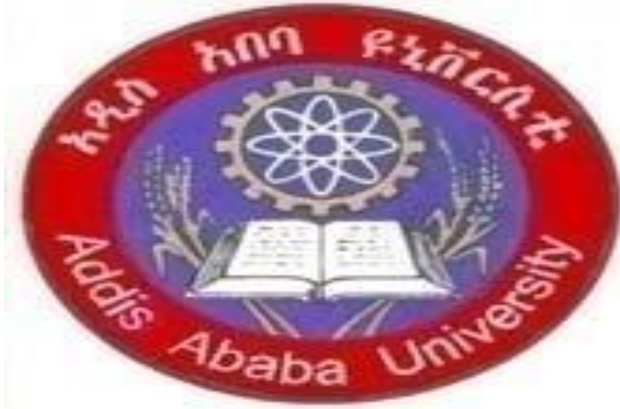

ADDIS ABABA UNIVERSITYCOLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

EFFECT OF SCHOOL FEEDING PROGRAM ON ANEMIA AND STUNTING AMONG PRIMARY SCHOOL CHILDREN IN ADDIS ABABA, ETHIOPIA; A QUASI EXPERIMENTAL STUDY

By; Kidist Tadesse (B.Sc.)

Advisers: Dr. Seifu Hagos (MPH, MSc., Phd)

: Dr. Bilal Shikur (MD, MPH)

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APPROVED BY THE BOARD OF EXAMINERS

This thesis, by Kidist Tadesse is accepted in its present form by the board of examiners as fulfilling for the degree of masters of public health in public health nutrition.

Advisor

___________________________	_________________	___________	__________
Full name	Rank	Signature	Date

Advisor

___________________________	_________________	___________	__________
Full name	Rank	Signature	Date

External Examiner

___________________________	_________________	___________	__________
Full name	Rank	Signature	Date

Internal Examiner

___________________________	_________________	___________	__________
Full name	Rank	Signature	Date

Chairman, Department Graduate committee

___________________________	_________________	___________	__________
Full name	Rank	Signature	Date

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Acronyms and Abbreviations

AA	Addis Ababa
BAZ	Body mass index for Age Z score
CDC	Centre for communicable disease control
EDHS	Ethiopian demographic health survey
FAO	Food and agricultural organization
FCT	Food composition table
HAZ	Height for Age Z score
Hgb	Haemoglobin
IDA	Iron deficiency anemia
IFPRI	International Food Policy Research Institute
KJ/d	Kilo joule per day
MNPs	Multiple micro nutrient powders
Mg	Mille gram
MOE	Ministry of Education
MOH	Ministry of health
PUFA	Poly unsaturated fatty acids
RBC	Red blood cells
RNI	Recommended daily intake
SFP	School feeding program
UNHTF	The United Nations Hunger Task Force
WHO	World health organization

Abstract

Background: School feeding is the Provision of meal at school with a primary objective of alleviating short-term hunger, reducing malnutrition and improving child survival. Prevalence of Stunting and anemia are high in children living in urban slums. In Ethiopia the burden of anaemia is the most common nutritional deficiency as in many developing countries. Stunting is a problem of high public health importance with major unenthusiastic health and societal impacts in the developing world .School meals should be designed to improve the nutrient intake and Nutritional status of beneficiaries.

Objective; The study aimed at evaluating the effect of school feeding programs on anemia and stunting levels among beneficiaries and on evaluating meals for adequacy in nutrient contribution.

Method; a quasi-experimental study was conducted among primary school children enrolled in governmental primary schools in Addis Ababa Ethiopia from April to May 2018.Samples were selected by simple random sampling . To assess the portion size and nutrient contribution of the school meal Weighed food record method was used. Hemoglobin was determined by a haemoglobin meter (HemoCue AB). Height for age index was computed from Anthropometric measurements. Stata version 14, WHO Anthroplus and Nutri survey software were used for data analysis. A total sample size of 409 (203 in the Feeding and 206 in the Non feeding groups) were involved in the study.

Result the response rate was 96.6% in the intervention (those involved in school feeding programs) and 98.1% in the comparison group (those not involved in school feeding programs). The mean ± SD age was 11.8 ± .14 and 12.09 ± 0.13 in the intervention and comparison groups respectively. From the total 409 participants 67 (16.38%) were anemic. Level of anemia was 13.3% and 19.42% in the intervention and comparison group respectively ($p<0.05$). Stunting prevalence was similar among the two study arms (32.5% in intervention Vs 31.6% in comparison).Iron contribution from School meals was adequate for all age and sex groups except for girls in the age group of 10-14 years .

Conclusion and Recommendation School feeding was effective in reducing anemia but it was not effective on decreasing levels of stunting among participants .The school meal contributed the adequate amount for Iron but it failed to contribute the recommended amount for Vitamin A, Vitamin C, Zinc , protein and Energy. The school meals need to be reviewed by the responsible body in order to increase the nutrient content, and improve stunting, we suggest considering Multiple Micronutrient powders to fortify school meals with the necessary nutrients.

1 Introduction

1.1 Background

Malnutrition is highly prevalent in the developing countries of the world, this high prevalence in developing countries high of the world has activated many intervention strategies to improve these nutritional problems which influence the affected individuals, their household members communities and nation at large, one of the strategies implemented with focus on school children in order to alleviate malnutrition is school feeding program (1).

School feeding is the provision of food to school children either by providing cooked food at school or take home rations for families whose children are attending school(2, 3) . School feeding has impacts on the education, nutrition, health and future productivity of children besides its impact on eliminating hunger (4). It is recognized as one of the social safety net program to protect the poor (2).

Provision of meal at school to alleviate short-term hunger is the primary objective of school feeding thereby increasing attention to education, facilitate learning, and decreasing the need for children to leave the school to find food (3).

Nutrition and health during early years of life have potential in leading to long term consequences that can affect a child's cognition. Children's readiness for school is determined in part by a child's physical development aptitudes and motivation to learn. A number of prevalent nutrition and health conditions are shown to affect school participation and educational outcomes (5).

There are 795 million undernourished people in the world today. That means one in nine people do not get enough food to be healthy and lead an active life. Hunger and malnutrition are in fact the number one risk to health worldwide greater than AIDS, malaria and tuberculosis combined. The good news is that malnutrition is entirely solvable. There is enough food in the world to feed everyone and no scientific breakthroughs are needed. Today's knowledge, tools and policies, combined with political will, can solve the problem (6).

Furthermore, a lack of essential vitamins and minerals in the diet affects immunity and healthy development. One of the strategies identified by the United Nations Hunger Task Force (UNHTF) to reduce hunger is implementation of School Feeding Programmes (SFPs) with locally produced foods rather than imported foods (aid). The UNHTF considers SFP as an important tool towards improvement of education and agriculture. Their point of view is that SFP's could increase school attendance, especially for girls and, also the task force expects that the implementation of SFPs' can stimulate the market demand for locally produced foods(5).

Wide-ranging community and school based feeding programme that embrace school feeding, and regular de-worming, micro nutrient supplementation, take home rations, safe cooking facilities, clean drinking water, and improved sanitation is recommended,Also education is also needed in the areas of HIV/AIDS, health, nutrition, and hygiene inorder to increase the success of school feeding, all these engaged together provide a good platform for improving schools, keeping children healthy and engaging the community (6,7).

In Addis Ababa, the capital of Ethiopia, there is 10 administrative sub-cities and 116 districts. The city has a total area of 527 km^2 and it is not a malaria endemic area. There are 221 government primary schools in Addis Ababa in which all of the schools have an ongoing school feeding program targeted to children from low socio economic status. The school feeding program is supported by the first lady office, Yeenatweg charitable association, Addis Ababa educational bureau and other non-governmental organizations. Over 20,000 school age children are being supported by this program; all schools in the city have an ongoing school feeding program.

1.2 Statement of The Problem

Micronutrient deficiency is common in schoolchildren(3). Anaemia, defined as a low blood haemoglobin concentration, is a public health problem that affects low, middle and high income countries. Anemia has significant adverse health consequences, as well as adverse impacts on social and economic development (8-11).

Retarded psychomotor development, poor cognitive performance, motor development behavioural problems, increased morbidity from infectious disease and decreased work capacity are some of the consequences of iron deficiency in children (12), yet Iron deficiency is the most difficult deficiency to address due to the low bioavailability and high reactivity of iron fortification compounds (13).

Half of the schoolchildren in poor communities of Sub-Saharan Africa and India are deficient in iron. Since micronutrient deficiencies are rapidly reversible at any age Intervention at school age offers direct benefits for the schoolchild. There are clear nutritional benefits for schoolchildren of providing foods that have been fortified with micronutrients(3).

Ethiopia also shares the burden of anaemia as the most common nutritional deficiency as in many developing countries with major health, social and economic consequences. It has been seen that iron deficiency anaemia is a moderate public health problem at which over all, prevalence of anaemia was 43.7%, in a study done in Ethiopia (14).

There is little evidence of school feeding program for nutritional status children (15). In situations of absolute poverty even severely malnourished children may not benefit from school feeding programmes because of substitution at home.

1.3 Significance of the study

In spite of the fact that there are number of studies related to school feeding in developing countries, nutritional status and nutrient adequacy of school meals has not been well studied. On the other hand the ministry of education in collaboration with other responsible bodies is planning to scale up the school feeding program started in Addis Ababa to decrease malnutrition among school age children, but the effect of the school meal on their nutritional status and nutrient content of the meal is not well known. This study is expected to add input on the existing knowledge regarding the nutrient value of the meal and its effectiveness in improving macro and micronutrient deficiencies. The strength and the limitations of this study will initiate further studies on addressing the micronutrient deficiencies among school age children. Thus, the results from this evaluation study will be an input to maximize the coverage and quality of school feeding programs depending upon the outcome. In combination with further researches this study will generate evidence for policy makers to make decisions and use available evidence based interventions.

2 Literature review

2.1 School feeding

2.1.1 School feeding and its aim

School feeding as defined by the world bank is the provision of food to school children(2). School feeding can be classified into two main groups based on the provision modalities. The first one is the in-school feeding, where children are fed in school; and the second one is take-home rations, where families are given food if their children attend school. In-school feeding can, in turn, be divided into two common categories: programs that provide meals, and programs that provide high-energy biscuits or snacks (3).

School feeding helps to eliminate hunger for millions of children around the globe and is contributing to their education, nutrition, health and future productivity as adults(4). School feeding is universally recognized as one of the key social safety net programs to protect the poor(2) .

The primary objective of school feeding is provision of meal at school to alleviate short-term hunger, increase attention span, facilitate learning, and obviate the need for children to leave the school to find food. School meals can be prepared in schools or in the community, or can be delivered from centralized kitchens (3).

2.2 Anemia in children

Anaemia, defined as a low blood haemoglobin concentration, has been shown to be a public health problem that affects low, middle and high income countries and has significant adverse health consequences, as well as adverse impacts on social and economic development (9,10, 11, 16). Anemia is caused by inadequate intake or absorption of dietary iron, increased need in periods of growth, or infection by intestinal helmints, such as schistosomiasis or hookworm infestation (17) while a third of the world's population is affected by Anaemia ; half the anemia cases are due to iron deficiency(18).

Iron is a mineral that is necessary to carry oxygen in haemoglobin, iron deficiency has long been understood to result from the interaction of multiple aetiological factors that lead to an imbalance between the iron requirements of the body and the amount of iron absorbed. The key factors responsible for iron deficiency include; Dietary factors such as Low levels of iron in diet, Low bioavailability of iron in the diet (due to the form of iron, high prevalence of inhibitors, low availability of enhancers of bioavailability or some combination of these), insufficient quantity of dietary iron relative to enhanced needs during specific life phases (infancy, adolescence, and pregnancy),deficiencies in nutrients that are linked to iron metabolism (19) .

Iron is a micronutrient that is essential for cell growth and differentiation (20). In the human body, when iron intake and absorption no longer meets the need of normal iron turnover and losses, and iron stores are exhausted then insufficient amounts of iron will be delivered to transferrin, which is the circulating transport protein of iron. This results in decreased transferrin saturation and when the depletion is sufficient to affect Hgb synthesis, a state of iron deficiency anemia occurs (21).

Diseases that lead to low haemoglobin level in the body like helminthic infections causing chronic blood loss, Other pathological blood losses (e.g., haemorrhoids, peptic ulcer, and other less common gastrointestinal diseases and malignancies)(17) .In developing countries the major cause of anemia is dietary inadequacy in iron rich foods: the consequences of the plant-based cereal diets typically consumed in these areas(22) .Among school age children in Ethiopia Malnutrition and intestinal parasitic infection were the main associated factors of anemia (23) .

In a study done in Addis Ababa to asses Urban food insecurity it was found that Urban food insecurity was a growing concern due to the combination of high rates of urban poverty, high dependency of urban households on food supplied by the market, and fluctuating food prices. The members of the households in Addis Ababa do not have adequate food to eat and the food is largely cereal based lacking an adequate diversity of food to yield good nutrition(24) .

2.2.1 Epidemiology of Anemia in Children

According to the joint report of World Health Organization (WHO) and centre for Disease Control and prevention (CDC) in 2008, the global prevalence of anemia in school age children was 25.4% (25).

Approximately 300 million children globally had anemia in 2011 (8, 26) . The WHO African, South-East Asia and Eastern Mediterranean Regions have the highest burden of anemia, with approximately 62%, 54% and 48%, respectively, of children aged 6–59 months suffering from anemia. Iron deficiency is thought to be the most common cause of anemia(17) .

The prevalence of anemia in Ethiopia among primary school children varies in different settings in a study done in southwest Ethiopia it was found that the prevalence of anemia was 43.7% and anemia was most prevalent among those in the lowest socioeconomic status and least in the highest socio economic level. Independent risk factors of identified in this study were not-consuming protein source foods, not-consuming dairy products, not-consuming discretionary calories, low family income and intestinal parasitic infections (27) .

In a study done in Filtu Town, Somali region, Southeast Ethiopia to assess prevalence of anemia and associated factors among school-age children it was found that anemia was moderately significant public health problem among school-aged children with the overall prevalence of 23.66% (23).

Anemia is the most common nutritional deficiency in many developing countries with major health, social and economic consequences. Ethiopia, as one of the developing countries, shares the burden (14).

2.2.2 Consequences of childhood Anemia

Globally, 50% of anemia is attributable to iron deficiency and accounts for approximately 841,000 deaths annually worldwide. Africa and parts of Asia bear 71% of the global mortality burden anemia in children is known to retard psychomotor development and impair cognitive performance, increase morbidity from infectious disease, and decrease work capacity. Moreover, iron deficient individuals have increased absorption capacity of divalent heavy metals, including toxic metals such as lead and cadmium, apparently increasing risk of metal poisoning (12) .

Iron is the micronutrient that is most often linked to cognition and performance (28), but due to the low bioavailability and high reactivity of iron fortification compounds (13) this is the most difficult deficiency to address , Most observational studies in children have found associations between iron- deficiency anemia (IDA) and poor cognitive and motor development and behavioural problems(29, 30).

2.2.3 Interventions toward Anemia Prevention in School Age Children

School-age children are a neglected group in terms of micronutrient interventions, because they are not reached by the intervention strategies aimed at pre-school children or pregnant women. School-feeding programs often focus on relieving short-term hunger, and do not always concentrate on alleviating or preventing micronutrient deficiencies. School feeding, however, offers an excellent opportunity for targeted fortification in this age group(31).

Food diversification offers the best long-term approach that is likely to be sustainable(32) , But often it requires either major change in agricultural production, including home gardens, or in higher incomes for the poor, allied with nutrition education. Food diversification is unlikely to reduce substantially micronutrient deficiencies in the near future (33) .

The conditions needed for successful fortification vary depending on the foods widely eaten in a country and the nutrients being considered for fortification, in many non-industrialized countries it is difficult to find a suitable food vehicle to fortify with iron or vitamin A. To be suitable for fortification, a food must be consumed regularly by those at risk of the deficiency often children and women in poor families. Especially in rural areas, those suffering from micronutrient deficiencies may purchase few manufactured or processed foods (33).

2.3 Stunting

Stunting is the long term impact of malnutrition that occurs in children mainly in developing countries. Stunting is considered as a problem of high public health importance due to its unenthusiastic long term consequences both in the economy and health of individuals and societies (34). According to the World Health Organization (WHO) stunting is the "height for age" value less than two standard deviations of the WHO Child Growth Standards median , which indicates a chronic form of malnutrition (35).

2.3.1 Causes of stunting

Stunting is the chronic manifestation of exposure to under nutrition (34).A study done to assess risk factors for childhood stunting in developing countries using a comparative risk assessment analysis at global, regional, and country levels identified that In south Asia, sub-Saharan Africa, and East Asia and pacific, factors related to child nutrition and infection were the leading risk factors for stunting (36).

In a study done in Pakistan it was reported that the mean nutrient and energy adequacy level of stunted children was significantly lower than those with normal heights for their ages , and there was significant difference between stunted and normal children in terms of percentage energy intakes from carbohydrate fat and protein , and the bioavailability of Zinc and Iron consumed by the children from food were very low , this study concluded that energy intake was risk for stunting because the intake of other nutrients also decrease (37).

The result of a Nigerian study reported that stunting prevalence was high in school children due to the risks of high intestinal parasitic infections , low health seeking behaviour and increased risk of stunted mothers (38). Studies done in Ethiopia also suggest that the major causes of stunting in poor settings are prolonged suffering from food shortage and as an end result of skipping meals as children go to school or work during the day starved of food whilst growing up (39-41).

2.3.2 Epidemiology

In 2016, approximately 23% of school age children were stunted worldwide. Of these, More than 37% of the cases of stunting are in Eastern Africa (42).Stunting is not only the problem of developing countries alone rather it should be a concern of the developed world too (43).The level of stunting prevalence among children in Africa ranges from 7.9% to 45.8% (44, 45).

The total number of stunted children has increased in Africa from 50.4 to 58.5 million in the time 2000-2015.A study done in North West Ethiopia showed result of 37.9% stunting prevalence among school age children in the area. Another study in Haik town north Eastern Ethiopia and Humbo district in Southern Ethiopia revealed in a stunting prevalence rate of 11.3 % and 57% respectively among school age children in the respective regions (40, 46).In a study conducted in 459 school age children in Lideta sub-city, Addis Ababa, Ethiopia the prevalence of stunting was 19.6% (47).

2.3.3 Consequences of stunting

2.3.3.1 Short and long term consequences

Poor nutrition and recurrent infection, lead to the 'vicious cycle' of malnutrition, which worsens nutritional status and increase susceptibility to infection (48, 49). Infection impairs nutritional status through reduced appetite, impaired intestinal absorption, increased need, and by turning direction of nutrients away from growth towards immune response. In turn, malnutrition increases the risk of infection by its negative impact on the epithelial barrier function and altered immune response(48).

Coexisting developmental problems and short term consequences consist of impaired psychomotor and mental development (50, 51) while the economic consequences relate to expenditures for health and the opportunity costs incurred in caring for sick children. At the immediate level, stunting is associated with communicable diseases that raise household expenditures for the care of a sick child. Among women, stunting has important implications for pregnancy outcomes.

Maternal stunting (height <145 cm) is a consistent risk factor for perinatal mortality, one study from Nepal estimated this to be as huge as 4% of per capita annual household expenditures (52). Studies done in Guatemala and Brazil also showed that Stunting as result of chronic malnutrition and infection results in delay in the development of cognitive function and later in life into cogenitive impairment, the impact of short stature is also linked to lower economic productivity in adult life of the affected individual its families and the society at large (6, 53).There is still some opportunity for catch-up growth during childhood, either due to improved nutrition or through a delay in skeletal maturation and the pubertal growth spurt that results in a longer overall period for growth in height , this is an opportunity period to tackle stunting among children (54).

2.4 Effect of School feeding on Anemia and stunting

Experts at a School Feeding/Food for Education Stakeholders meeting in 2000 concluded that there is little evidence for nutritional benefits of school feeding and that school feeding only enhances learning when other improvements in school quality are made(15).

In situations of absolute poverty even severely malnourished children may not benefit from school feeding programmes because of substitution at home. The feeding protocol might be designed to provide a higher energy meal or in order to compensate for the food that will be withheld at home or give food as a mid-morning snack which has a lower possibility of being replaced than lunch or other interventions such as rations to take home or income supplementation might be used(55) .

It is suggested that Well-designed school feeding programmes, which include micronutrient fortification and deworming, can provide nutritional benefits and should complement nutrition programmes for younger children, which remain a clear priority for targeting malnutrition overall (2).

A result of a systematic review of literatures from different countries aimed to assess impact of school feeding programs on educational, nutritional, and agricultural development goals: suggest that school feeding programs provide only modest gains in measurements of growth in school children. Stunting (height-for-age) showed no significant gains for interventions when students received school meals, but did have significant positive effects from interventions involving snacks or beverages. The provision of snacks and beverages in schools, which are often nutritionally dense or fortified, also showed significant increases in weight and height (56).

A Kenyan study aimed at evaluating the effect of a school feeding programme in the slums of Nairobi (Kenya) on anaemia and nutritional status, by participating children in a school feeding program which included meat , cereals , fruits , vegetables and micronutrient enriched porridge for one year and comparing their status with control groups which did not involve in the feeding found that children who participated in the school feeding programme were less stunted (p=0.02) than children in the control group, and the levels of anaemia among the intervention arm was significantly lesser than in the control group (57)

Another two studies done in South Africa with the objective to see if school feeding could be effective on stunting showed that there was significant decrease in levels of stunting after school feeding program participation of a year, both studies disclosed the same effect in the second study stunting levels were reduced by almost five percentage points over a ten month period (58, 59).

In the contrary a study done to assess the influence of School Feeding Program on nutritional status of school children in Atwima-Nwabiagya District of Ashanti Region, Ghana with an assumption that the nutritional status of school feeding participants would be better than that of non-participants it was reported that there was no difference in case of nutritional status by school feeding ,the assessment of this study on stunting level among study participants in both groups showed that there was no significant difference in level of stunting between the study arms and the prevalence of stunting was greater than 50 percent in the study (60).

2.5 Nutrient contribution of school meals

School meals are provided to children School feeding helps to eliminate hunger for millions of children there by contributing to their macro and micronutrient needs, the school meals' contribution to daily RNI should be in line with standard recommendations of dietary guides (4).The finding of a study in England showed that school children School meals failed to make good the deficit in daily intakes of non-starch polysaccharides and zinc in primary-school students , and of calcium, iron, zinc, vitamin A and non-starch polysaccharides in secondary-school students , nor excess daily intakes of saturated fatty acids, non-milk extrinsic sugars and sodium at all ages (61) .

Assessment of the food provided by a Scottish school to children showed that School canteen lunches provided the most nutritious lunch and the overall menu up on which the meal was prepared over a week met standard criteria for balanced diet but, this study specifies that since the children choose the food served in the canteen the actual lunchtime nutrient intakes of children consuming canteen lunches were often far from achieving the nutritional standards (62).

Another study done in Sweden to evaluate the contribution of school meals to energy and nutrient intake of school children in relation to dietary guidelines showed that the meals were not sufficient to meet the needs of children in terms of the mean daily intakes for energy, carbohydrates, dietary fibber, polyunsaturated fatty acids (PUFA), and vitamins D and E. It also showed that there was difference between age groups in consuming the adequate amount of nutrients; older children were more exposed to having lower mineral intake from the school meal due to their increased demand(43).

A study in Nigeria to assess the nutrient contribution of school meals to daily RNI (recommended nutrient intake) also showed that the lunches consumed by school children in schools provided more than one third of the RNI for protein, zinc, vitamins A and C but failed to meet a third of the RNI for calcium, iron and energy(1). A study in Ghana also agrees with this finding (63).There are contradicting suggestion on the nutritional effect of school feeding This study aims at providing inputs in the area of effectiveness of school meal programs in reliving stunting and anemia thereby evaluating the nutrient contribution of the meals in Ethiopian context .

3 Objectives

3.1 General Objective

To evaluate effectiveness of school feeding programs in improving anemia and stunting among primary school children enrolled in school feeding programs in Addis Ababa Ethiopia 2018.

3.2 Specific Objectives

1. To evaluate the effectiveness of school meals in improving Anemia among primary school children enrolled in school feeding programs in Addis Ababa, Ethiopia.
2. To evaluate the effectiveness of school meals in improving the stunting among primary school children enrolled in school feeding programs in Addis Ababa, Ethiopia.
3. To determine the nutrient contribution of school meals to daily energy and nutrient intake of school meal beneficiaries in Addis Ababa, Ethiopia.

Research Questions

1. Is school feeding program effective in improving anemia among primary school children enrolled in school feeding programs in Addis Ababa, Ethiopia?
2. Is school feeding program effective in improving stunting among primary school children enrolled in school feeding programs in Addis Ababa, Ethiopia?
3. How much is the contribution of school meals to daily nutrient requirement beneficiary children in Addis Ababa, Ethiopia?

4 Method

4.1 Study Setting and Period

The study was conducted in Addis Ababa, the largest and the capital city of Ethiopia which lies 9°1′48″N latitude and 38°44′24″E longitude with total area of 540 Km^2 .The city has a complex mix of highland climate zones, with average temperature differences of up to 12.2°C, depending on elevation and prevailing wind patterns, its time zone is categorized in East Africa time (UTC+3).

The city is divided in to ten sub-cities which are the second administrative units next to city administration. In terms of area coverage Bole is the largest sub-city followed by Akaki- Kality and Yeka. Addis ketema is the smallest followed by Lideta and Arada Sub-cities. The sub-cities are also divided in to woredas, which are the smallest administrative units.

There are 221 government primary schools in Addis Ababa, all of these schools have ongoing school feeding program targeted to children from low socio economic status. The school feeding program is supported by the first lady office; Yeenatweg charitable association, Addis Ababa educational bureau and other non-governmental organizations. Over 20,000 school age children are being supported by the program. This study was conducted from April 2018 to May 2018 in government primary schools in Addis Ababa ,Ethiopia.

4.2 Study design

A school based quasi experimental study was conducted among primary school children in governmental primary schools in Addis Ababa Ethiopia.

4.3 Population

4.3.1 Source Population

The source populations for the study are all primary school children enrolled in government primary schools.

4.3.2 Study Population

The study populations for the study are primary school children enrolled in selected government primary schools.

4.3.3 Study Arms

This study is a post intervention evaluation aimed at studying the effect of school feeding on anemia and stunting among children who have been receiving school meals. The study had two arms, an intervention arm and a comparison arm. The first arm consisted of children who had been receiving school meals for the past one year at least, and the second arm consisted of children who had never received school meal but are in the waiting list of school meal beneficiary students to be enrolled in the future. These students did not differ in terms of socio economic status from the children in the intervention groups rather they were not enrolled in the feeding program due to limited chance as a result of restricted quotas in schools, they did not get priority as a result of reasons like delay in providing evidence for their socioeconomic status to the schools, not receiving the information early and as the students or their parents were afraid to ask for child enrolment in the feeding program. The list of participants in the two arms of the study was obtained from respective schools of the children.

4.4 Sample Size Determination

The sample size calculation was based on the primary outcome measure which is anemia status of the children. With the aim to have an 80% power to detect the differences in primary outcome measure between the intervention and comparison arms, an estimated change in anemia prevalence of 10 % between intervention and comparison groups was taken from results of similar study done in Kenya (66) , and a prevalence of 7.5% anemia in the general population (68) .This was taken because it gave the highest sample size than the other objective. The final sample size to detect this difference was calculated to be 420 subjects (210 in the intervention and 210 in the comparison groups) as calculated using Open-epi version 2.3 online calculator with an additional 10% non-response rate and 95% confidence interval.

4.5 Sampling Procedure

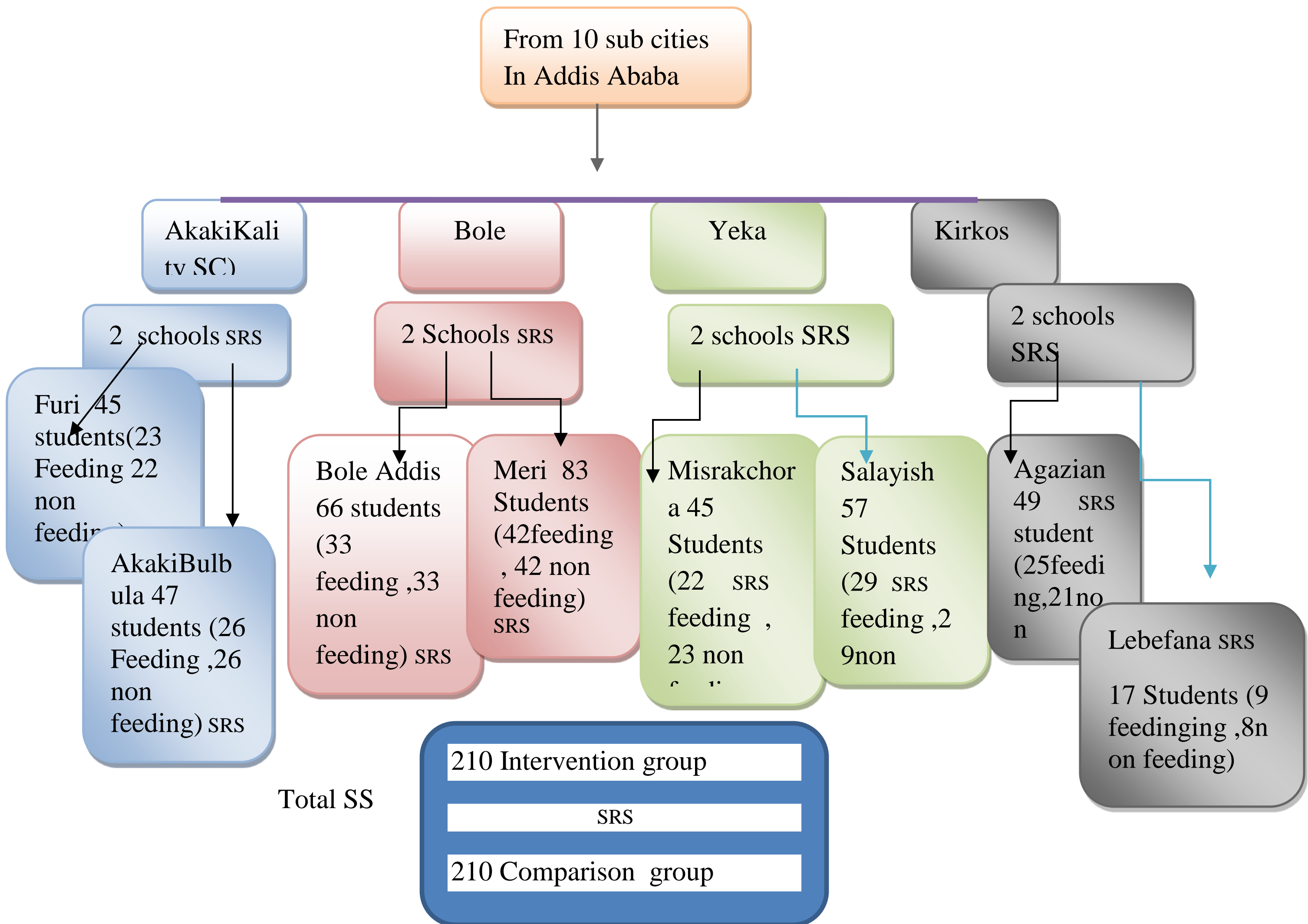
A three stage stratified sampling scheme was employed. The following are the steps taken to sample children:

Step 1: From the ten sub cities the four sub cities were selected randomly using Simple random sampling

Step 2: Two schools from each sub city were selected randomly

Step 3: From each school study subjects were selected randomly by obtaining list of students from school feeding coordinating teachers , samples were allocated based on number of children in the feeding program per school

Figure 1 Schematic presentation of sampling procedure



SRS – Simple random sampling

4.5.1 Inclusion Criteria

Children were considered eligible for enrolment in the study after fulfilling the following criteria:

- ✓ Is either in the current school feeding beneficiary list or is in the waiting beneficiary list to be included at the intervention or comparison groups respectively.
- ✓ If enrolled (will be enrolled) in the feeding program due to socio economic problem only (not due to illness).
- ✓ If at least one parent has signed an informed consent form.

4.6 Measurements

- **Socio-demographic Characteristics**: Data on socio-demographic characteristics including age, sex, religion, grade level, care giver type, care givers' occupation, care givers' education and family size were collected using an interviewer administered questionnaire.
- **Health Behavior;** Menstrual status, Smoking habit, fever in previous two weeks and diarrhea in previous two weeks and getting medical help after illness in the previous two weeks were assessed using an interviewer administered questionnaire.
- **Feeding Practice;** Number of meals eaten at home, involvement in School feeding program, and number of days in a week receiving school meal, number of school meals received per day and sharing of school meals with family were assessed by using Interviewer administered questionnaire.
- **Nutrient Contribution of school meals;** The school meals nutrient content and contribution were evaluated using food composition tables after collecting food intake of the school meal beneficiaries by food record method.
- **Anemia;** Status of all study participants was measured using blood haemoglobin levels as the diagnostic test.
- **Anthropometric measures** were done to calculate anthropometric indices for stunting measurement.
- **School conditions;** Data on provision of food supplement with the school meal and presence of regular deworming program were collected.

4.7 Data Collection Technique and Tools

Interviewer-administered questionnaire were used to collect data. The questionnaire consists of information on socio demographic characteristics which was adopted from Ethiopian demographic and health survey (EDHS), questions related to feeding for students were adopted from the FAO questionnaire on Supplementary feeding. Questions on cigarette smoking status and Questions on menstrual status adopted from WHO. Questionnaire for Interview with responsible school representative in school feeding program of schools adopted from different literatures. Weighed food record method was used to assess the portion size and Energy and nutrient contribution of the school meal for the beneficiaries'. Hemoglobinometer (HemoCue AB) was used for determining hemoglobin level and anthropometric measurements were done for all participants. The questionnaire was first develop in English and translated in to local language (Amharic). To check consistency, the questionnaire was translated back to English by another language expert.

4.7.1 Haemoglobin Level

Hemoglobin (Hgb) concentration was determined bya portable haemoglobin meter (HemoCue AB) from capillary blood sample. Blood was collected by finger pricking each child aseptically, using sterile single-use disposable lancet after rubbing the fingertip with sterile cotton (immersed in 70% alcohol). A drop of blood was allowed to enter the optical window of the micro cuvette through capillary action after discharging the first drop of blood. Then micro cuvette was placed into the cuvette holder for photometric determination of hemoglobin level. This was done by health professionals who were trained on the sample collection for this study. The necessary safety measures were taken during blood collection and the procedure was supervised by other health professional and the principal investigator.

4.7.2 Anthropometric Measurement

Height: Measurements of height was carried out with a portable stadiometer. A students was asked to stand straight on leveled surface with shoes off, heels together, eyes looking straight ahead (Frankfurt plane), and hands freely by the side, head, shoulder blades and buttocks against the board/wall. The moving head piece of the stadiometer was lowered to rest flat on the top of the head and reading was noted to the nearest 0.1cm.

All measurements were taken twice; when necessary, any discrepancies were resolved by a third measurement and measurement scales were handled carefully

Four data collectors and one supervisor were recruited with minimum qualification of diploma in health related fields. Training was given for supervisor and data collectors on sampling procedures, techniques of interview and data collection process by principal investigator for three days and any doubt in the questionnaire were clarified. Demonstration of instrument and measurement techniques was performed at school for each data collector.

4.7.3 Diet Data Collection

4.8.3.1 Determination of portion sizes and type of the meals

The recipes used to make each kind of food were weighted and recorded and the quantity of food consumed by the students (portion size) was determined for each beneficiary (203) in the study. This was done on five school days for breakfast and lunches using a food weigh scale. In order to obtain the exact amount of food the students consumed the following steps were followed:

1. An empty plate (cup in case of tea) was weighed for each school child
2. Food was added to the plate and the weight recorded
3. The students were given the food to eat (drink) and after eating, any leftover in the plate (cup) were weighed.
4. The weight of the leftover food and wastes were subtracted from the quantity served each child to obtain the actual quantity of food consumed (food intake).

4.7.4 Determination of Nutrient Intake

The nutrient values of the foods; Injera (Ethiopian flat pancake made from cereal Teff), DinchWot (stew made from potato), Shiro Wot (Stew made from chickpea powder), MisirWot (stew made from lentil), Firfir (A scrambled Injera with onion and tomato sauce), bread, rice and tea were computed from the Ethiopian food composition table (FCT) and the West African (FCT) then the nutrient intake of each child was computed using the nutrient value of foods (cooked) obtained from FCTs and the portion size of children by using Nutrisurvey software. This was done for all the nutrients involved in the study and the mean intake supplied by the school meal was calculated by dividing the values by 5 days.

Table 1 Recipe used to prepare school meals for students enrolled in school feeding programs in Addis Ababa

	List of food	**Ingredients**
1.	Rice	Shallot, oil, butter, salt, tomato, water, garlic, ginger, carrot, cabbage, spice and green pepper
2.	Firfir	Shallot, injera, oil, peper, salt, tomato
3.	Injera(Ethiopian flat pancake made of cereal teff)	Teff (white, red, mixed) maize, spice, rice (flour)
4.	Bread	Refined wheat flour, baking powder, salt
5.	MisirWot(stew made from lentil)	shallot, oil, tomato, field pea split, salt, garlic, ginger, spice, pepper
6.	DinchWot (stew made from potato)	shallot, tomato, potato, pepper, carrot, oil, garlic, ginger, spice, salt
7.	ShiroWot	Shallot, shiro (chickpea) powder, onion, garlic, oil, pepper, salt
8.	Tea with sugar	tea, sugar

4.8 Statistical analysis

4.8.1 Data analysis procedures and presentation

Epi data version 4.2.1 and Stata version 4.0 were used to enter, clean and analyze the collected data. Data was cleaned for outliers and corrected by transforming in to categorical variable if they were numeric or by omitting extreme values (highest and lowest value).

The WHO growth reference population was used as a standard reference for classifying students based on Height for Age using WHO Anthro plus software. Anthropometric measures were done and values were calculated based on WHO standards, WHO reference 2007 for children 61 months to 19 years. For each indicator all children with a plausible z-score were included in the evaluation. Percentages below median based on weight-dependent indicators are defined.

Hemoglobin level was adjusted for the relevant altitude (2,355 m above sea level) based on the formula below. Anemia was defined based on WHO age and sex cutoff for Anemia (Annex VI) (64).

$$Hg = -0.32\times(\text{altitude in meters} \times 0.0033) + 0.22\times(\text{altitude in meters} \times 0.0033)^2$$

To describe the study population by explanatory variables like socio-demographic, feeding and health habit descriptive statistical analysis was conducted using frequency, percentage, mean (SD), median and P-value .

The WHO 2007 growth reference was used as a standard reference for classifying study participants based on height for age using WHO Anthro plus software version 1.0.4. Stunting (low height-for-age) was defined based on the WHO cutoff values which are: Z values less than -2SD classified as stunted, whereas values above -2SD considered as normal HAZ score. Data were cleaned for outliers and corrected by transforming in to categorical variable if they were numeric or by omitting extreme values (highest and lowest value).

Binary logistic regression was done to investigate the association between explanatory variables and outcome variables and to assess the differences in baseline characteristics in the study arms, thus variables which were found to be different between the two arms at a statistically significant level were included in the multivariable logistic regression model the multivariable logistic regression was used to statistically adjust the estimated effects of each variable in the model. Adjusted odds ratio with 95% CI at p-value less than 0.05 were used to declare statistically significant association.

Adequacy of school meals in the contribution of nutrient intake namely energy, protein, Vitamin A, vitamin C, Iron and Zinc was analyzed for school meal beneficiaries based on the cutoff proposed by the WHO and FAO. We have calculated mean nutrient intake using STATA version 14.1 using the portion size of meal obtained from the food record method and by computing the nutrient content of the meal derived from FCTs on the nutrisurvey software database prepared for this study. The nutrient contribution was measured with comparison of WHO/FAO recommended nutrient intake. One way Analysis of variance (ANOVA) was done in data analysis and scheffe's procedure was used to see pair wise comparison between the means with significance level at $P < 0.05$ among the participants.

The recommended nutrient intake used for assessing iron intake was based on the RNI for plant source Iron which has 5% Bioavailability, and the comparison for Zinc content of the school meals was done with that of low Zinc bioavailability because the school meal consisted only diets that are unfermented, and ungerminated cereal grain, and the intake of animal protein from the school meals was nil.

4.9 Data Quality assurance

Data quality assurance was done before, during and after data collection process. Before data collection, data collectors were trained on measurement errors; a three days practical training was given for the data collectors on hemoglobin level and height measurements, data collection techniques and procedures based on the questionnaires and also about the purpose of the study. The training was given by the principal investigator.

Height measurements were done by the data collectors using calibrated equipment and standardized techniques. Height was measured with bare foot using a measuring board with a precision of 0.1 cm.

The questionnaire was pretested on 5% of the sample size (10 children for each group) which were not included in the study. During the data collection, the procedure was observed closely by the supervisor and the principal investigator. Data quality and completeness was assessed every day after data collection. Non over lapping numerical code were assigned for each question and the coded data were entered and cleaned into Epi data software, data coding, entry and cleaning was performed by the principal investigator.

4.10 Ethical Consideration

The study was initiated after obtaining of ethical clearance from Addis Ababa University, school of public health research ethics committee. Formal letter was submitted to sub cites and schools chosen to participate in the study in order to gain permission to carry out the study informed written consent was obtained from the school directors. The eligible study participants were enrolled in the study only after one of their parents or legal guardians gave a written informed consent and they were not forced to participate. For children aged greater than seven years incent was provided. Parents of the children were informed about the use of the study and about the blood tests to be performed.

The participants and their parents (guardians) were informed about the purpose of the study. The subjects who enrolled in the study had the benefits of being examined for anemia status, and were linked to the school health department if found anemic. Subjects who were not willing to participate in the study were informed that they will not face any harm due to not participation. The information regarding the study participants was kept confidential by using specific codes for each of them and will not be used apart from this study. The privacy of the children during the data collection period was kept through collection of data from each individual in a private room.

4.11 Dissemination of results

The study result will be submitted to Addis Ababa University College of Health Sciences as a partial fulfillment for Master's Degree in Public Health nutrition. It will also be disseminated to governmental and nongovernmental organization, institutions and individuals and policy makers and for individuals who directly or indirectly works on nutrition. All attempts will be made to present on different professional conferences and publish on local/international journals.

5 Results

5.1 Socio-demographic Characteristics of the Study Participants and their caregivers

A total of 420 children were selected, among whom complete response of the anthropometric measurements and blood samples were obtained from 409 students with the response rate of 96.6% in the intervention arm and 98.1% in the comparison arm. Analysis was done based on the 409 respondents.

Eight schools were included in the study from 4 sub cities, 203 (49.6%) of the respondents were involved in school feeding programs (Intervention groups) and 206 (50.4%) of the participants were not involved in school feeding programs (comparison groups).

Table 2 shows the overall baseline characteristics between the study arms. We found that most of the variables were comparable between study arms. However, there is a significant difference in terms of Family size, parent employment and paternal education.

The mean ± SD age was 11.8 ± .14 and 12.09 ± 0.13 in the intervention and comparison groups respectively.

The mean ± SD age among the two groups was 11.8 ± .14 and 12.09± 0.13 in the intervention and comparison groups respectively. Age range was comparable between the two arms 7-17years Vs 7-18years in the intervention and comparison groups respectively. Male to female ratio of participants was 45% Vs 53% and 54% Vs 46% in the intervention and comparison groups.

From the total 409 participants 179(43.8 %) of them were from first cycle (1st-4th grade) and 230(56.2%) from second cycle (5th -8th grade). Of the respondents 336 (82.2 %) were Orthodox Christian followed by Muslim 46 (11.3%) and Protestant 24 (5.9).

Table 2 Socio-demographic Characteristics of School feeding and Non School Feeding Primary School Students and their parents in Addis Ababa, Ethiopia 2018.

Variable	Involved in the school feeding program		
	Yes	**No**	***P value***
Age (n=409)			
<=9	28(13.8)	15(7.3)	*0.072*
10-14	157(77.3)	176(85.4)	
>=15	18(8.9)	15(7.3)	
Sex (n=409)			
Male	91(44.83)	110(53.40)	
Female	112(55.17)	96(46.6)	0.083
Grade level (n=409)			
First cycle	98 (48.3)	81(39.3)	
Second cycle	105(51.7)	125(60.7)	0.068
Religion (n=409)			
Orthodox	170(83.7)	166(80.6)	0.602
Muslim	23(11.3)	23(11.2)	
Protestant	9(4.4)	15(7.3)	
Catholic	1 (0.5)	2 (0.9)	
Caregiver Type(living with)(n-409)			
Both parents	88(43.4)	84(40.9)	0.803
Mother/Father only	88(43.4)	96(46.6)	
Relatives	27(13.3)	26(12.6)	
No of meals perday (n=409)			
<3	3(1.5)	65(31.55)	
>=3	200(98.5)	141(68.45)	0*
Family Size (n=409)			
1-4 members	118(58.1)	90(43.6)	
5-8 members	77(37.9)	110(53.4)	0.007*
9-12 members	8(3.9)	6(2.9)	
Father's occution (n=349)			
Employed	41(24.9)	77(41.9)	0.003*
Self Employed	101(61.2)	91(49.5)	

Unemployed	23(13.9)	16(8.7)	
Mother's occution (n=373)			
Employed	26(14.3)	45(23.6)	0.013*
Self Employed	102(12.6)	80(41.9)	
Unemployed	54(29.7)	66(34.6)	
Father's Education (n=262)			
No formal education	96(85.7)	111(74.0)	
Primary and above	16(14.3)	39(26.0)	0.02*
Mother's Education (n=368)			
No formal education	122 (65.2)	82 (45.3)	
Primary	54(28.9)	66(36.5)	
Secondary and above	11(5.9)	32(18.3)	0**
Menstural status (208)			
Atained	23(20.5)	24(25.0)	0.44
Not Atained	89(79.5)	72(75.0)	
Fever in the past two weeks			
Yes	45(22.2)	34(16.5)	0.15
No	158(77.83)	172(83.5)	
Diarhea in the past two weeks			
Yes	12(5.9)	17(8.3)	0.35
No	191(94.1)	189(91.75)	
Had received medical care in the past two weeks			
Yes	26 (12.81)	18(8.74)	
No	177 (87.19)	188(91.26)	0.184

* Statistically significant difference at $P < 0.05$

** Statistically significant difference at $P < 0.01$

5.2 Effect of School feeding on Nutritional status of the study participants

5.2.1 Effect of School Feeding on Anemia among Study Participants

There is a significant difference in anemia prevalence among the two study arms (Intervention 13.3% Vs comparison 19.4%).A total of 67 (16.38%) children were anemic. Table 3 shows that after adjusting for possible confounders such as family size, parent employment and paternal education which were obtained from the bivariate analysis to be different between the two study arms. The odds of anemia is two times higher among children who were not in the school feeding group program compared to the odds of children who were involved in school feeding group (AOR 2.38 95% CI 1.04-5.47 P=0.04).

Table 3: Effect of school feeding program in the anemia status of primary school children in Addis Ababa, Ethiopia.

Variables	Not Anemic (n=342)	Anemic (n=67)	COR(95% CI)	AOR(95%CI)
Involvement in school feeding				
Yes	176(86.7)	27(13.3)	1(base)	1(base)
No	166 (80.6)	40(19.4)	1.57 (0.92-2.67)	2.38(1.04-5.47)* P=0.04
Father's Occupation				
Employed	104(88.1)	14(11.8)	1(base)	1(base)
Self Employed	160(83.3)	32(16.6)	1.48(0.76-2.91)	2.06 (0.9-4.7)
Unemployed	28(71.8)	11(28.2)	2.91(1.19-7.12)	4.9(1.63-14.5)* p=0.004
Mother's occupation				
Employed	57(80.3)	14(19.7)	1(base)	1(base)
Self employed	151(82.9)	31(17.0)	0.84(0.41-1.68)	0.53(0.2-1.4)
Unemployed	102(85.0)	18 (15.0)	0.71(00.33-1.55)	0.57(0.22-1.47)
Father's education				
No formal education	171(82.6)	36(17.4)	1(base)	1(base)
Primary and above	46(83.6)	9(16.4)	0.92(0.14-2.06)	0.83(0.33-2.12)
Family size				
1-4 members	172(82.7)	36(53.7)	1(base)	1(base)
5-8 members	158(84.5)	29(15.5)	0.87(0.51-1.49)	0.89(0.42-1.9)
9-12 members	12(85.7)	2(14.3)	0.88(0.17-3.71)	1.1(0.2-5.9)
Number of meals received per day				
<= 3 meals per day	56(82.4)	12(17.7)	1(base)	1 (base)
>= 3 meals per day	286(83.9)	55(16.3)	0.89(0.45-1.78)	1.5(0.5-4.04)

5.2.2 Effect of School feeding on Stunting among Study Participants

Table 4 shows the effect of school feeding on stunting adjusted for possible confounders which were found to be different between the two. Among the intervention group 66 (32.5%) were stunted while in the comparison group 65(31.6%) were stunted, apparently there was no difference in the prevalence of stunting among the two groups There was no statistical difference in the prevalence of stunting among the study arms.

Table 4; Effect of school feeding program on stunting among government primary school students in Addis Ababa Ethiopia, 2018.

Variables	Stunted (132)	Not Stunted(277)	COR (95%CI)	AOR(95%CI)
Involvement in school feeding				
Yes	66(32.5)	137(67.49)	1 (base)	
No	65(31.5)	140(68.45)	0.97(0.6-1.48)	0.94(0.5-1.7) P=0.84
Father's Occupation				
Employed	40(33.9)	78(66.1)	1 (base)	1(base)
Self Employed	62(32.3)	13067.7)	0.95(0.5-1.54)	0.94(0.5-1.75)
Unemployed	12(30.7)	27(69.2)	0.86(0.3-1.8)	1.2(0.5-3.2)
Mother's occupation				
Employed	28(39.4)	43(60.6)	1(base)	1(base)
Self employed	55(30.2)	127(69.8)	0.66(07-1.17)	0.79(0.34-1.82)
Unemployed	41(34.1)	79(65.9)	0.79(0.43-1.46)	1.06(0.47-2.4)
Father's education				
No formal education	72(34.8)	135(65.2)	1(base)	1(base)
Primary and above	13(23.6)	42(76.4)	0.64(0.32-1.27)	0.56(0.26-1.21)
Family size				
1-4 members	67(32.2)	141(67.8)	1(base)	1(base)
5-8 members	61(32.6)	126(67.38)	0.99(0.65-1.51)	0.89(0.49-1.59)
9-12 members	3(21.4)	11(78.57)	0.56(0.15-2.07)	0.37(0.7-1.88)
Number of meals received per day				
<= 3 meals per day	26(38.24)	42(61.76)	1(base)	1 (base)
>= 3 meals per day	105(30.8)	236(69.21)	0.67(0.39-1.15)	0.7(0.32-1.5)

5.3 Evaluation of the school meals

5.3.1 Portion size and type of food consumed

All the schools provided breakfast and lunch for the beneficiary students. The menu was developed by ye'natwog charitable association and it was used by all schools providing school meal service. The meals were prepared by community cooks with source of water for cooking being tap water All children in the intervention arm reported that they received school meals every school day at breakfast in the morning and lunch at noon , and the children ate the meals at school and there was no sharing of school meals with families or friends. There was no additional nutrient supplement given to children with the school meals and the schools did not also encompass regular deworming for children.

The meal constituted of bread and tea for breakfast three times weekly and firfir and tea for breakfast for the remaining two school days. For lunch "misirwot" with "injera"," Dinichwot" with" injera", shirowot with " injera" and rice with bread were served for students . Table 5 showes the portion size and type of meal consumed by the beneficiaries, the portion size was based on the age of the students and it was also based on their preferences (Annex VIII).

5.3.2 Nutrient Intake from School Meals for Beneficiary Students

Macro and Micro Nutrient Intake of school feeding beneficiary students from School Meals were evaluated thus , we found that from The foods provided in the school meal program Injera contributed the highest amount of protein (11.6g) followed by "Misirwot" (9.4 g) and Rice (9.1g). The main source of Iron and Zinc was Injera 41.98g and 3.9g respectively. The highest Energy and Carbohydrate contribution was from rice giving an average of 634Kcal of energy and 127g of Carbohydrate (Annex IX).

5.3.3 Nutrient Intake of School Feeding Beneficiary Students From school meals

Table 5 shows that the intake of nutrients from school meals by beneficiary students, From the result the nutrient gained from school meal increased with age, students aged 7-9 years having the smallest amount of nutrient intakes than their respective pairs in other age groups .Those children aged between 15 and 18 years had the largest amount of nutrient intake ($p<0.05$) from the school meals than their respective in other age groups.

Iron intake from the school meal ranged from 22.5 to 51.3g .The mean Iron intake was 37.08g. The amount of Zinc consumed by the students ranged from 2.75 to 5.37 increasing in amount in all of the different age groups at all schools, this difference was statistically significant ($P<0.05$) .

As for the intake of macro nutrients Carbohydrate intake ranged from 115.3 to 220.8g , protein and fat intake ranged from 14.96 to 27g and from 7.5 to 14.01g respectively , the intake of these nutrients did not differ from school to school but there was statistically significant difference between the different age groups ($p<0.05$).

Table 5; Macro and Micro Nutrient intake of the Students from the school meals consumed by the School feeding beneficiary Primary School Students in Addis Ababa, Ethiopia 2018.

	Schools & Age group	Protein (g)	CHO (g)	Energy (Kcal)	Fiber (g)	Vit A (mg)	Fat (g)	Vit C (mg)	Iron (mg)	Zinc (mg)
1	**Bulbula**									
	7-9 Years(03)	15.1^{x}	116.8^{x}	584.2^{x}	4.4^{x}	177.3^{x}	7.6^{x}	1.7^{x}	23^{x}	2.8^{x}
	10-14 Years(20)	21.4^{y}	171.1^{y}	847.8^{y}	7^{y}	298.8^{y}	11.2^{y}	2.8^{y}	38.8^{y}	4.2^{y}
	15-18 Years (0)									
2	**Furi**									
	7-9 Years	15.8^{x}	124.3^{x}	621.4^{x}	4.6^{x}	166.9^{x}	7.9^{x}	1.7^{x}	24.3^{x}	2.9^{x}
	10-14 Years	20.5^{y}	163.9^{y}	813.1^{y}	6.6^{y}	269.5^{y}	10.6^{y}	2.6^{y}	36.3^{y}	4^{y}
	15-18 Years	23.8^{z}	191^{z}	951^{z}	7.9^{z}	343.3^{z}	12.5^{z}	3.3^{z}	44.2^{z}	4.7^{z}
3	**Bole Addis**									
	7-9 Years	17.2^{x}	135.9^{x}	676.4^{x}	5.2^{x}	201^{x}	8.7^{x}	2^{x}	28.1^{x}	3.3^{x}
	10-14 Years	21.1^{y}	168.4^{y}	835.9^{y}	6.8^{y}	282^{y}	10.8^{y}	2.7^{y}	37.8^{y}	4.1^{y}
	15-18 Years	23.2^{y}	187.2^{y}	933.1^{y}	7.7^{y}	339.2^{y}	11.9^{y}	3.4^{y}	43.6^{y}	4.6^{y}
4	**Meri**									
	7-9 Years(5)	16.1^{x}	123.6^{x}	617.6^{x}	4.8^{x}	189.5^{x}	8^{x}	1.9^{x}	24.5^{x}	2.9^{x}
	10-14 Years(28)	20.1^{y}	160.8^{y}	798.2^{y}	6.3^{y}	249.3^{y}	10.3^{y}	2.5^{y}	35.0^{y}	3.9^{y}
	15-18 Years (7)	23.4^{z}	187.6^{z}	931.7^{z}	7.7^{z}	346.8^{z}	12.1^{z}	3.3^{z}	44.3^{z}	4.7^{z}
5	**MisrakChora**									
	7-9 Years(10)	17.0^{x}	132.7^{x}	660.6^{x}	5.2^{x}	212.9^{x}	8.6^{x}	2.1^{x}	27.4^{x}	3.1^{x}
	10-14 Years(12)	21.3^{y}	170^{y}	842^{y}	6.9^{y}	285^{y}	11^{y}	2.7^{y}	38.1^{y}	4.1^{y}
	15-18 Years (0)									
6	**LebeFana**									
	7-9 Years(0)									
	10-14 Years(7)	22.7^{x}	181.6^{x}	898.6^{x}	7.4^{x}	321.2^{x}	11.6^{x}	3^{x}	42.2^{x}	4.4^{x}
	15-18 Years(2)	24.9^{x}	196.9^{x}	969.7^{x}	8.3^{x}	362.9^{x}	12.5^{x}	3.5^{x}	49.8^{y}	5.1^{y}
7	**Agazian**									
	7-9 Years(4)	17.8^{x}	140.2^{x}	689.1^{x}	5.4^{x}	206.2^{x}	8.9^{x}	2^{x}	28.5^{x}	3.3^{x}
	10-14 Years(21)	23.4^{y}	186.6^{y}	924.2^{y}	7.6^{y}	316.5^{y}	11.9^{y}	3.1^{y}	43^{y}	4.5^{y}
	15-18(0)									
8	**Salayish**									
	7-9 Years(0)									
	10-14 Years(25)	21^{x}	167.2^{x}	829.7^{x}	6.6^{x}	265.5^{x}	10.7^{x}	2.6^{x}	36.6^{x}	4^{x}
	15-28(3)	25.8^{y}	207.8^{y}	1027.9^{y}	8.5^{y}	356.4^{y}	13.2^{y}	3.5^{y}	49.5^{y}	5.2^{y}

Values with different superscripts in the same column for each school are significantly ($P < 0.05$) different

5.3.4 Adequacy of Energy and Nutrient Intake of Beneficiary Students From School Meals

The School meals should provide at least two third (an equivalent of 66.6%) of the daily recommended nutrient intake (RNI) for macro and micro nutrients, since the beneficiary children eat two (breakfast and lunch) of their meals at school. Table 10 shows contribution of school meals to daily energy and nutrient requirements of the beneficiaries compared to the WHO recommended nutrient intakes of Energy and Nutrients. We found that the Iron contribution of school meals for the students was in line with the recommendation for those children aged 7-9 years and for males aged 10-18 years, but it was less than the recommendation for female students aged 10-14.

Table 6; Contribution of school meals to the WHO recommended nutrient intakes of Energy and Nutrients for the School feeding beneficiary Primary School Students in Addis Ababa, Ethiopia 2018.

Age and sex	Variables	Vitamin A (mg)	Vitamin C (mg)	Iron (mg)	Zinc (mg)	Protein (g)	Energy (KJ)
7-9 Years	WHO RNI	500	35	18	11.3	28	1950
	Mean daily intake	198	1.96	26.3	3.11	16.65	648
	% contribution to RNI	39.6	5.6	146	27.5	59.46	33.23
10-14 (Female)	WHO RNI	600	40	65	15.5	35	2100
	Mean daily intake	281	2.77	38.01	4.16	21.29	842.3
	% contribution to RNI	46.8	6.9	58.4	26.8	60.82	40.1
10-14 Years (male)	WHO RNI	600	40	29	19.2	40	2200
	Mean daily intake	281	2.77	38.01	4.16	21.9	842.3
	% contribution to RNI	46.8	6.9	131	21.6	54.75	38.28
15-18 Years(Female)	WHO RNI	600	40	62	15.5	47	2350
	Mean daily intake	348.4	3.4	45.6	4.85	24.04	955.5
	% contribution to RNI	58	8.5	73.5	31.2	51.14	40.65
15-18 Years (Male)	WHO RNI	600	40	38	19.2	47	2900
	Mean daily intake	348.4	3.4	45.6	4.85	24.04	955.5
	% contribution to RNI	58	8.5	120	25.2	51.14	32.9

Source: Human Vitamin and Mineral Requirements Report of a joint FAO/WHO expert consultation Bangkok, FAO Rome, 2001.

6 Discussion

The study was a quasi experimental post intervention evaluation, aimed at evaluating the effectiveness of school meals in improving anemia and stunting among primary school students and on evaluating the nutrient contribution of school meal. Stunting and anemia were assessed through anthropometric measurements and by measuring blood hemoglobin respectively. The school meal nutrient value was assessed by computing the nutrient value of each food measured by weighted food record method and computed by using values from food composition tables. From the result we found that involvement in the school feeding program was by two times protective for anemia and but it was not effecting in improving levels of stunting. The school meal was adequate in the provision of Iron when compared with the WHO recommendation to meet the two third of daily RNI for the nutrients but the meal failed to met its contribution for Vitamin A,C ,zinc , energy and protein.

The school feeding program visibly had a positive effect on the children's anemia status. When the feeding group was compared to the control group the school feeding had a substantially favorable outcome in anemia. In the control group 19.4% of the children were anemic, making this a moderate public health problem according to the WHO global database on anemia(65). There was a significantly lower prevalence of anemia in the Feeding group; this is supported by the values from the evaluation of the school meals for Iron content. The result of the school meal Iron content showed that the amount of Iron in the food supplied was sufficient to meet two third of the requirement of nutritional Iron recommended by WHO (65).

Our result was in line with a study done in Kenya to asses Impact of school feeding in anemia status of children , the reduction of anemia in the study was much higher than the present study and this can be explained by the fact that the meal was accompanied by medical help and deworming in the former study in addition to this the children in the intervention group of our study consumed only foods of plant source where as the ones in the Kenyan study were consuming animal source food which are of high micronutrient source (66).

The result of a systematic review in Ethiopia showed that the prevalence of anemia among school children in Ethiopia was 23% (95% CI 18–28%)(67) this finding is higher in 7% from ours this could be due to involvement of participants from rural settings in the former study ,

which increases the risk of anemia due to exposure to infection and low health seeking behaviors in the rural settings(38) . Where as a study done in Addis Ababa showed that the prevalence of stunting among school age children is 5.8 % which is much lower than our finding, this discrepancy might be subject to that we took only those in the lowest socioeconomic status which might have increased our finding (68), When compared with this study's result our finding shows the difference in the prevalence of anemia among different socioeconomic status .

Stunting did not differ between the two groups involved in the study and the result was lower than the WHO 2007 population of the same age , The prevalence of stunting was similar with both groups but it is less than the prevalence of stunting reported on EDHS 2016(69) , this might be due to interventions and health promotions done in order to reduce child malnutrition beginning from Antenatal care to Breast feeding and Infant and young child feeding and caring practices that has been given due attention in the previous decade(70) .

The result of our finding is lower than that of the result from a study done in Humbo district southern Ethiopia (57%)(39) but our result is higher than another study done in Addis Ababa , the reason for this could be due to our sample population which is only from the lowest socioeconomic level which might increase the prevalence of under nutrition (37) .

The finding of our study in relation to stunting is similar to a study done to assess the influence of School Feeding Program on nutritional status of school children in Atwima-Nwabiagya District of Ashanti Region Ghana with an assumption that the nutritional status of school feeding participants would be better than that of non-participants it was reported that there was no difference in case of nutritional status by school feeding ,the assessment of this study on stunting level among study participants in both groups showed that there was no significant difference in level of stunting between the study arms and the prevalence of stunting was greater than 50 percent in the study (61).

Our result was different from the results of a study in South Africa which showed that there was significant decrease in levels of stunting after school feeding program participation of a year (58), Another study in Alexandra also showed the same effect in the study Stunting levels were reduced by almost five percentage points over a ten month period (59). The discrepancy with our

study might be due to presence of combined nutrition interventions, in these studies which might overestimate the particularly the effect of a nutritious breakfast on stunting levels of stunting.ht be due to interventions other than school feeding targeted at stunting .

The diet evaluation of the school meal showed that the amount of macronutrients supplied by the school meals was less than the amount anticipated to be achieved from the meals consumed twice a day which is two third of their daily recommended nutrient intake(macro and micro nutrients). The evaluation showed that the meal did not meet 66.6% of the recommended protein and Energy needed to be provided, and the main dietary source of protein meat, poultry, fish or any animal source products were not included in the diet. This could be the reason for the high prevalence of stunting level in the feeding group.

The school meals only meet the recommendation for Iron but for the other nutrients it failed to meet this requirement, the nutrient that was least contributed by the school meals was Vitamin C hence humans are among the few species that cannot synthesize vitamin C and must obtain it from food. Vitamin C functions in manufacture of collagen, it helps support and protect blood vessels, bones, joints, organs and muscles, it is a protective barrier against infection and disease, promotes healing of wounds, fractures and bruises. The sources of Vitamin C from the diet are Citrus fruits, strawberries, kiwifruit, blackcurrants, papaya, and green vegetables(71) Since the school meal did not contain any of the above foods except a few vegetables the meal failed to meet the requirement of the children .

Our finding was in agreement with the findings of a study in England which showed that School meals failed to improve the deficit in daily intakes of non-starch polysaccharides and zinc in primary-school students and of calcium, iron, zinc, vitamin A and non-starch polysaccharides in secondary-school students (61).The finding was not in agreement with the study done in Nigeria which showed that the meal was adequate to meet one third of the requirement (lunch was the only meal), this difference can be explained by the difference in type and nutrient value of the meals served , the meal served was of different food groups from ours (1) .

Our study has found the contribution of school meals to be low for major nutrients in order to overcome these micronutrient deficiencies in these age groups, literatures support micronutrient fortification (fortifying commonly eaten foods) and supplementation (providing nutrients through micronutrient pills or suspensions) as part of the School feeding programs in communities with high levels of micronutrient deficiencies (4).

The WFP has been strongly recommends that multiple nutrient fortification and meal supplementation, as well as deworming, be complementary services to school feeding and included in the "essential package."(3). Studies done in India and Thailand has proven the effectiveness and acceptability of multiple micro nutrient supplements added to cooked food by school meal beneficiary children as they had promising results both in macro and micro nutrient deficiencies improvements (72, 73).

While this study has accomplished its objectives, the findings of this study were interpreted in the context of the following limitations.

Post intervention evaluation was conducted due to lack of baseline data for comparison for both groups, this might limit the knowledge to the exact etiology of the nutritional problems Pre-existing differences between groups might be the cause of the different levels of the problem in the post evaluations, in our study to eliminate preexisting differences between the study arms we used matching at sample selection and the results were interpreted after adjusting for differences found between the groups at analysis level.

Second this study is subject to limitations of using food composition tables for computing the nutrient content of school meals, these tables tend to underestimate or overestimate nutrient values and there were missing foods and nutrients in the food composition table, to overcame these challenges we have used recipes and a borrowed food composition table for missing food values, and all values were taken for cooked food nutrient values taking in to consideration retention factors which will yield true nutrient values.

Third as a quasi-experimental study was used there is lack of random assignment into test groups which might lead to non-equivalent test groups which can limit the generalizeability of the results to a larger population. Beside of the lack of randomization and the reduced internal validity, conclusions about causality are less definitive in quasi-experimental designs. Pre-existing factors and other influences are not taken into account because variables are less comparison led in quasi-experimental research.

We have tried to match the participants in terms of explanatory variables other than involvement in school feeding program to overcome these challenges, and we have found from our result that the students in the two groups were generally similar. .

The Fourth limitation is the use of hemoglobin test to diagnose anemia which cannot control unmeasured covariates of anemia like infection and worm infestation , this might over estimate our finding .The fifth is we did not use design effect and this might reduce the power of our study and affect our result .

Despite the above limitations the study has the following strengths: Instead of self-reported height measurement, actual Height for Age was calculated after taking anthropometric measurement by well-trained health professionals. Hemoglobin determination was done by the HemoCue method which is comparable to that determined by the other methods and is recommended for use as on-the-spot device for determining hemoglobin level, measurement was done by experienced and trained health professionals which give the data good quality.

Using dietary record methods in this study has the potential for providing quantitatively accurate information on food consumed during the recording period, the problem of omission is lessened and the foods are described more fully. Further, the measurement of amounts of food consumed at each occasion provide more accurate portion sizes than if the respondents were recalling portion sizes of foods eaten previously. As of my knowledge the study is the first in its kind in the area of Evaluation of school meals and effects of school meals in the nutritional status of beneficiary students thus it can motivate different researchers to do more investigation on the area and can also serve as a baseline data for future investigators.

Conclusion

This study assessed the effect of school feeding program in improving the anemia and stunting among school meal beneficiaries in Addis Ababa by comparing to comparison group from similar socio-demographic condition and it also evaluated the contribution of the school meal to the daily nutrient requirements of the children by comparing with the WHO recommendation of daily RNI for the specific age and sex groups. The school feeding program was effective in reduction of anemia but it was not effective in improving stunting level. The nutrient contribution of the school meal was adequate for iron in all age groups except females in the early adolescent age otherwise, the meal did not meet the recommended nutrient value expected from it for the other nutrients (Vitamin A, Vitamin C , Energy , protein and Zinc).

Recommendations

To School meal providing organizations

Since the result showed that the nutrient value of the school meal for many nutrients is poor. The school meal type needs to be reviewed and corrected by the nutrition professionals to increase the quality of the school meal with regard to its micro and macronutrient content.

To organizations working on Reducing Micronutrient deficiencies

Besides the Energy, the micronutrient content of the school meals can also be improved using Multiple Micronutrient powders to fortify the meals with the necessary nutrients, this has shown great impact in areas where it was implemented and the WHO recommends use of Micronutrient powders to fortify school meals.

To researchers

A true experimental study with a baseline survey would show the real effect of school feeding on the nutritional status of the participants, thus we suggest researchers to begin with newly enrolled beneficiaries and study them longitudinally.

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8 Annexes

8.1 Annex Informed Consent and/or Ascent Form (English version)

Addis Ababa University, School of public health

Subject Information Sheet

Hello,

My name is ——————— I am here on behalf of Kidist Tadesse, student of Addis Ababa University School of public health. She is conducting a research on "Evaluation of the Effectiveness of school feeding programs in improving the Anemia status of primary School children in Addis Ababa, Ethiopia". She received permission from Addis Ababa university school of public health and the respected sub city education bureau to conduct this study.

You are selected to participate in this study because you are currently attending in one of the selected school for the study purpose. Your participation is purely based on your willingness & you have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment.

If you agree to participate in the study, your height will be measured using standard measuring instruments. Height will be measured with bare foot. Blood sample will also be collected for hematological examination. You will also be interviewed about your habitual dietary intake that could be associated with anemia. The measurement and interview will take about 30 minutes.

The study could provide evidence on the effectiveness of school feeding programs in improving the nutritional status of the beneficiaries. It will create opportunity for intersectoral collaboration among health, nutritional and educational sectors to improve Nutritional status in primary school children. It could also enable the government and health organizations to design appropriate intervention strategies and tackle malnutrition.

The information that you provide will be kept confidential by using code numbers and locking the data. Your name will not be written on the questionnaire. No one will have access to the non-coded data except the principal investigator and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

8.2 Annex Consent Form

Based on the understanding of the above information, are you willing to participate in this study?

A) Yes

B) No

If yes, I will continue and

If no I will skip to next participant after writing the reasons of refusal ___________________

Respondent (For both under and above 18 years old)

Signature _______________________Date___________________

Respondents Parent (for those under 18 years old)

Signature _______________________Date___________________

Name of the person obtaining parental permission ___________________________________

Interviewer

Name______________________________________ Signature_________________

Questionnaires ID number______________________

Date of interview____________________ Starting time_________ Completed________

Result of interview

A) Completed

B) Not completed

C) Partially completed

D) Refused

Checked by Supervisor: Name _________________________Signature_____________

For further explanation use the Principal Investigator's Address;

Name: KidistTadesse

Email: kikidisttadesse@gmail.com

Cell phone: +251 923810988

8.3 Annex Survey Questionnaire

I. Background information

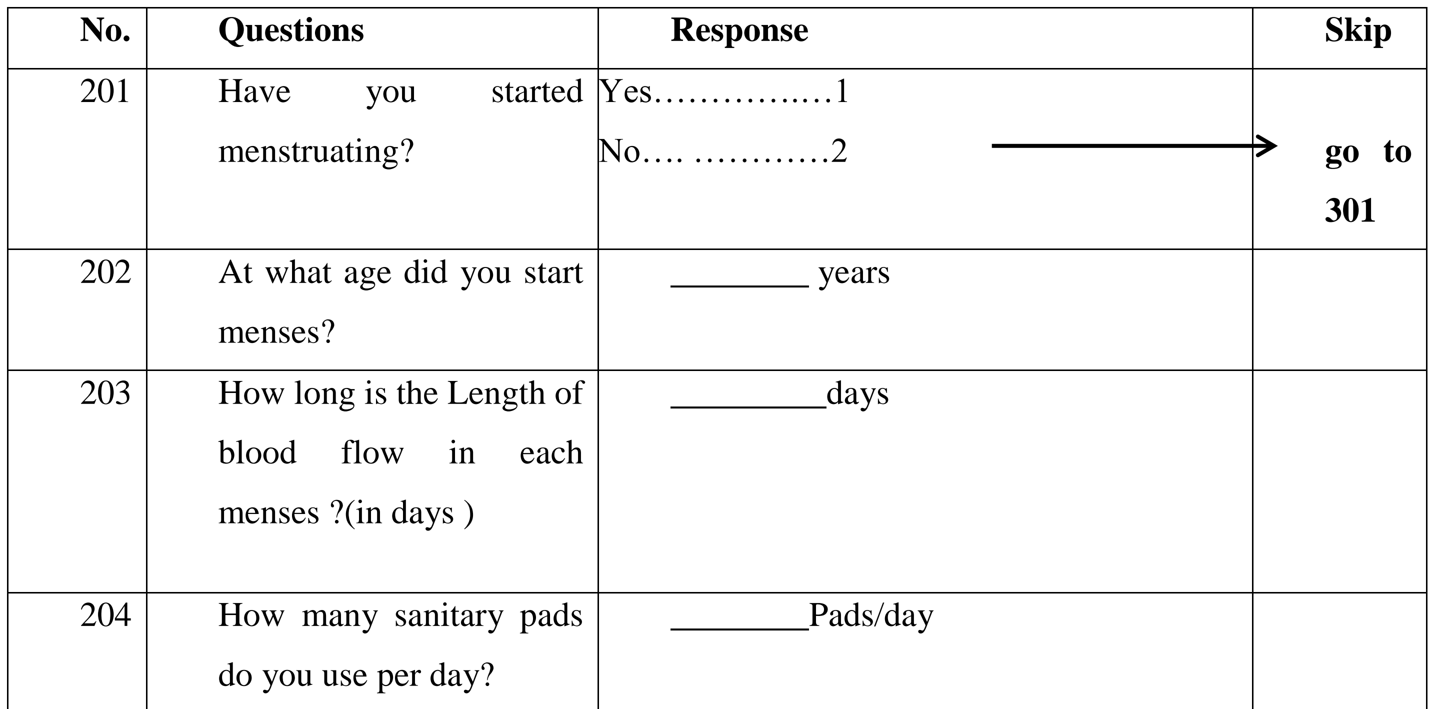
Instruction: Ask the following questions carefully and circle the response

No	Questions	Alternatives	Skip
101	How old are you? (in completed years)	________________	
102	Sex	Male ……………..……………..…..1 Female …………………..…….2	
103	What is your Grade level?		
104	What is your Caregiver Type?	Mother ……………………….....1 Father ……………….............…2 Mother and Father…..................3 Brother ……………….............4 Sister ……………….................5 Grandparents ……...............…..6 Uncle……………................……7 Aunt………………...................8 Other……………..........……9 (Specify)___________________	
106	What is your Religion?	Orthodox…………………..…1 Muslim …………………...2 Catholic…………………...3 Protestant …………………4 Other…………………..….5	
110	How much is your household family size including you?	____________________	
112	What is your father's occupation?	Government/private employee…….. 1 Merchant…………………………… 2 Daily laborer……………………….. 3 Unemployed……………………… 4 I don't know ………………………..5	

		Other (specify)______________	
114	What is your father's educational Status?	Illiterate (can't read and write)……… 1 Read and write only…………………. 2 Primary school (grade 1-8)………….. 3 Secondary school (grade 9-12)……… 4 Some college or technical school……. 5 College graduate or above…………… 6 I don't know…………………………. 7 Father is not alive……………………. 8	
113	What is your mother's occupation?	Government/private employee…….. 1 Merchant…………………………… 2 Daily laborer……………………….. 3 Housewife/unemployed……………. 4 I don't know ………………………..5 Other (specify)______________	
115	What is your mother's educational status?	Illiterate (can't read and write)….…… 1 Read and write only….,…………..… 2 Primary school (grade 1-8)…………..… 3 Secondary school (grade 9-12)……… 4 Some college or technical school……. 5 College graduate or above…...………. 6 I don't know…………..……………… 7 Mother is not alive…………………… 8	

II. Questions on menstrual status (only for females)

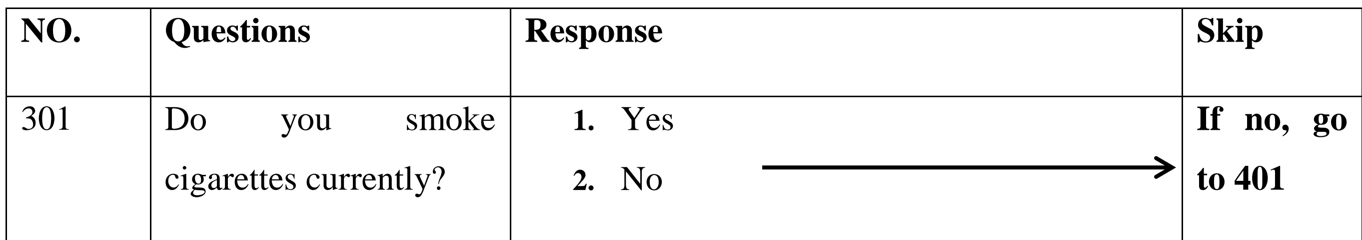
Instruction: Ask the following questions carefully and circle the response



No.	Questions	Response	Skip
201	Have you started menstruating?	Yes……………1 No…. …………2 →	go to 301
202	At what age did you start menses?	________ years	
203	How long is the Length of blood flow in each menses ?(in days)	_________days	
204	How many sanitary pads do you use per day?	________Pads/day	

Questions on cigarettesmoking status

Instruction: Ask the following questions carefully and circle the response



NO.	Questions	Response	Skip
301	Do you smoke cigarettes currently?	**1.** Yes **2.** No →	**If no, go to 401**

III. Questions related to feeding for interview with students

Instruction: Ask the following questions carefully and circle the response

No	Questions	Alternatives	Skip
401	Are you involved in the school feeding program currently?	Yes …..……..1 No…………..2 →	Skip to Q 03
402	If yes, When did you start using the program?	Before 2007 …..….1 In 2007 …………..2 In 2008 …………..3 In 2009……………4 last moths…………5 Other ……………..6	
405	How many meals a day do you get at Home?	___________________	
For School feeding beneficiary students only			
412	How many days a week do you get school meals?	Every school day …….1 2-3 days a week ……..2 Others ………..……3	
413	At which times do you get meals in school?	At Breakfast and lunch…..1 At Lunch only …………..2 Others ………………..3	
414	Do you eat the meal you are served at school?	____________________	
415	Do you take part of or all the food from school to share with the household?	Yes…………………1 No ………………....2	
416	If yes, How often?	Always………..………………......1 Most days, 3-4 days per week...2 Sometimes,1-2 days per week...3 Rarely………................. ….....4 Never……..................................5 Others …………………………6	

IV. Biochemical and Anthropometric Data Recording sheet

No.	Anthropometric & Biochemical indices	Results
501	Height (in centimeter)	☐☐☐ ☐ Cm
503	Hemoglobin (g/dl)	---------------- g/dl

V. Questionnaire for Interview with responsible school representative in school feeding program of schools.

No.	Questions	Alternatives	Skip
601	Type of School Meals Program in this school	Mid-day meal…………...1 Breakfast and mid-day meal….2 Others ……………3	
602	When did the school start giving food under the school meals program?	______/_______ Month Year	
603	Who supports the feeding program?(multiple answers are possible)	Ministry of education…..1 Ministry of health………2 Yenatwog charitable association …..3 Other Local NGOs ………………....4 International NGOs ....5 Teachers……………………..… ……6 Others ………………………..…....7	
605	Who prepares the food at school?	Chefs ………………….1 Community cooks……2 Teachers………. ……3 Volunteer Parents …..4 Paid parents ………..5 Others ……………....6	

606	What is the source of water for cooking?	Piped water into school building ..1 Piped water to school yard ..2 Public tap/ stand pipe…3 Rain water collection…4 Tanker truck….5 No water available in school ….6 Other ……7	
608	How many days a week does the school provide meals?	Every day including week ends ….1 All school days………………..….2 Three days a week…....………....3 Others ……………………..………...4	
609	How many meals per day are provided at the school?	One …………….1 Two ………...….2 Three……………3 Others…….…….4	
610	At what time do you provide breakfast? (if there is breakfast provision)	______________________	
611	At what time do you provide lunch?	________________________	
616	In addition to the school meals program, does the school provide any other supplement to students? (E.g. micronutrient supplements , fortified foods)	Yes……1 No……..2	
617	What are the additional food supplements given?		
618	Is there deforming program in the school?	Yes …….1 No……...2	
619	Is it regularly performed?	__________________	
620	In what time interval is it carried out?	_____________________	

8.4 Annex Diet Data collection tool

No	Food type (Monday)	Weight of Plate/ cup before food is added in Kg	Weight after food is added Amount in Kg	Additional food (Kg)	Wasted(Kg)	Net intake (Kg)
1						
2						
3						
4						
5						
No	Food type (Tuesday)	Weight of Plate/ cup before food is added in Kg	Weight after food is added Amount in Kg	Additional food (Kg)	Wasted(Kg)	Net intake (Kg)
1.						
2.						
3.						
4.						
5.						
No	Food type (Wednesday)	Weight of Plate/ cup before food is added in Kg	Weight after food is added Amount in Kg	Additional food (Kg)	Wasted(Kg)	Net intake (Kg)
1.						
2.						
3.						
4.						
5.						
No	Food type (Thursday)	Weight of Plate/ cup before food is added in Kg	Weight after food is added Amount in Kg	Additional food (Kg)	Wasted(Kg)	Net intake (Kg)
1.						
2.						
3.						
4.						
5.						
No	Food type (Friday)	Weight of Plate/ cup before food	Weight after food is added Amount in	Additional food (Kg)	Wasted(Kg)	Net intake (Kg)

		is added in Kg	Kg			
1.						
2.						
3.						
4.						
5.						

8.5 Annex Amharic questionnaire

ፈቃደ ኝነት መጠየቂያ ቅጽ

አዲስ አበባ ዩኒቨርሲቲ

የጤናሳይንስኮሌጅ

የሕብረተሰብጤናአጠባበቅት/ቤት

የእኔ ስም --------------- እኔ እዚህ የሆንኩት የአዲስ አበባ ዩኒቨርስቲ የህዝብ ጤና ትምህርት ቤት ተማሪን ለሆኑት ታደሰ ታደሰ ናቸው. "የአዲስ አበባ ትምህርት ቤቶች ህጻናት የደም ማነስ ሁኔታን ለማሻሻል የትም / ቤት አመጋገብ ፕሮግራሞች ውጤታማነት ግምገማ" እየተካሄደች ነው. ይህ ጥናት ለመምራት ከአዲስ አበባ ዩኒቨርሲቲ የህዝብ ጤና ትምህርት እና ከተከበረው የከተማው ትምህርት ቢሮ ፈቃድ አግኝቷል. በዚህ የጥናት ክፍል እንዲሳተፉ ተመርጠዋል ምክንያቱም በአሁኑ ወቅት በአንዱ ትምህርት ቤት ውስጥ ለጥናቱ አላማ ላይ ተገኝተዋል. ተሳትፎዎ በፈቃደኝነት ላይ የተመሰረተ እና በዚህ ጥናት ለመሳተፍ የመምረጥ መብት አለዎት. ለመሳተፍ ከመረጡ በማንኛውም ጊዜ, ለማቆም መብት አለዎት. ለመሳተፍ ፈቃደኛ ከሆኑ ወይም ለመቃወም ፈቃደኛ ከሆኑ ወይም በኋላ ለማቆም ከወሰኑ ማንኛውም ዓይነት በደል አይፈጸምብዎትም. በጥናቱ ውስጥ ለመሳተፍ ከተስማሙ, ቁመትዎ በመለኪያ መሳሪያዎች ይለካል. ቁመት በእግረኛ እግር ይለካዋል. ለሂማቶሎጂ ምርመራም የደም ናሙና ይዘጋጃል. ከደም ማነስ ጋር ሊዛመድ የሚችል ስለ መደበኛ የአመጋገብ ስርዓትዎም ቃለ መጠይቅ ይደረግልዎታል. መለኪያው እና ቃለመጠይቁን 30 ደቂቃ ያህል ይወስዳሉ. ጥናቱ የጥቅማው መርሃግብሮች ውጤታማነት ላይ ያተኩራል. በመጀመሪያ ደረጃ ትምህርት ቤቶች ህፃናት የአመጋገብ ሁኔታን ለማሻሻል በጤና, በአመጋገብ እና የትምህርት ዘርፎች መካከል በመነፃፀር መካከል ትብብር እንዲኖር ያስችለዋል. እንዲሁም መንግሥትና የጤና ድርጅቶች ተገቢውን ጣልቃ ገብነት ስልት እንዲቀርጹ እና የተመጣጠነ ምግብ እጥረትን እንዲቋቋሙ ያስችላቸዋል. የሚሰጧቸው መረጃዎች በምሥጢር ቁጥሮች እና በምስጢር ቁልፍን በሚስጥር ይጠበቃሉ. መጠይቁ በመጠይቁ ላይ አይጻፍም. ከዋና ዋናው መርማሪ በስተቀር ማንኛውም ሰው ያለመስማማት ያልተደረገውን ውሂብ ማግኘት የሚችል ሲሆን ጥናቱ ከጥናት ውጪ ለሌላ ዓላማ ጥቅም ላይ አይውልም. ዚህ ጥናት ስኬታማነትዎ እና ንቁ ተሳትፎዎ በጣም አስፈላጊ ነው.ስም____________________ ፊርማ____________________ ቀን____________________________

የት/ቤቱስም		
የተጠያቂውመለያቁጥር (ክፍልናቁጥር)		
የክፍለ ከተማው ኮድ		
መጠይቁየተሞላበትቀን	/ቀን/ /ወር/ /ዓ.ም/	
ጠያቂ	ስም	ፊርማ
በተቆጣጣሪውተረጋግጦአል	ስም	ፊርማ

የፈቃድ ፎርም

ከላይ የተጠቀሱትን መረጃዎች መሠረት በማድረግ በዚህ ጥናት ለመሳተፍ ፈቃደኛ ነዎት?

ሀ) አዎ

B) አይ

አዎን ከሆነ እቀጥላለሁ

ካልተከለከለ በስተቀር ወደ ሚቀጥለው ተሳታፊ እሄዳለሁ. -------------------

ምላሽ ሰጪ (ለሁለቱም ከ 18 ዓመት በታች እና ከዚያ በላይ)

ፊርማ ________________ የውጤት _____________

ምላሽ ሰጪዎች ወላጅ (ከ 18 ዓመት በታች ለሆኑ)

ፊርማ ________________ የውጤት _____________

የወላጅ ፈቃድ ለማግኘት የተሰጠው ሰው ስም ----------

ቃለ መጠይቅ አድራጊ

ስም _________________________ ፊርማ _________________

የጥያቄዎች መታወቂያ ቁጥር ___________

የቃለ መጠይቅ ቀን ________ የጊዜ ማጠናቀቂያ _______ ተጠናቋል

የቃለ መጠይቁ ውጤት

A) ተጠናቅቋል

B) አልተጠናቀቀም

ሐ) በከፊል ተጠናቅቋል

መ) ውድቅ ተደርጓል

በክትትል ተጠሪ የተረጋገጠ: ስም ____

ለተጨማሪ ማብራሪያ ዋናው መርማሪውን አድራሻ ይጠቀማል,

ስም: KidistTadesse

ኢሜል: kikidisttadesse@gmail.com

የተንቀሳቃሽ ስልክ: +251 923810988

የመጠይቁመለያቁጥር————

መጠይቅ

ክፍል፤. መሰረታዊ መረጃን የሚመለከቱ ጥያቄዎች

ቁ	ጥያቄዎች	አማራጮች	ዝለል
101	ዕድሜ	________________	
102	ፆታ	1. ወንድ 2. ሴት	
103	የትምህርትደረጃ	_________________	
104	ከማን ጋርነው የምትኖሪው/ረው?	ከ እናት እና ከ አባቴ ጋር…….......1 ከ እናቴ ጋር ብቻ…………….....2 ከ አባቴ ጋርብቻ……………..…3 ከእህቶቼ/ወንድሞቼጋር..............4 ከ አያቶቼ ጋር ………......…..5 ከአክስቴ/አጎቴልጆችጋር.........6 ከእናቴናከእንጀራአባቴወይምከአባቴእናከእንጀራእናቴ..... 7ሌሎች………………........…9 (ዝርዝርይግለጹ)	
105	ሃይማኖትህምንድንነው?	ኦርቶዶክስ…………………..…1 ሙስሊም …………………...2 ፕሮቴስታንት…………………3 ካቶሊክ…………………...4 ሌላ (ዝርዝርይግለጹ) …..….5	
109	የቤተሰብዎየቤተሰብመጠንከእር ስዎጋርምንያህልነው?	_______________________________________ _____	
111	የአባትዎ / አሳዳጊሙያዉምንድነው?	የመንግስት/የግልተቀጣሪ……..…… 1 ነጋዴ…………………………… 2 የቀንሰራተኛ…………………….. 3 ስራየሌለው…………………… 4 አላውቅም………………………..5 በ ህይወት የለም……………………6 ሌላጥቀስ______________________7	
112	የእናትዎ / አሳዳጊሙያዋምንድነው?	የመንግስት/የግልተቀጣሪ….. 1 ነጋዴ…………………… 2 የቀንሰራተኛ…………… 3 የቤትዕመቤት/ ስራየሌላት/ ..4 አላውቅም………………..5 በ ህይወት የለችም…………6 ሌላጥቀስ_______________7	
113	የአባትዎ/ አሳዳጊየትምህርትሁኔታምንድነ	ያልተማረ (ማንበብናመፃፍየማይችል)……… ………..1	

	ው?	ማንበብናመፃፍየሚችል…………………………… … 2 የመጀመሪያደረጃ (ከ1ኛ-8ኛክፍል) ……………….. 3 ሁለተኛደረጃ (ከ9ኛ-12ኛ) …………….………….. 4 የተወሰነየኮሌጅወይምቴክኒክናሙያትምህርትያለው. 5 ኮሌጅያጠናቀወይምከዛበላይ……… ………..6 አላውቅም…………………………. ………..7	
114	የእናትዎ / አሳዳጊየትምህርትደረጃምንድነው ?	ያልተማረች (ማንበብናመፃፍየማትችል) …..1 ማንበብናመፃፍየምትችል………….2 የመጀመሪያደረጃ (ከ1ኛ-8ኛክፍል) …3 ሁለተኛደረጃ (ከ9ኛ-12ኛክፍል) ……4 የተወሰነየኮሌጅወይምየቴክኒክናሙያትምህርትያላት…5 ኮሌጅያጠናቀቀችወይምከዛበላይ…6 አላውቅም……… ………..7	

I. የሚከተሉትን ጥያቄዎች በአግባቡ በመጠየቅ መልሳችሁን በ ባዶ ቦታው ላይ አስቀምጡ ፡ ፡

II. የወርአበባንአናየተመለከቱጥያቄዎች(ለሴት ተማሪዎች ብቻ)

የሚከተሉትን ጥያቄዎች በአግባቡ በመጠየቅ መልሳችሁን በ ባዶ ቦታው ላይ አስቀምጡ

ቁ	ጥያቄዎች	አማራጮች	ዝለል
201	የወርአበባማየትጀምረሻል	አዎ……………………1 አይ……………………2	Go to 301
202	በስንትአመትሽነውየወርአበባማየትየጀመርሽው	———አመት	
203	በወርምንያህልቀንይፈስሻል	———ቀናት	
204	በቀንምንያህልሞዴስትጠቀሚያለሽ	————	
205	የወሊድመከላከያትጠቀሚያለሽ	አዎ……………………1 አይ ……………………2	

III. ሲጋራማጨስንየተመለከቱጥያቄዎች

የሚከተሉትን ጥያቄዎች በአግባቡ በመጠየቅ መልሳችሁን በ ባዶ ቦታው ላይ አስቀምጡ

ቁ	ጥያቄዎች	አማራጮች	ዝለል
301	ሲጋራታጨሻለሽ/ ታጨሳለህ?	አዎ……………………1 አይ ……………………2	Go to 401
302	በቀን ውስጥ ስንት ሲጋራ ታጨሻለሽ/ህ?		

IV. የአመጋገብሁኔታንየተመለከቱጥያቄዎች

የሚከተሉትን ጥያቄዎች በአግባቡ በመጠየቅ መልሳችሁን በ ባዶ ቦታው ላይ አስቀምጡ

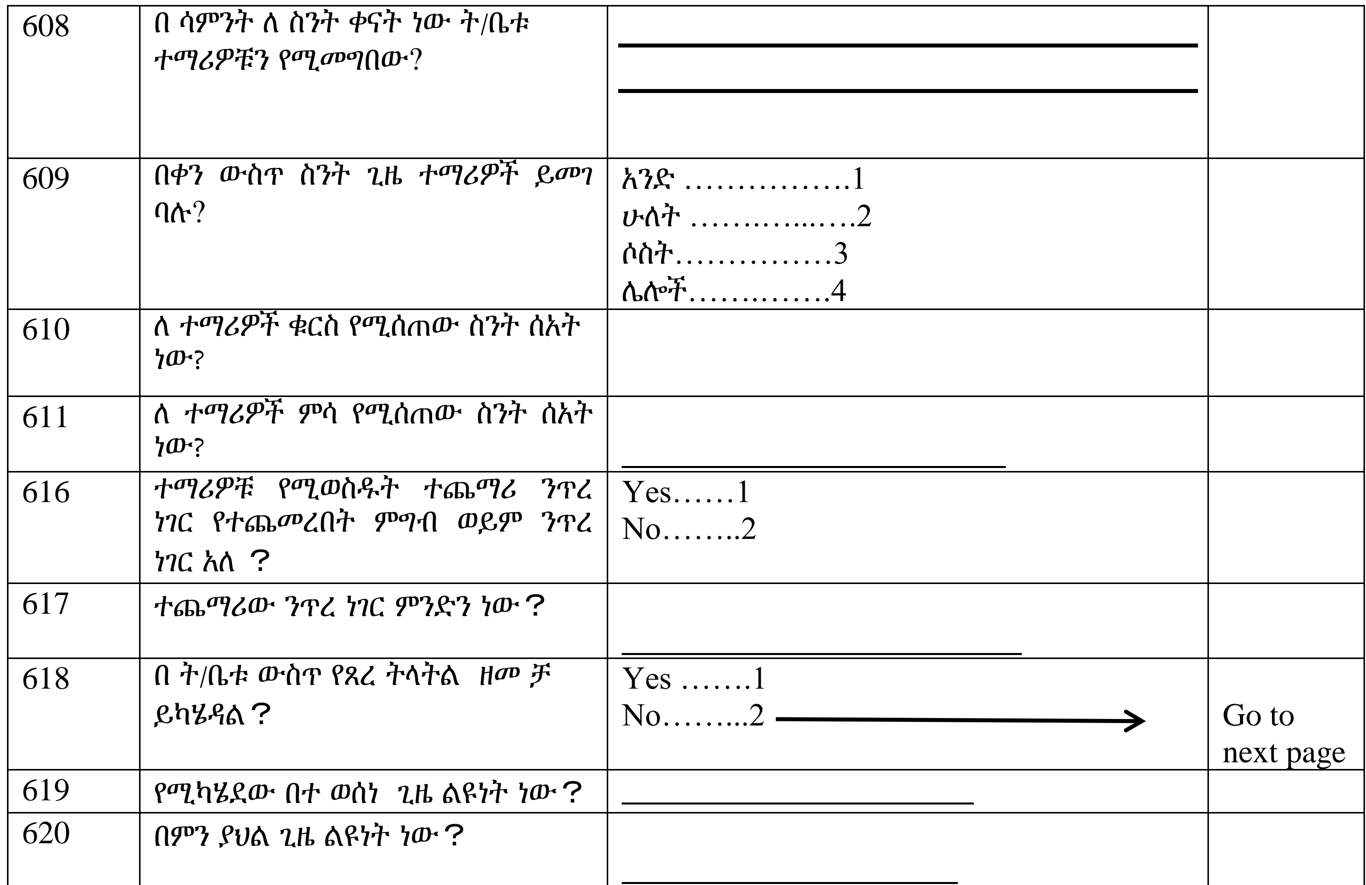
ቁ	**ጥያቄዎች**	**አማራጮች**	**ዝለል**
401	በ አሁኑ ጊዜ የ ት/ቤት ምገባ ፕሮግራሙ ተጠቃሚ ነህ/ሽ?	Yes ………..1 No…………..2 →	Go to no 403
402	ከመቼ ጀምሮ ነው ተጠቃሚ የ ሆንከው/ የሆንሽው?	ከ 2007 በፊት ………..1 ከ 2007 በኋላ…………..2 በ 2008 ……………3 በ 2009………………4 ባለፈው ወር……………5 ሌሎች…………………6 ዝርዝሩን ይግለጹ_____________7	
405	እቤት ውስጥ በ ቀን ስንት ጊዘ ትመገባለ ህ/ሽ?	__________________	
413	ባለፉት ሁለት ሳምንታት ውስጥ የተቅማጥ በሽታ ይዞህ/ሽ ነበር?	አዎ ……….1 አይ………...2 →	
414	ባለፉት ሁለት ሳምንታት ውስጥ ጉንፋን በሽታ ይዞህ/ሽ ነበር?	አዎ ……….1 አይ………...2 →	
415	ባለፉት ሁለት ሳምንታት ውስጥ ትኩሳት ነበረህ/ሽ?	አዎ ……….1 አይ………...2 →	
416	የ ህክምና እርዳታ አጊኝተሃል/ሻል?	አዎ ……….1 አይ………...2 →	
በት/ቤት ምገባ ፕሮግራሙ ለሚሳተፉ ተማሪዎች ብቻ			
413	በ ሳምንትለ ስንት ቀናት ት/ቤቱ ውስጥ ትመገባለህ/ሽ?	____________________	
414	በ የትኛው ሰአት ነው ት/ቤት ዉስጥ የምትመገበው?	በ ቁርስ …………….1 በ ምሳ…………..2 በ ቁርስ እና በምሳ………..3 ሌሎች ……..……………..4 ዘርዝሩ————————————	
415	የ ሚሰጠውን ምግብ የምትመገበው/ቢው ት/ቤት ውስጥ ነው?	አዎ ……….1 አይ………...2 →	Go to no 418
416	ከሚሰጠው ምግብ ላይ ቀንሰህ/ሽ ወደ ቤት ትወስዳለህ/ሽ?	አዎ ……….1 አይ………...2 →	Go to no 418
417	በ ሳምንት ስንት ቀን ወደ ቤት ትወስዳለህ/ሽ?	ሁልጊዜ ……..………………......1 አብዛኛውን ጊዜ (3-4) ቀናት በሳምንት…2 አንዳንድ ጊዜ (1-2) ቀናት በሳምንት......3 አልፎ አልፎ………................ …......4 ወስጄ አላቅም……...............................5 ሌሎች…………………………6 ዘርዝሩ————————————	

V. የሰውነት መጠን ልኬት

No.	አንትሮፖሜትሪክ እና ባዮኬሚካል ኢንዴክሶች	ውጤቶች
501	ቁመት (በሴንቲሜትር)	☐☐☐.☐
503	ሄሞግሎቢን መጠን (g/dl)	☐☐ ☐

VI. ስለ ት/ቤት ምገባው ከሚመከታቸው መምህራን ጋር የሚደረግ መጠይቅ

ቁ	ጥያቄዎች	አማራጮች	ዝለል
601	ልጆቹ የትኛውን ምግቦች ነው በ ት/ቤትዉስጥ የሚያገኙት?	ቁርስ ብቻ…………1 ምሳ ብቻ……………..2 ቁርስ እና ምሳ………….3 ሌሎች …………….4 ዘርዝሩ ________________	
602	ከመቼ ጀምሮ ነው ት/ቤቱ ለ ተማሪዎች ምገባ አገልግሎት መስጠት የጀመረው?	______/______ Month Year	
603	ት/ቤቱ ለሚሰጠው አገልግሎት ድጋፍ የሚያገኘው ከማን ነው?	________________	
604	የ ት/ቤቱን ሜኑ ያዘጋጀው ማን ነው?	________________	
605	የ ት/ቤቱን ምግብ የሚያዘጋጀው ማን ነው?	ሼፎች ………………..1 የ አካባቢው ሰዎች……….2 መምህራን………. …..3 ፈቃደኛ ወላጆች…………4 የተማሪዎች ወላጆች …..5 ሌሎች…………………6 ዘርዝሩ________________	
606	ምግብ ለማዘጋጀት የምትጠቀሙት ውሃ ምንጩ ምንድን ነው?	በ ት / ቤቱ ውስጥ የሚገኝ ቧንቧ ውሃ … .1 የትምህርት ያርድ በቧንቧ ውኃ ……… .2 የሕዝብ መታጠቢያ / የመቆለፊያ ቧንቧ ……………..3 ቱቦ በደንብ /borehole………………..4 የዝናብ ውኃ ማሰባሰብ ……………… 5 ታንኳ መኪና ……………………… 6 በትምህርት ቤት ውስጥ ምንም ውሃ አይገኝም …… ..7 ሌላ ……………………………………. 8	



608	በ ሳምንት ለ ስንት ቀናት ነው ት/ቤቱ ተማሪዎቹን የሚመግበው?	______________________ ______________________	
609	በቀን ውስጥ ስንት ጊዜ ተማሪዎች ይመገ ባሉ?	አንድ ……………1 ሁለት ………...….2 ሶስት……………3 ሌሎች…………..4	
610	ለ ተማሪዎች ቁርስ የሚሰጠው ስንት ሰአት ነው?		
611	ለ ተማሪዎች ምሳ የሚሰጠው ስንት ሰአት ነው?	______________________	
616	ተማሪዎቹ የሚወስዱት ተጨማሪ ንጥረ ነገር የተጨመረበት ምግብ ወይም ንጥረ ነገር አለ ?	Yes……1 No……..2	
617	ተጨማሪው ንጥረ ነገር ምንድን ነው?	______________________	
618	በ ት/ቤቱ ውስጥ የጸረ ትላትል ዘመ ቻ ይካሄዳል?	Yes …….1 No……...2 →	Go to next page
619	የሚካሄደው በተ ወሰነ ጊዜ ልዩነት ነው?	______________________	
620	በምን ያህል ጊዜ ልዩነት ነው?	______________________	

8.6 Annex Portion size

Portion size (in gram) and type of school meals consumed by the School feeding beneficiary Primary School Students in Addis Ababa, Ethiopia 2018.

	Variables	Age groups		
		7-9 (N= 28)	**10-14 (N= 157)**	**15-18 (N= 18)**
1	**Bulbula**	N=3	10-14 (N= 20)	15-18 (N= 0)
	Injera	$174^{x} \pm 2.08$	$306^{y} \pm 46.5$	
	Dinch Wot	$112^{x} \pm 1.52$	$186^{y} \pm 37.1$	
	Shiro Wot	$102^{x} \pm 1.5$	$176^{y} \pm 37.17$	
	Misir Wot	$106^{x} \pm 1.52$	$180^{y} \pm 37.1$	
	Firfir	$88^{x} \pm 7.6$	$114^{y} \pm 6.02$	
	Bread	$65^{x} \pm 0$	$65^{x} \pm 0$	
	Rice	$199^{x} \pm 2.08$	$332^{y} \pm 46.6$	
	Tea	$123^{x} \pm 14$	$188^{y} \pm 28.6$	
2	**Furi**	7-9 (N= 3)	10-14 (N= 17)	15-18 (N= 3)
	Injera	$192^{x} \pm 9.5$	$289^{y} \pm 47.4$	$359.3^{y} \pm 4.16$
	Dinch Wot	$104^{x} \pm 8.18$	$167^{y} \pm 29.21$	$216^{z} \pm 7.54$
	Shiro Wot	$94^{x} \pm 8.18$	$157^{y} \pm 29.21$	$173^{y} \pm 50.71$
	Misir Wot	$98^{x} \pm 8.18$	$161^{y} \pm 29.21$	$210^{z} \pm 7.5$
	Firfir	$101^{x} \pm 4.9$	$114^{y} \pm 6.27$	$124.6^{y} \pm 13.4$
	Bread	$66^{x} \pm 2.8$	$65^{x} \pm 1.61$	$65^{x} \pm 0$
	Rice	$217^{x} \pm 9.5$	$314^{y} \pm 47.45$	$384.33^{y} \pm 4.16$
	Tea	$128^{x} \pm 4.72$	$189^{y} \pm 24.29$	$247^{z} \pm 8.08$
3	**Bole Addis**	7-9 (N= 3)	10-14 (N= 27)	15-18 (N=3)
	Injera	$224^{x} \pm 45.74$	$307^{y} \pm 52.1$	$366^{y} \pm 10.59$
	Dinch Wot	$125^{x} \pm 14.29$	$176^{xy} \pm 38.53$	$217^{yz} \pm 7.76$
	Shiro Wot	$115^{x} \pm 14.29$	$150^{x} \pm 33.74$	$122^{x} \pm 14.42$
	Misir Wot	$120^{x} \pm 14.29$	$171^{xy} \pm 38.35$	$211^{yz} \pm 7.76$
	Firfir	$94^{x} \pm 1$	$113^{y} \pm 8.9$	$121^{y} \pm 9.23$
	Bread	$65^{x} \pm 0$	$65^{x} \pm 1.02$	$65^{x} \pm 0$
	Rice	$294^{x} \pm 45.74$	$322^{xy} \pm 45.45$	
	Tea	$132^{x} \pm 6.4$	$184^{y} \pm 24.35$	$253^{z} \pm 9.66$
4	**Meri**	7-9 (N=5)	10-14 (N=28)	15-18 (N=7)
	Injera	$186^{x} \pm 2.04$	$281^{y} \pm 24.77$	$362^{z} \pm 23.17$
	Dinch Wot	$119^{x} \pm 6.72$	$152^{x} \pm 27.82$	$210^{z} \pm 36.09$
	Shiro Wot	$109^{x} \pm 6.72$	$114^{xy} \pm 29.22$	$160^{yz} \pm 35.85$
	Misir Wot	$113^{x} \pm 6.72$	$148^{y} \pm 29.22$	$215^{z} \pm 7.97$
	Firfir	$91^{x} \pm 5.54$	$116^{y} \pm 3.66$	$126^{z} \pm 7.25$
	Bread	$68^{x} \pm 3.31$	$66^{x} \pm 4.03$	$65^{x} \pm 0$
	Rice	$211^{x} \pm 2.04$	$306^{y} \pm 24.77$	$354^{z} \pm 38.33$
	Tea	$123^{x} \pm 6.4$	$192^{y} \pm 27.6$	$253^{z} \pm 9$
5	**MisrakChora**	7-9 (N=10)	10-14 (N= 12)	15-18 (N= 0)
	Injera	$215^{x} \pm 27.6$	$305^{y} \pm 27.66$	
	Dinch Wot	$134^{x} \pm 20.99$	$177^{y} \pm 30.28$	
	Shiro Wot	$124^{x} \pm 20.99$	$167^{y} \pm 30.28$	
	Misir Wot	$128^{x} \pm 20.99$	$171^{y} \pm 30.28$	

	Firfir	$80^{x} \pm 8.6$	$108^{y} \pm 9.97$	
	Bread	$65.8^{x} \pm 1.61$	$65.9^{x} \pm 3.17$	
	Rice	$240^{x} \pm 27.6$	$330^{y} \pm 27.6$	
	Tea	$120^{x} \pm 10$	$185^{y} \pm 26.35$	
6	**Lebefana**	7-9 (N= 0)	10-14 (N= 7)	15-18 (N= 2)
	Injera		$348^{x} \pm 41.46$	$412^{y} \pm 4.24$
	Dinch Wot		$191^{x} \pm 42.2$	$224^{x} \pm 0$
	Shiro Wot		$173^{x} \pm 37.8$	$214^{x} \pm 0$
	Misir Wot		$197^{x} \pm 28.2$	$218^{x} \pm 0$
	Firfir		$102^{x} \pm 14.2$	$128^{y} \pm 7.07$
	Bread		$65^{x} \pm 0$	$65^{x} \pm 0$
	Rice		$350^{x} \pm 37.8$	$342^{x} \pm 15.31$
	Tea		$195^{x} \pm 28.2$	$249^{y} \pm 0.7$
7	**Agaiziyan**	7-9 (N=4)	10-14 (N=21)	15-18 (N= 0)
	Injera	$230^{x} \pm 49.82$	$355^{y} \pm 51.5$	
	Dinch Wot	$129^{x} \pm 17.44$	$193^{y} \pm 39.1$	
	Shiro Wot	$119^{x} \pm 17.44$	$179^{y} \pm 36.79$	
	Misir Wot	$123^{x} \pm 17.44$	$191^{y} \pm 35.3$	
	Firfir	$85^{x} \pm 3.3$	$106^{x} \pm 8.9$	
	Bread	$70^{x} \pm 0$	$70^{x} \pm 0$	
	Rice	$255^{x} \pm 49.8$	$356^{y} \pm 43$	
	Tea	$127^{x} \pm 5.6$	$181^{y} \pm 22.02$	
8	**Salayish**	7-9 (N=0)	10-14 (N= 25)	15-18 (N= 3)
	Injera		$296^{x} \pm 35.26$	$414^{y} \pm 13.42$
	Dinch Wot		$158^{x} \pm 29.12$	$221^{y} \pm 4.6$
	Shiro Wot		$153^{x} \pm 30.08$	$186^{x} \pm 41$
	Misir Wot		$160^{x} \pm 32.54$	$215^{y} \pm 4.61$
	Firfir		$111^{x} \pm 9.25$	$133^{x} \pm 2.51$
	Bread		$70^{x} \pm 0$	$70^{x} \pm 0$
	Rice		$316^{x} \pm 29.6$	$393^{y} \pm 89.81$
	Tea		$208^{x} \pm 17.07$	$255^{y} \pm 10.8$

- Values with different superscripts in the same row are significantly ($P < 0.05$) different.
- Values are means ± standard deviations

8.7 Annex Macro and Micro Nutrient

Macro and Micro Nutrient Intake of school feeding beneficiary students from School Meals in Addis Ababa, Ethiopia 2018

Food	Protein(g)	CHO(g)	Fat (g)	Energy (Kcal)	Fiber (g)	Vitamin A (mg)	Vitamin C (mg)	Iron (mg)	Zinc(mg)
Bulbula									
Injera	11.1	93.8	1.7	435	4	32.7	1.4	39.9	3.2
Dinch Wot	2.8	21.3	6.8	141.4	4.4	203.8	3.8	11.1	1.6
Shiro Wot	5.7	27.3	3.3	140	2.3	100	0	19.5	1.2
Misir Wot	9.5	25.4	4.4	172.5	1.7	977	3.5	15.0	1.3
Firfir	2.3	22.3	2.6	120.9	0.6	17.6	0.9	7.2	1.3
Bread	5.7	33.7	1.9	178	0.8	0	0	0.3	0.6
Rice	9.1	123	9.4	626	3.7	0	0	0.9	0.3
Tea	0.2	3.5	0.001	15	0	0	0	0.04	0.06
Furi									
Injera	10.8	92.6	1.7	429	4	32.3	1.4	39.5	3.1
Dinch Wot	2.6	20.0	6.4	132.5	4.1	190.9	3.6	10.4	1.5
Shiro Wot	5.1	15.7	3.0	127.1	2.1	91.1	0	17.7	1.1
Misir Wot	8.9	23.7	4.1	161	1.6	913.3	3.4	14.0	1.2
Firfir	2.4	22.8	2.7	124.2	0.7	18.3	1.0	7.4	1.4
Bread	5.7	34	1.9	180	0.8	0	0	0.3	0.6
Rice	9	121.8	9.3	618.9	3.7	0	0	0.9	0.3
Tea	0.2	3.7	0.001	15.8	0	0	0	0.047	0.06
Bole Addis									
Injera	11.6	98.8	1.8	458	4.2	34.4	1.5	42	3.4
Dinch Wot	2.8	21.2	6.8	140.4	4.4	202.3	3.4	11.1	1.5
Shiro Wot	4.8	14.9	2.9	120.7	2	86.5	0	16.9	1
Misir Wot	9.5	25.2	4.4	171.4	1.7	970.8	3.5	14.9	1.3
Firfir	2.3	22.3	2.6	121.2	0.6	17.8	0.9	7.2	1.3
Bread	5.7	33.8	1.9	178.6	0.8	0	0	0.3	0.6
Rice	9.2	124.6	9.5	633	3.8	0	0	1.0	0.3
Tea	0.2	3.6	0.001	15.54	0	0	0	0.046	0.06
Meri									
Injera	10.8	92.0	1.7	462.5	3.9	32	1.4	39.2	3.1
Dinch Wot	2.5	19.2	6.2	126.7	3.9	182	3.4	10	1.4
Shiro Wot	4.9	14.9	2.8	120.2	2	86.2	0	16.8	1.0
Misir Wot	8.7	23.3	4.1	157.6	1.5	892.8	3.3	13.7	1.2
Firfir	2.4	23	2.7	125	0.6	18.4	0.9	7.4	1.3
Bread	5.8	34.5	2	182	0.8	0	0	0.3	0.6
Rice	8.7	118	9	603	3.6	0	0	0.9	0.3
Tea	0.2	3.7	0.001	16.22	0	0	0	0.048	0.06

MisrakChora									
Injera	10.1	85.7	1.5	397.4	3.7	29.9	1.3	36.5	2.9
Dinch Wot	2.5	19	6.2	126	4	182	3.4	10	1.4
Shiro Wot	5.0	15.4	3.0	124.3	2	89	0	17.3	1.06
Misir Wot	8.5	22.6	4.0	153	1.5	870	3.2	13	1.1
Firfir	2	19	2.3	103	0.57	15.3	0.8	6.2	1.14
Bread	5.8	34.1	2.0	180.4	0.79	0	0	0.32	0.59
Rice	8.4	130	8.6	576	3.4	0	0	0.8	0.3
Tea	0.2	3.0	0.001	13	0	0	0	0.038	0.06
Lebefana									
Injera	13.8	117.3	2.2	544	5.07	40.9	1.8	49.9	3.9
Dinch Wot	3.2	24	7.7	159	5	228	4.3	12.5	1.7
Shiro Wot	6.2	18.9	3.6	153	2.5	109.7	0	21.3	1.3
Misir Wot	11.3	30.1	5.3	204	2.02	1156	4	17	1.6
Firfir	2.2	21.6	2.6	117	0.64	17.3	0.9	7.0	1.3
Bread	5.7	33.7	1.9	178	0.78	0	0	0.3	0.6
Rice	10.1	136.6	10.4	694.6	4.2	0	0	1	0.3
Tea	0.2	4	0.002	17	0	0	0	0.05	0.06
Agaiziyan									
Injera	12.7	108.7	503.8	2	4.7	37.9	1.6	46.3	3.6
Dinch Wot	2.9	22.2	7	146.6	4.6	211.4	4.03	11.5	1.6
Shiro Wot	5.7	17.6	3.4	142.6	2.4	102.2	0	19.8	1.2
Misir Wot	10.1	2.9	4.7	182.6	1.8	1034	3.8	15.9	1.4
Firfir	2.2	20.6	2.5	112	0.6	16.5	0.8	6.7	1.2
Bread	6.2	36.3	2.1	191	0.8	0	0	0.4	0.6
Rice	9.8	133.2	10	676	4	0	0	1.0	0.3
Tea	0.2	3.3	0.001	14.4	0	0	0	0.04	0.06
Salayish									
Injera	11.7	100	1.8	463	4.3	34.9	1.5	42.6	3.4
Dinch Wot	2.6	20	6.4	132.4	4.1	190.8	3.6	10.4	1.5
Shiro Wot	5.3	16.3	3.14	132.1	2.2	94.6	0	18.39	1.1
Misir Wot	9.3	24.7	4.3	167	1.7	949	3.5	14.6	1.3
Firfir	2.4	22.8	2.7	124.0	0.6	18.2	0.97	7.4	1.3
Bread	6.2	36.3	2.1	191.8	0.8	0	0	0.4	0.6
Rice	9.4	127.3	9.7	646.7	3.8	0	0	1.0	0.3
Tea	0.2	4.1	0.002	17.8	0	0	0	0.05	0.06

Kidist Tadesse Degefu

+251923810988

Addis Ababa, Ethiopia

E-mail: kikidisttadesse@gmail.com

8.8 CURRICULUM VITAE

PERSONAL DATA

NAME: Kidist Tadesse Degefu

DATE OF BIRTH: November 6, 1993 GC

PLACE OF BIRTH: Addis Ababa

SEX: Female

MARTIAL STATUS: Single

NATIONALITY: Ethiopian

EDUCATION

2016- Recent : Addis Ababa University, Addis Ababa, MPH in public health nutrition

2012 – 2015: Addis Ababa University, Addis Ababa, BSC Degree in Public Health ..

2010 – 2011: Dej. Wondirad Preparatory School, Addis Ababa, Certificate.

2008 – 2009: Elbetel Secondary School, Addis Ababa, Certificate.

2000 – 2007: Omega Elementary and Secondary School, Addis Ababa, Certificate.

PROFESSIONAL EXPERIENCE

Aug 2015,- Data collection and supervision for the thesis of a masters work in global health.

Sep, 2015 – Aug ,2016- Team leader, Outpatient department, Suke Health Center, Wolaita Sodo, Ethiopia.

- EPI (expanded program of immunization) focal person, Suke Health Center, Wolaita Sodo

- IMNCI (Integrated management of Newborn and Childhood Illness) Focal Person, Suke health center, Wolaita Sodo.

Major Duties and Responsibilities then;

- Management of patients at Adult and under five OPD,vaccination of children,antenatal care and family planning service provisions.

- Attending meetings held among the members of the Emergency Responsive team and giving response accordingly in cases of Epidemics.

- Doing Quarterly supervisions at health center and health post levels with supporting NGOs and woreda assigned supervisors.

July 2017 – Aug 2018 worked as an assistant for a consultant working for an international organization called Nutrition International (NI) forthe five year strategic plan of the organization.I worked on country level strategic plan formulation for the organization to scale up its domain for the next 5 years. I worked on development of country strategic plan by doing landscape analysis through desktop reviews, stakeholder's analysis by doing key informant interviews (KII) and organized validation workshops for stakeholders such as government officials, partners and donors along with two colleagues.

COMPUTER SKILLS:

Advanced skill in

- MS word, MS Excel, Power Point, MSAccess, SPSS, Stata, Epidata,Epiinfo and other nutrition software like Nutisurvey and WHO Anthro software.

TRAININGS AND CERTIFICATES

- Mid-level management immunization practice cold chain training, wolaita zone.
- Obstetric fistula awareness raising and patient identification training, HamlinFistula, Yirgalem Hospital by IFHP.
- Certificate from Addis Ababa University for a training took on “Scientific Writing and Communication” with the financial support of NORHED project.
- Certificate from the young African leaders initiative in recognition of successful completion of the course “Understanding renewable energy”.
- Receive a recommendation letter from a consultancy company for supervising data collection and coordination.
- Certificate from the young African leaders initiative in recognition of successful completion of the course “Effective communication for healthy outcomes”.
- Certificate from the young African leaders initiative in recognition of successful completion of the course “Basics of public private partnership”

LANGUAGES:

Oral Written

Amharic Excellent Excellent

English Excellent Excellent

OTHERS: -

I am self-starter, Eager to learn new things, Strive for continued excellence, very good at working with team spirit.I am a social entrepreneur and passionate advocate of youth and women volunteerism. In high school, I have been young active SBCC (Social &Behaviour Change communication) volunteer in gender clubband HIV/AIDS club. Then later in graduate school I gave tutorial to eight children in their high school studies besides I also supported them by providing the necessary materials for their education like books and other reference materials ,for the past two years I have been committing two hours a day every school day and the whole Saturdays every week tutoring the children , I enjoy helping students with their academic problems and giving them guide on how to succeed academically and how to implement their theoretical knowledge in practical challenges by giving them repeated and practical assignments. I want to work in development and academic areas which I believe are my passion and will always be satisfied and I am always eager to learn new experience .

REFERENCES:-

- Seifu Hagos Gebreyesus (MPH, M.Sc, Ph.D.) ,President, Public Health Officers Association

Ethiopia ,Head of Nutrition Unit School of Public Health Addis Ababa University)

Email: seif_h23@yahoo.com Tel: +251-911 613577

- Sintayehu Abebe (BSC, MSC in Global Health), Maternal Adolescent and Youth Health

Case Team Coordinator, MCH Directorate, FMOH. Email: sintayehumoh@gmail.com

Tel: +251966904343

- Yimer Seid, Statistician and Researcher at Addis Ababa University, E-mail:

yimer0505@yahoo.com

- Haimanot Feseha (BSc, MPH) (UNICEF Ethiopia/Seconded to FMOH, Immunization

Technical advisor), Tel. +251 912030986, Email: haimanot123@gmail.com