and other foods that promote iron absorption and reduce consumption of foods prevent iron absorption(phenolic compounds E.g. coffee)
- Family planning service should be strengthend.

District responsible offices

- Households, those in food insecure status should be identified and included in safety net programs. Children living in those households should be included in school feeding programs since there is no school feeding program in the woreda.

Regional and Zonal bureaus

- Fortification of Qocho (local food almost consumed by all communities in different socioeconomic status)
- Increase the frequency of de-worming program at school should be considered.
- Malaria prevention and control program should be strengthened.
- Advocacy should be started on the impact of anemia on school age children, in terms of health disadvantages, school performance and development of country.

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Annex 2 English questionnaire

Information sheet and household head and individual Consent form (English)

- **Information sheet**

Good morning? / Good afternoon? My name is----------I am member of the research team from Addis Ababa University. We are conducting a survey about the anemia status of school children (6-10). Your village and your household are chosen by chance to participate in the study. We need to collect data about socio-demography; food consumed in the household and anemia test will be done on your children. I want to assure you that all of your answers will be kept strictly secret. I will not keep a record of your name or address. You have the right to stop the interview at any time, or to skip any questions that you don't want to answer. Your participation is completely voluntary but your experiences could be very helpful to design better nutrition related services for school age children in the region and improve their health.

We will be taking a few drops of your children blood to check for anemia and we will inform you right away the result. We will follow a standard aseptic procedure. The interview takes approximately half an hour to complete

Do you have any questions?

- **Consent form**

Do you agree to be interviewed? And do you agree your children to be tested for anemia?
Respondents agree to be interviewed?

Yes No

May I begin the interview now? ☐ ☐

To be signed by interviewer

I certify that I have read the above consent procedure to the participant.
Signed: _____

Interview information

- Name of the kebele _____Name of the village_____
- Name of the school_____
- Questionnaire IDN……|___|___|___|
- Household IDN ……|___|___|___|
- Date of interview |___|___| Day |___|___| Month l___|___|___|___| |Year

Time started |___|___| Hour |___|___| Minutes
Time ended |___|___| Hour |___|___| Minutes
Result * |___|

- Interviewer Name _____
- Supervisor _____
- Checked by _____
- Entered by 1) _____

2) _____

*Result codes:

1=completed	4=refused	7=other (specify)
2=not available	5=partly completed	
3=postponed	6=incapacitated	_____

SN	Characteristics or questions	Answers codes	Skip option
Part one **A. Socio-demographic characteristics ofthe child and household head** *I would like to ask you a few questions about you and your child*			
101	What is your relationship with the child? *(ask the primary care giver)*	Mother…….……...1 Father……2 Elder Sister ……3 Step father…… 4 Step mother……. ….5 Elder Brother ……6 Relative …….7 Other (specify)…….99 _____	
102	How can you describe your village in terms of urban and rural? *(List the answering option)*	Urban……1 Semi urban……2 Rural ……..……..….3	
103	How old are you? *(Age of the primary care giver completed years)*	Age _____	
104	In what month and year he/she is born?***(The child's age)***	Month……Don't know month.....9999 Year.....Don't know year.....9999	
105	How old is he/she now? ***(The child's age)***	Age _____ (*completed years)*	
106	What is the highest grade of class she/he is attending now?	Grade_____	
107	What is your religion?	Orthodox Christian.....1 Muslim .....2 Protestant .....3 Catholic .....4 Other (specify) .....99 _____	
108	To which ethnic group do you belong?	Gurage……1 Wolene……2 Silete…….3 Hadiya……...4 Oromo…….5 Amhrara ……6 Tigere…….7 Other(specify)……99 _____	
109	What is yourcurrent Marital status?	Never marred……1 Married……2 Living together……3 Separated ……...4 Divorced …….5	

		Widowed…….	
110	What is your educational status? ***(Care giver/ mother)***	Primary (1-8) .....1 Secondary (9-12) .....2 College/university .....3 Read and write.....4 Illiterate ……. 5	
111	What is child's father or care giver educational status? ***(Care giver/ father)***	Primary (1-8) .....1 Secondary (9-12) .....2 College/university .....3 Read and write.....4 Illiterate ……. 5	
112	What is your occupation? ***(Care giver/ mother)***	Farmer and housewife .....1 Housewife.....2 employee/private .....3 Student.....4 Merchant.....5 Local drink seller.....6 Commercial sex worker .....7 Maid servant.....8 Daily laborer.....9 Unemployed .....10 Other (specify) .....99 _____ _____	
113	What is the child's father occupation? ***(Care giver/ father)***	Farmer……1 Employee of government/private……2 Student ……3 Merchant…….4 Daily laborer…….5 Unemployed ……6 Other (specify) .....99 _____	
114	What is the total number of family members currently living in this house? ***(including all individuals will stay and stayed for greater than 6 month)***	_____	
B. <u>information pertaining to household environment, which is source of water for domestic purpose, sanitation facilities, housing characteristics, household possessions</u> *Now I will ask you some questions and observe about your drinking water source, type and condition of sanitary facility*			
115	What is the main source of drinking water for members of your	Piped water/supply water Piped inside dwelling 1	

	household? ***(interviewer: be sure of the source of "piped water". if the answer is "piped water" check the source and circle the appropriate code)***	Piped to yard/plot .....2 Public tap.....3 Water from spring Protected well/spring .....4 Unprotected well/spring .....5 Water from Dug well Protected well .....6 Unprotected well .....7 Water form borehole Borehole in yard/plot.....8 Public borehole.....9 Surface water Pond/lake/River/stream/spring/Dam…10 Rain water .....11 Tanker truck .....12 Vendor.....13 Bottled water .....14 No fixed facility .....15 Other (specify) .....99 _____	
116	Do you do anything to the water to make it safer to drink?	Yes……1 No……2 don't know.....98	
117	What was you did yesterday to make the water safer to drink? Anything else? ***(record all mentioned)***	Boil……1 Add bleach/chlorine/water guard/pur/ bishan gari/aquatabs …… 2 Strain through a cloth……. 3 Bio sand /composite/ceramic pot filter……. 4 Solar disinfection……. 5 let it stand and settle ……6 don't know……98 other (specify)_____99	
118	What is the main source of water used by your household for other purposes such as cooking and hand washing? ***(interviewer: be sure of the source of "piped water". if the answer is "piped water" check the source and circle the appropriate code)***	<u>Piped water/supply water</u> Piped inside dwelling .....1 Piped to yard/plot .....2 Public tap.....3 <u>Water from spring</u> Protected well/spring .....4 Unprotected well/spring .....5 <u>Water from Dug well</u> Protected well .....6 Unprotected well .....7 <u>Water form borehole</u> Borehole in yard/plot.....8 Public borehole.....9 <u>Surface water</u> Pond/lake/River/stream/spring/Dam…10	

		Rain water .....11 Tanker truck .....12 Vendor.....13 Bottled water .....14 No fixed facility .....15 Other (specify…….99	
119	What kind of toilet facility does your household have? (***interviewer: limit to one response; if two types are mentioned, record the type closest to the top of the list)***	flush toilet flush to piped sewer system .....1 flush to septic tank.....2 flush to pit latrine .....3 flush to somewhere else .....4 flush, don't know where.....5 Pit latrine traditional pit toilet.....6 pit latrine with slab.....7 pit latrine without slab.....8 ventilated improved pit latrine .....9 bucket toilet.....10 composting toliet.....11 hanging toilet/hanging latrine.....12 no facility/bush/field .....13 other (specify) .....99 _____	
120	Tell me, please, if your home has: ***(interviewer: circle all that apply)***	Electricity .....1 Watch/clock.....2 Radio .....3 Television.....4 Mobile Telephone .....5 House Phone.....6 Refrigerator .....7 Chair.....8 A bed with cotton/Sponge/Spring mattress……..9 Electric Mitad.....10 Kerosene Lamp/pressure .....11 None 12	
121	What type of fuel does your household mainly use for cooking? ***(interviewer: allow multiple answers)***	Electricity .....1 LPG/natural gas.....2 Biogas.....3 Kerosene.....4 wood.....5 Charcoal .....6 Straw/shrubs/grass.....7	

		Animal Dung .....8 Agricultural crop .....9 Other (specify).....99 _____	
interviewer: please supply the following information about respondent's home			
122	main construction material used for the floor: *circle all that apply*	natural floor earth /sand .....1 dung .....2 rudimentary floor wood planks .....3 bamboo.....4 finished floor polished wood or parquet .....5 vinyl or asphalt strips .....6 ceramic tiles .....7 cement .....8 carpet .....9 other (specify) .....99 _____	
123	What is main construction material used for the roof? ***circle all that apply***	natural roofing no roof .....1 thatch/leaf/mud .....2 rudimentary roofing rustic mat/plastic sheet .....3 reed/bamboo.....4 wood planks .....5 cardboard.....6 finished roofing corrugated iron/metal .....7 wood .....8 asbestos/cement fiber .....9 cement/concrete .....10 roofing/shingles.....11 other (specify) .....99 _____	
124	main construction material used in exterior walls: circle all that apply	natural walls no walls .....1 cane/trunks/bamboo/reed .....2 dirt .....3 rudimentary walls bamboo/wood with mud .....4 stone with mud .....5 uncovered adobe .....6 plywood .....7 card board .....8 reused wood .....9 finished walls cement 10	

		stone with lime/cement .....11 bricks .....12 covered adobe.....13 wood planks/shingles .....14 other (specify) .....99 _____	
125	Will you please describe your family's household living structure?	we rent a room.....1 we rent an apartment .....2 we rent a house.....3 we rent part of a house .....4 we live in a dormitory .....5 we live in an apartment that we own 6 we live in a house that we own .....7 we live in part of a house that we own 8 other (specify) .....99 _____	
126	Does any member of the household own the following? [interviewer: circle all that apply	bicycle .....1 motorcycle/scooter .....2 animal drawn cart .....3 car/truck.....4 all absent ……5	
127	Does the household own any livestock, herds, other farm animals, or poultry?	yes.....1 no.....2 →	**130**
128	How many of the following animals do you keep? *(Interviewer: if household does not own a particular item, record "00" against that item.)*	a) milk cows, oxen or bulls ... |_____|_____| b) chickens..... |_____|_____| c) goats ..... |_____|_____| d) sheep ..... |_____|_____| e) horses, donkey, or mule .... |_____|_____| f) camels ..... |_____|_____| g) beehives..... |_____|_____|	
129	Does any member of this household own any agricultural land?	Yes …….1 No ……2	
130	How many (local units) of agricultural land do members of this household own? *local units:*- hectare (100m*100m)	_____local unit Don't know ……98	
C. <u>information pertaining to past history and current illness of the child</u> *Now I will ask you about the child past history and current illness*			
131	Has (NAME) been ill with any kind of illness at any time in the last 2 weeks?	Yes …….1 No ……2 Don't know……98	**Go to Q 137**
132	Does the child have fever in the last two weeks?	Yes …….1 No ……2 Don't know……98	
133	Does the child have fever in the last	Yes …….1	

	two weeks?	No ……2 Don't know……98	
134	Does the child have cough in the last two weeks?	Yes …….1 No ……2 Don't know……98	
135	Does the child have diarrhea in the last two weeks?	Yes …….1 No ……2 Don't know……98	
136	Does the child take a drug like this in the last six month?	Yes …….1 No ……2 Don't know……98	
137	Do you have insect side treated bed net?	Yes …….1 No ……2 Don't know……98	
138	Does the child sleeps under the ITN last night?	Yes ……1 No ……2 I don't know…….98	

Part two

Household food security status

Now I will ask you about the food security of your house based on the last four weeks

SN	Question or filters	Categories of Answers code	Skip option
201	In the past four weeks, did you worry that your household would not have enough food?	Yes…….1 No……2	If you code is 2 go to 203
202	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks) …….1 Sometimes (three to ten times in the past four weeks) …….2 Often (more than ten times in the past four weeks)……3	
203	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	Yes…….....1 No……2	If you code is 2 go to 205
204	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks) ….1 Sometimes (three to ten times in the past four weeks) ……2 Often (more than ten times in the past four weeks) ……3	
205	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	Yes…….....1 No……2	If you code is 2 go to 207
206	How often did this happen in the	Rarely (once or twice in the past	

	past four weeks?	four weeks…….1 Sometimes (three to ten times in the past four weeks) …….2 Often (more than ten times in the past four weeks)……..3	
207	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	Yes…….1 No……2	If you code is 2 go to 209
208	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks).....1 Sometimes (three to ten times in the past four weeks).....2 Often (more than ten times in the past four weeks) 3	
209	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Yes…….....1 No……2	If you code is 2 go to 211
210	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks).....1 Sometimes (three to ten times in the past four weeks).....2 Often (more than ten times in the past four weeks) 3	
211	In the past four weeks, did you or any other household member have less freqent meals because there was not enough food?	Yes…….....1 No……2	If you code is 2 go to 213
212	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks).....1 Sometimes (three to ten times in the past four weeks).....2 Often (more than ten times in the past four weeks) 3	
213	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	Yes…….1 No……2	If you code is 2 go to 215
214	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks).....1 Sometimes (three to ten times in the past four weeks).....2	

		Often (more than ten times in the past four weeks) 3	
215	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	Yes……1 No……2	If you code is 2 go to 217
216	How often did this happen in the past four weeks?	Rarely (once or twice in the past four (weeks) ……1 Sometimes (three to ten times in the past four weeks) ….2 Often (more than ten times in the past four weeks) ……..3	
217	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	Yes 1 No……2	
218	How often did this happen in the past four weeks?	Rarely (once or twice in the past four weeks) ……1 Sometimes (three to ten times in the past four weeks) …….2 Often (more than ten times in the past four weeks)……3	

Part three

Household dietary diversity score

Now I would like to ask you about the types of foods that you or anyone else in your household *ate yesterday during the day and at night* either separately or combined with other foods.

301	Any bread, rice, pasta, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat, teff?	No…….....1 Yes…….2 Don't know…… 98
302	Any potatoes, bulla, *kocho* or any other food made from roots or tubers?	No…….1 Yes…….2 Don't know……9999
303	Any vegetables?	No…….1 Yes……2 Don't know…..9999
304	Any fruits?	No…….1 Yes…….2 Don't know…..9999
305	Any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?	No…….1 Yes……..2 Don't know…..9999
306	Any eggs?	No……1 Yes…….2 Don't know…..9999
307	Any fresh or dried fish or shellfish?	No……1 Yes…….2 Don't know…..9999

308	Any foods made from beans, peas, lentils, or nuts?	No…….1 Yes…….2 Don't know…..9999
309	Any cheese, yogurt, milk or other milk products?	No…….1 Yes…….2 Don't know…..9999
310	Any foods made with oil, fat, or butter?	No…….1 Yes……2 Don't know……..9999
311	Any sugar or honey?	No……1 Yes…….2 Don't know….9999
312	Any other foods, such as condiments, coffee, tea?	No…….1 Yes……2 Don't know……9999

Part four: measurement of height, weight, hemoglobin result of stool examination

401	**Sex of the child**			
401	Height in centimeter			
403	Weight in kilogram			
405	Hemoglobin in gram per deciliter			
406	Longitude and Latitude	N		
		E		
407	Altitude			
408	Stool exam result	Posetive	Negative	Not vallid or stool not examined
	A.lumbricoids			
	Trichuris trichiura			
	Hook worm			
	Shistosoma mansoi			

	Entameba histolotica			
	Gardia lamblia			
	Tape worm			

የመረጃ መስጫ ቅጽና ስምምነት ፎርም

1.መረጃመስጫ

- ስሜ_____ይባላል፡፡የመጣሁት ከአዲስ አበባ ዩንቨርስቲ የደም ማነስ ተመራማሪዎች ቡድን ጋር ነው፡፡ የጥናቱ አላማም የደም ማነስ በአካባቢው ህጻናት በተለይ እድሜያቸው ከ6 እስከ 10 የሆኑትን በምን ያህል ደረጃ እያጠቃ እንዳለ ማወቅ ነው ፡፡
- የእርስዎ ቤት እና መንደር ለጥናቱ የተመረጡት በእጣ ነው፡፡ ጥናቱ የህጻናትን የደም እና የሰገራ ምርመራ ያካትታል፡፡ የደም ማነስ ምርመራ ለማካሄድ ትንሽ የደም ጠብታ ከልጅዎ የግራ እጅ ጣቱ ላይ ከፍተኛ ልምድ ባላቸው ባለሞያዎች በጥንቃቄ እንወስዳለን:: ውጤቱንም ወዲያውኑ እነግሮታለን፡፡ ምርመራው ህጻኑ ላይ ምንም ችግር እንደማይፈጥር እናረጋግጣለን::
- ልጅዎ በመመርመሩ የሚያገኘው ጥቅም ደም ማነስ እንዳለበትና እንደሌለበት፤በአንጀት ጥገኛ ትላትል መጠቃት አለመጠቃቱን መረጃ ያገኛሉ በተጨማሪም ከፍተኛ ደም ማነስ ያለባቸውን ወደ ከፍተኛ ህክምና ተቋማት ለህክምና እንልካቸዋለን:: እንዲሁም መድሃኒት በአንጀት ጥገኛ ትላትል ለተጠቁ ይሰጣቸዋል፡፡
- ማንኛውም የሚሰጡን መረጃ በሚስጢር እንደሚያዝ እናረጋግጣለን፡፡ ስምዎ እና አድራሻዎ አይመዘገብም፡፡ ቃለምልልሱን በማንኛውም ጊዜ ለማቋረጥ ይችላሉ፡፡ ማንኛውንም ጥያቄ ላለመመለስ መብትዎ የተጠበቀ ነው፡፡
- በዚህ መጠይቅ የሚኖረዎት ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት ላይ የተመሰረተ ነው፡፡ ሆኖም የእርስዎ ልምድና እውቀት ልጆች ላይ የሚከሰተውን የደም ማነስ በሽታ ለመከላከል ከፍተኛ አስተዋፆ ይኖረዋል፡፡
- ቃለ ምልልሱና ምርመራው በግምት ግማሽ ሰአት ይፈጃል፡፡

- ጥያቄ አለዎት?

2. የስምምነ ትፎርም

- ቃለ ምልልስ ለመስጠት ፈቃደኛ ነዎት?
  ፈቃደኛ አይደለሁም_____ አመስግነህ/ሽ ቃለ-መጠይቁን አቁም/ሚ
  ፈቃደኛ ነኝ_____
- በጠያቂው የሚፈረም_____
  <u>ከዚህ በላይ የተመለከተውን መረጃና ስምምነት መፈጸማችን አረጋግጣለሁ</u>

- የቀበሌ ስም _____ የጎጥ ስም_____
- የመጠይቁ መለያቁጥር |____|_____|_____|
- የቤቱ መለያቁጥር |____|_____|_____|
- መጠይቁ የተደረገበት ቀን |____|____|ቀን|____|____|ወር|____|____||____|____|ዓ.ም
- የተጀመረበት ሰአት |____|____|ሰአት|____|____|ደቂቃ

Annex 2 Amiharic questionnaire

ተ.ቁ	ጥያቄዎችና መለያዎች	የመልስ ኮድ	ይለፍ

ሀ. ስለ ማህበረሰባዊ ጉዳዮችን በተመለከተ ለመጀመር ያህል ስለ እረሶዎ እና ስለ ቤተዎ በተመለከተ አንዳንድ ትያቄዎችን እጠይቆታለሁኝ		
101	እርስዎ ከልጁ/ከልጅቷ ጋር ያልዎት ዝመድና ምንድን ነው?	የልጁ እናት.....1 የልጁ አባት.....2 የልጁ የእንጅራ አባት.....3 የልጁ የእንጅራ እናት.....4 የልጁ ወንድም .....5 እህት.....6 የቅርብ ዘመድ.....7 ልላ ካለ ይገለጽ.....99_____
102	የመኖሪያ አድራሻ ሁናቴ ምንድን ነው? ለጠያቂ፣ ምርጫውን አንብብ/ቢ	ገጠር.....1 ከተማ.....2 በከፊል ከተማ.....3
103	የእርሶዎ እድሜ ስንት ነው? ***በሙሉ የተተናቀቀ አመት ሲቆጠር***	_____
104	ሀይማኖቶ ምንድን ነው ?	ኦርቶዶክስ ክርስቲያን.....1 እስላም.....2 ፕሮቴስታንት.....3 ካቶሊክ.....4 ሌላ ካለ ይገለጥ.....99 _____
105	እርስዎ ከየትኛው ህብረተሰብ ነዎት ?	ጉራጌ..... .....1 ወለኔ.....2 ስልጤ.....3 ሃድያ.....4 ኦሮሞ.....5 አማራ.....6 ትግሬ.....7 ሌላ ካለ ግለጥ.....99
106	የእርስዎ የትምህርት ደረጃን ቢገልጡልኝ? ***የልጁ/የልጅቷ እናት (ያሳዳጊ)***	አንደኛ ደረጃ(1-8).....1 ሁለተኛ ደረጃ(9-10).....2 ዩኒቨርሲቲ መሰናዶ.....3 ዲፕሎማና ከዚያ በላይ.....4 ማንበብና መጻፍ የሚችል.....5 ያልተማረ.....6
107	የልጁ/የልጅቷ አባት የትምህርት ደረጃ ስንት ነው? ***የልጁ/የልጅቷ አባት (ያሳዳጊ)***	አንደኛ ደረጃ(1-8).....1 ሁለተኛ ደረጃ(9-10).....2 ዩኒቨርሲቲ መሰናዶ.....3 ዲፕሎማና ከዚያ በላይ.....4 መንበብና መጻፍ.....5 ልተማረ.....6
108	የእርስዎ የስራ አይነት ምንድን ነው? ***የልጁ/የልጅቷ እናት (ያሳዳጊ)***	አርሶ አደርና የቤት እመቤት.....1 የቤት እመቤት.....2 የመንግሰት/የግል ተቀጣሪ.....3 ተማሪ.....4 ነጋዴ.....5 አረቄ፣ጠላ የመሳሰሉትን መሸጥ...6 ሴተኛአዳሪ.....7 የቤት ሰራተኛ.....8 የቀን ሰራተኛ.....9 ስራ የሌለው.....10 ሌላ ካለ ይገለጽ.....99 _____

109	የልጁ/የልጅቷ አባት የስራ አይነት ምንድን ነው	አርሶ አደር.....1 የመንግስት/የግል ተቀጣሪ.....2 ተማሪ.....3 ነጋዴ.....4 .....5 የቀን ሰራተኛ.....6 ስራ የሌለው.....7 ሌላ ካለ ይገለጽ.....99
110	ጠቅላላ የቤተሰብ አባል ስንት ነው በዚህ ቤት የሚኖረው? ***(ሁሉም ሰዎች ከስድት ወር በላይ በዛ ቤት የሚኖሩና እየኖሩ ያሉ)***	_____

ለ. <u>የመጠጥ ውሃን፣ የሽንት ቤት አይነት መረጃን በተመለከተ</u>

በመቀጠል ስለ መጠጥ ውሀና ስለሽንት ቤት አይነት አንዳንድ ጥያቄዎች በመጠየቅና በማየት መረጃ እወስዳለሁ

111	ለቤተሰብዎ የመጠጥ አገልግሎት የሚውል ውሃ ዋና ምንጭ ምንድን ነው? *(ለጠያቂ፡ መገኛው የቧንቧ ውሃ ስለመሆኑ አረጋግጥ፡፡ መልሱ የቧንቧ ውሃ ከሆነ አረጋግጠው ትክክለኛውን ኮድ ያክብቡ)*	<u>የየቧንቧ ውሃ</u> በመኖሪያ ግቢ ውስጥ.....1 ከመኖሪያ ግቢ ውጭ.....2 የቦኖ ውሃ.....3 <u>ከምንጭ</u> የተከለለ ምንጭ.....4 ያልተከለ ምንጭ.....5 <u>ከኩሬ</u> የተከለለ ኩሬ.....6 ያልተከለለ ኩሬ.....7 <u>የጉድጓድ ውሃ</u>.....8 ከመኖሪያ ግቢ ውስጥ.....9 የጋራ የጉድጓድ ውሃ .....10 <u>የምድር ውሃ</u> ሀይቅ፣ወንዝ፣ጅረት፣ግድብ.....11 <u>የዝናብ ውሃ</u>.....12 <u>የታንክር ውሃ</u>.....13 <u>የግዢ ውሃ (ከግለሰብ)</u>.....14 <u>የታሸገ ውሃ</u>.....15 ቋሚ የሆነ የውሃ መገኛ የለም.....16 ሌላ ካለ ይገለጽ.....99
112	ውሃውን ከመጠጣታችሁ በፊት ውሃውን ከጀርም ለማንፃት ምን ተጠቀማችሁ?	አፈላነው.....1 በረኪና/ውሃአጋር/ውሃ ማከሚያ እንክብል.....2 በነጠላ/በልብስ ማጣራት.....3 ባሸዋ ማጣራት.....4 ለፀሃይ ማጋለጥ.....5 በማዝቀጥ.....6 አላውቅም ምን እንደተደረገ.....98 ሌላ ካለ ይገለፅ.....99
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ሐ. <u>የተከሰተ የምግብ እጥረት በተመለከተ</u>

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201.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በቤትዎ በቂ ምግብ አኖርም ብለው ሰግተው/ተጨንቀው ያውቀሉ?	አዎ ..... 1 የለም ..... 0 →	203
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203.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል አቅም በማጣት (በችግር) ምክንያት የፈለጉትን የምግብ አይነት መመገብ ሳይችሉ ቀርተዋል? *<u>ለጠያቂ፡ ለምሳሌ ምስር መብላት ፈልገው አልበሉም</u>* ?	አዎ ..... 1 የለም ..... 0 →	205
204.	ባለፈው አንድ ወር ውስጥ ይህ ችግር ምን ያህል ግዜ ተከስቷል?	አልፎ አልፎ (አንድ ወይም ሁለት ግዜ በወር ዉስጥ) .....1 አንዳንዴ(ከሶስት እስከ አስር ግዜ በወር ዉስጥ).....2 ብዙጊዜ (ከአስር ግዜ በላይ በወር ዉስጥ)....3	
205.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በአቅም ማጣት ምክንያት በየቀኑ ተመሳሳይ ምግብ ተመግበው ያውቀሉ? ለምሳሌ ሁሌ ጎመን ብቻ	አዎ ..... 1 የለም ..... 0 →	207
206.	ባለፈው አንድ ወር ውስጥ ይህ ችግር ምን ያህል ግዜ ተከስቷል?	አልፎ አልፎ (አንድ ወይም ሁለት ግዜ በወር ዉስጥ) .....1 አንዳንዴ(ከሶስት እስከ አስር ግዜ በወር ዉስጥ).....2 ብዙ ጊዜ ብዙ (ከአስር ግዜ በላይ በወር ዉስጥ).....3	
207.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በአቅም ማነስ (ማጣት) ምክንያ በአካባቢው ማህበረሰብ ዘንድ ያልተለመዱ (የማይበሉ) ምግቦችን ተመግበው ያውቀሉ? <u>በችግር ግዜ ብቻ የሚበላ</u>	አዎ ..... 1 የለም ..... 0 →	109

208.	ባለፈው አንድ ወር ውስጥ ይህ ችግር ምን ያህል ግዜ ተከስቷል?	<u>*አልፎ አልፎ*</u> (አንድ ወይም ሁለት ግዜ በወር ዉስጥ) ...1 <u>*አንዳንዴ*</u> (ከሶስት እስከ አስር ግዜ በወር ዉስጥ).....2 <u>*ብዙጊዜ*</u> (ከአስር ግዜ በላይ በወር ዉስጥ).....3	
209.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በቤትዎ በቂ ምግብ ባለመኖሩ (በማጣት) ምክንያት ከሚያስፈልግዎ ምግብ መጠን ያነሰ ተመግበዋል? *ለምሳሌ ሙሉ ቂጣ ይመገቡ ከነበረ ግማሽ ቂጣ ፣ አንድ እንጀራ ከብዙ ሰዉ ጋር መብላት ሊሆን ይችላል)*	አዎ ..... 1 የለም ..... 0 ⟶	111
210.	ባለፈው አንድ ወር ውስጥ ይህ ችግር ምን ያህል ግዜ ተከስቷል?	<u>*አልፎ አልፎ*</u> (አንድ ወይም ሁለት ግዜ በወር ዉስጥ) .....1 <u>አንዳንዴ</u> (ከሶስት እስከ አስር ግዜ በወር ዉስጥ).....2 <u>*ብዙጊዜ*</u> (ከአስር ግዜ በላይ በወር ዉስጥ).....3	
211.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በቤትዎ በቂ ምግብ ባለመኖሩ (በማጣት) ምክንያት በቀን ውስጥ ከተለመደው ያነሰ ግዜ ምግብ ተመግበው ያውቃሉ? ለምሳሌ በቀን ሶስት ግዜ ይመገቡ ከነበረ፣ከሶስት ግዜ ያነሰ	አዎ ..... 1 የለም ..... 0 ⟶	213
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213.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በቂ ምግብ ባለመኖሩ (በማጣት) ምክንያት በቤት ውስጥየሚላስ የሚቀመስ ጠፍቶ ያዉቃል?	አዎ ..... 1 የለም ..... 0 ⟶	215
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215.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በቂ ምግብ ባለመኖሩ (በማጣት) ምክንያት የተነሳ ሳትበሉ ያደራቹበት ቀን አለ?	አዎ ..... 1 የለም ..... 0 ⟶	217
216.	ባለፈው አንድ ወር ውስጥ ይህ ችግር ምን ያህል ግዜ ተከስቷል?	<u>*አልፎ አልፎ*</u> (አንድ ወይም ሁለት ግዜ በወር ዉስጥ)....1 <u>*አንዳንዴ*</u> (ከሶስት እስከ አስር ግዜ በወር ዉስጥ).....2 <u>*ብዙጊዜ*</u> (ከአስር ግዜ በላይ በወር ዉስጥ).....3	

217.	ባለፈው አንድ ወር እርስዎ ወይንም ሌላ የቤተሰብዎ አባል በቂ ምግብ ባለመኖሩ (በማጣት) ምክንያት የተነሳ ሳትበሉ ውለው፤አድረው የውቃሉ?	አዎ ..... 1 የለም 0	
218.	ባለፈው አንድ ወር ውስጥ ይህ ችግር ምን ያህል ግዜ ተከስቷል?	<u>*አልፎ አልፎ*</u> (አንድ ወይም ሁለት ግዜ በወር ዉስጥ)....1 <u>*አንዳንዴ*</u> (ከሶስት እስከ አስር ግዜ በወር ዉስጥ).....2 <u>*ብዙጊዜ*</u> (ከአስር ግዜ በላይ በወር ዉስጥ).....3	

<u>መ.የቤተሰብ የአመጋገብ ስብጥር:</u>

ከዚህ በመቀጠል በትላንትናው እለት ቀንም ሆነ ማታ ቤተሰብዎ ስለተመገበዉ ምግብ አንዳንድ ጥያቄዎችን እጠይቆታለሁኝ፡፡ የተመገቡት ምግብ አንድ አይነት ወይም ከሌሎች ምግቦች ጋር በመደባለቅ ሊሆን ይችላል፡፡

(ለጠያቂ፡ጥያቄው ከ2 አመት በላይ ለሆኑ ብቻ ለተዘጋጁ ምግቦች ይጠየቅ)

301	ዳቦ፣ ፓስታ፤ ሩዝ፤ ወይም ከአጃ፤በቆሎ፤ገብስ፤ስንዴ፤ማሽላ ወይም ከሌሎች የእህል ዘር የተሰራ ምግብ	አዎ.....1 የለም.....2 አላውቅም.....98
302	ድንች፤ስኳር ድንች፤ቀይ ስር፤ጎደሬ፤ወይንም ሌሎች ስራቸው የሚበሉ	አዎ.....1 የለም.....0 አላውቅም.....98
303	እንደ ጎመን፤ሰላጣ፤ካሮት፤ቆስጣ ሌሎች ደማቅ አረንጓዴ ቅጠል ያላቸው አትክልቶች	አዎ.....1 የለም.....0 አላውቅም.....98
304	ፍራፍሬ፡ እንደ ብርቱካን፤ሎሚ፤መንደሪን፤አናናስ ወዘተ...	አዎ.....1 የለም.....0 አላውቅም.....98
305	ስጋ፡ የላም፤የበሬ፤ያሳማ፤የበግ፤የፍየል፤የዶሮ፤ የዳክዬ ሌላም	አዎ.....1 የለም.....0 አላውቅም.....98
306	እንቁላል፡የዶሮ፤የጅግራ፤ወዘተ...	አዎ.....1 የለም.....0 አላውቅም.....98
307	ዓሣና ሌሎች የባህር ምግቦች	አዎ.....1 የለም.....0 አላውቅም.....98
308	ባቄላ፤አተር፤አኩሪ አተር፤ቦለቄ፤ ኑግ፤ሰሊጥ፤ለውዝ ወይንም ከሌሎች ጠራጥሬዎች የተሰራ ምግብ	አዎ.....1 የለም.....0 አላውቅም.....98
309	አይብ እርጎ ወተት ወይንም ሌላ የወተት ተዋፅዎ	አዎ.....1 የለም.....0 አላውቅም.....98
310	ማንኛም ምግብ በምግብ ዘይት ወይንም በቅቤ የተሰራ	አዎ.....1 የለም.....0 አላውቅም.....98
311	ስኳር፤ማር	አዎ.....1 የለም.....0 አላውቅም.....98
312	ቡና፤ሻይ	አዎ.....1 የለም.....0 አላውቅም.....98

<u>ክፍል ሁለት</u>

ሀ. የህፃናቱን ማህበረሰባዊ መገለጫ በተለከተ

አሁን ደግሞ ስለ ልጁ/ጅ አንዳንድ ትቂዎችን እጠቆዎታለሁ			
401	**ዎታው/ዋ ምንድን ነው ;**	**ወንድ**.....1 **ሴት**.....2	
402	**በየትኛው ወርና አመት የተወለደው/ችው ;**	**ወር**_____**አላውቅም**.....98 **አመት**_____**አላውቅም**.....98	
403	**ስንት አመት ሆናት;**	_____ **(እድሜ በተተናቀቀ አመት ሲቆጠር)**	
404	**በአሁን ሰአት ስንተኛ ክፍል እየተማረ/ች ነው;**	_____ **(ያለፈውን ያጠናቀቀችውን/ውን ክፍል)**	
	ለ. የህፃናቱን የጤና ሁኔታ በተመለከተ **አሁን ደግሞ ስለ**		
405	**ባለፉት ሁለት ሳምንታት ውስጥ ልጁ/ጅ በማንኛውም ህመም ታመው ያውቃሉ;**	**አዎን**.....1 **አልታመመም/ችም**.....2 → **አላወኩም**.....98	409
406	**ባለፉት ሁለት ሳምንታት ውስጥ ልጁ/ጅ ትኩሳት ኖሮባት/በት ያውቃል/ታውቃለች;**	**አዎን**.....1 **አልታመመም/ችም**.....2 **አላወኩም**.....98	
407	**ባለፉት ሁለት ሳምንታት ውስጥ ልጁ/ጅ ሳል ኖሮባት/በት ያውቃል/ታውቃለች;**	**አዎን**.....1 **አልታመመም/ችም**.....2 **አላወኩም**.....98	
408	**ባለፉት ሁለት ሳምንታት ውስጥ ልጁ/ጅ ተቅማጥ ኖሮባት/በት ያውቃል/ታውቃለች;**	**አዎን**.....1 **አልታመመም/ችም**.....2 **አላወኩም**.....98	
409	**ባለፉት ስድስት ወራቶች ውስጥ ልጁ/ጅ ይህን የመሰለ መድሃኒት ወስዳ/ዶ ያውቃል;** ***(ባአካባቢው የተለመደውን ለህፃናት የሚሰጠውን አንጀት ትላትል መድሃኒት ለመላጀ አሳያት)***	**አዎን**.....1 **አልታመመም/ችም**.....2 **አላወኩም**.....98	
410	**በቤቱ ውስጥ የወባ መከላከያ አጎበር አለ;** ***(ለመለሸ አጎበሩን እንድታሳይ ጠይቃት)***	**አለ**.....1 **የለም**.....2 **አላወኩም**.....98	
411	**ምን ያህል ግዜ ሆኖታል አጎበሩን ካገኘችሁ;**	_____**ወር በፊት** _____**አመት በፊት** **አላወኩም**.....98	
412	**ትላንትና ሌሊት ልጁ/ጅ አጎበር ተጠቅመዋል;**	**አዎን**.....1 **አልተጠቀመም/ችም**.....2 **አላወኩም**.....98	

ክፍል 3፡ የደም እና የሰገራ ምርመራ ውጤት መመዝገቢያ)		
501	**ዎታ**	ወንድ ☐ ሴት ☐ የ ኤክስ(x) ምልክት አድርግ
502	**ሄሞግሎቢን በግራም ደሲሌትር**	☐☐.☐

503	የቤቱ ላቲቲዉድ ና ሎንግቲዉ ድ	N		E	
504	የቤቱ ከመሬት ወለል ከፍታ				
505	የሰገራ ምርመራ ውጤት	አለ	የለም	ያልተሳካ ምርመራ	
	አስከሪስ				
	ተሪቹሀሪሰ				
	አሜባ				
	የመንጠቆ ትል				
	ሌላ				
	1				
	2				
	3				
	4				
506	የአርዲቲ ውጤት				
	ፕ. ፋልሲፓረም				
	ፕ. ቫይቫክስ				
	ሚክስድ				

Annex 3

RESUME

JEMAL HAIDAR ALI (MD,MSC,DRM,CME)
Associate Professor
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ETHIOPIA
***Phone* +251-911-50 54 65(mob) +251-1-262341(Res)**
E-mail hjemal@gmail.com or hjema2009l@gmail.com
School of Public Health, Addis Ababa University P.O.BOX:27285-1000

Educational Background

- **Doctorate in Medicine**Addis Ababa University Medical Faculty Ethiopia,1986.
- **MSc in Applied Nutrition** from Nairobi University,Keny,2001.
- **Diploma in Research methodology(DRM**) from Nairobi University,Keny,2002
- **Certified in medical education(CME**)from University of Toronto ,Faculty of Medicine ,Department of Family andcommunityMedicine,Graduate studies &Academic Fellowship Program,2009(March-November,2009**)**

Other Trainings

- **Certificate in Brith defect Surveillance**,WHO,geneva, Switzerland October 2(one week),2011**.**
- **Certificates in Balance Score Card,Netherlands,** Addis Ababa,Ethiopia,(one week)2011
- **Audited Course on international Health** at Johns Hopkins for 2month 9mid August-october,2010)
- **Certificate in leadership** from International Health Program,Public Health Institute,SantaCruz,California,2007
- **Certificate in computer use** .Nairobi university,Kenya,2000
- **Certificate in Household Food Security and Strategic Planning**,Applied nutrition programme unit,Nairobi,2000
- **Certificate in Serum RetinoalAnalysis**,StellenboschUnivesity,south Africa,1998
- **Certificates in sport Medicine**,sportfederation,Addis Ababa,Ethiopia,1997.
- **Certificates in General management**, Ethiopia mangemet institute Debre Zeit,Ethiopia,1995
- **Certificate in Project Management** ,Ethiopian managmant institute with Mc-Gruppen from Sweden,Debre Zeit,Ethiopia,1991
- **Certificate on Safe Matherhood**,MOH in collaboration with family health planning,ECA,Addis Ababa,1990.
- **Certificate in Health service Management**,MOH ,Addis Ababa,Ethiopia,1998
- **Attended special course on supply chain management focused (4days) on reproductive health service,2010.**
- **Attended various meeting on Key Population issues.**
- **Attended various conferences and seminars conducted by RRC,Ethiopian Nutrition institute,Ministry of health on disaster preparedness and prevention; early warning ;nutrition surveillance and the like.**

Academic Experience
2007-present Associate Professor,School of Public Health,Addis Ababa Univesity
2003-2006 Assistant Professor (Hon.);Departement of community Health , Addis Ababa University

Professional Experiences:

Over 28 years of experience in Health and nutrition Field that Includes HIV care ,micro nutrient malnutrition and provided various consultancy to local and international organization on HIV related issues and public Health nutrition that included child health days, vitamin A surveys,evaluation of therapeutic/supplementary feeding program, emergency nutrition surveys and IYCF.

Presently

- Works as Associate professor at School of Public Health (SPH) form August 2007 to date and member of the staff affairs of the medical faculth.

Past work Experience

- Deputy Director ofEHNRI(October 2005-2007)
- Honorary Assistant professor incommunity Department Addis Ababa University medical Faculty (October 2003-2007)
- County Coordinating Mechanism (CCM) Steering Committee member (October 2005-2007)
- Seiner Researcher at EHNRI (January 2002-September 30, 2004)
- Chairman –Grievance committee at ENHRI(February,2002-september30,2004)
- Contact Person for Yools For Health Managers Course in Kenya(May2002-April2004)
- Chair –Research and Ethical Clearance Committee at ENHRI(1997-1999)
- Head of Food Science and Nutrition Research Department ENHRI (May 1995-Augest 1996)
- Head of Medical and Nutrition Department ENHRI(november1994-April 1995)
- Coordinator of Nutritional Anemia Control Program/ENI(January 1994-October 1994)
- Coordinator of Vitamin ADeficiency Control and Prevention Program (December 1992)
- Regional Health Director, Assab Autonomous Region/MOH((May1990-October1991)
- Head-Health Service Division, Assab Autonomous Region/MOH(Nov1989-Apr 1990)
- Medical Director,Assab Hospital/MOH (January 1987-October 1989)
- Member of Ethiopian Heath and Science Technology commission /ESTC(May 1994-1996

Manual Production

1.Amharic Manual on Child Feeding Practice,2010.

Chapter in a Book

- **HaiderJ,**kloosH,Hailemariam D and Demissie T ."Food and Nutrition"InBerhaneY,HaileMariamD,Kloos H**. The Epidemology and Ecology of Health and Disease in Ethiopi.**2006.shama Book:AddisAbaba,Ethiopia**.**

***e*-Book**

- JemalY,**HaidarJ**.**Under nutrition and anemia amog refugee childrenfrom Ethiopia**-The magnitude and Determinant of under nutrition and anemia among refugee pre-school children from Ethiopi,2013.Lamberts Academic publisher,Germany

Abstract Presentation (over 30)
Mission delegated

- Led ateam from ENHRI and member from traditional Healer Association to Beijing,China 2006
- Led agroup of reaserch representing Evipnet-Ethiopia to WHO-Afro,2006**.**

Publication: (authoredand co-ordinated over 70 articles in reputable journals)
Award :

- Swiss Trans-disciplinary Award .Zurich ,March 2000.
- Certificate ofthe development Market Place Global Copetition, December 4-5,2003,Washington
- Certificate of recognition by school of public Health in recognition of outstanding contributions made to the academic achievement and personal growth of 2011.

Reference:

- Dr.Damen H/Mariam,AssociateProffessorat Addis Ababa University Medical School (AAUMS)
- Professor Ahmed Ali,School of Public Health,AAUMS
- DrGetinetMitike,Associate professor and Head- SPH Addis Ababa University Medical
  School (AAUMS)

PERSONAL PROFILE

HAILEYESUS CHANE HASSEN
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ALEM BANK, ADDIS ABABA ETHIOPIA
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CAREER HISTORY

- *Disease prevention and control department coordinator*
- *Alem bank health center*
- *From June, 18/ 06/2010 to present*

Work duties:

- ✓ As coordinator planning, coordinating, monitoring and evaluation of activities under maternal and child health department.
- ✓ diagnosing and treatment of adult and pediatric HIV AIDS, opportunistic infection and malnutrition assessment and treatment
- ✓ Giving short course on job trainings for health and non health staffs like infection prevention, rapid testing algorism for HIV/AIDS, and about extended immunization program.
- ✓ Collection of data conducted by Ethiopian health and nutrition research institute

- *From, 24/11/2004 to May, 08/ 2008*

Work duties:

- ✓ Coordinating and implementing TB/HIV programs in the health center and in the community
- ✓ Planning, implementing and coordinating all activities under taken by Orbis international Ethiopia in health center and in the community.
    - Screening students those have refractive error.
    - Conducting Trichiasis surgery.
    - Mass screening of community those who needs advanced eye diseases and facilitating referral
    - And assisting physicians during advanced eye surgery

SUMMARY OF EDUCATION AND UALIFICATION

Name of institutions	Grade or Qualification	Year of entry	Year of completion or graduation	Award or	City/town
Goro-high school	9-12	1998	2002	Certificate	Gurage Zone , Wolkite
Rass-The-Selase primary school	1-8	1989	1997	Certificate	Gurage Zone , Wolkite
Hawassa health science college	Diploma in clinical nursing	Jan. 2003GC	Jan. 2003GC Nov. 2004GC	Diploma	SNNPR, Hawassa
ALKAN university college	Bachelor Degree in public health	Sep 2008GC	Sep. 2011GC	Diploma	Addis Ababa
Addis Ababa university	Masters of public health	2007GC	--	---	Addis Ababa It will be completed in June 2016GC

REFERENCES

Address:-tell +251-924-29-60-36

- Ato Mintesinote Berhanu :-HR manager of the health center

Annex Declaration

I, the undersigned declare that this thesis is my own original work in partial fulfillment of the requirement for the degree of Masters of Public Health in Public Health Nutrition.

Name Haileyesus Chane.

Signature _____

Place of submission: to School of Graduate Studies, Addis Ababa University, Ethiopia.

Date of submission _____

This thesis work has been submitted for examination with my approval as university advisor.

DrJemal Haidar (associate professor)

Signature _____

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical Conduct of the research project and for provision of required progress reports as Per terms and conditions of the Research Publications Office in effect at the time of Grant is forwarded as the result of this application.

Name of the student: _____

Date._____ Signature _____

Approval of the primary Advisor

Name of the primary advisor: ***DrJemal Haidar (associate professor)***

Date._____ Signature _____