ADDIS ABABA UNIVERSITY, COLLOGE OF HEALTH SCIENCE, SCHOOL OF PUBLIC HEALTH,DEPARTMENT OF REPRODUCTIVE AND HEALTH SERVICE MANAGEMENT

LEVEL OF ANEMIA IN FOOD SECURED VERSUS NONESECURED HOUSEHOLDS AMONG WOMEN OF REPRODUCTIVE AGE GROUP IN FAFAN ZONE, JIGJIGA WOREDA, SOMALI REGIONAL STATE OF ETHIOPIA: A CROSS SECTIONAL STUDY.

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THESIS SUBMITTED TO SCHOOL OF GRADUATES OF ADDSI ABABA UNIVERSITY, , COLLEGE OF HEALTH SCIENCE, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER IN PUBLIC HEALTH IN NUTRTION.

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Approved by the examining board

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I. Abstract

Introduction: Although the impact of food insecurity and anemia have been shown to be more among reproductive aged women, there is little information in Fafan zone regarding the issue under caption.

Objectives: To compare the level of anemia in food secured versus non secured households among women of reproductive age group in Fafan zone.

Methods: A Comparative Community based cross sectional study design was conducted in rural Jigjiga woreda and Jigjiga council of Somali regional state of Ethiopia from February to April, 2017. A total of 468 participants were recruited from food secured (n=142) and insecured households (n=287). Household food insecurity status was measured using a modified household food insecurity access scale and hemoglobin was measured using HemoCue spectrophotometer. The collected data were edited manually and then entered and cleaned by using Epi data 3.1 and analyzed by Stata 14.0 software. Both Bivariate and Multivariate analysis were conducted with 95% confidence interval. Statistical significance was set at p-value less than 0.05.

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Result: The overall prevalence of anemia was 39.86% [95 CI (0.353- 0.446)] of which, 25.17%) had mild anemia, 13.29% moderate and 1.3 had severe anaemia. Anemia in food insecured households was 79.53%[95% CI (.415-0.509)] while among food secured was 20.47%. The major determinants for anemia were inadequate meat and fruit consumption in food secured as well as insecure households.

Conclusion and Recommendation

The level of anemia was significantly associated in households suffered moderate and severe food insecure households. It is recommended that policymakers need to reinforce the ongoing food supplementation that contains iron and consider subsidizing nutritious foods for poor households.

II. Acknowledgments

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Finally, I would like to express my appreciation to my families and friends whose enthusiastic encouragement has helped me to accomplish this research project.

III. Abbreviations and acronyms

CSA	Central Statically Agency
CI	Confidence Interval
DHS	Demographic Health Survey
DALYs	Disability Adjusted Live Years
EDHS	Ethiopian Demographic Health Survey
FI	Food Insecurity
g/dl	Gram Per Deciliter
Hg	Hemoglobin
HFI	Household Food Insecurity
HFIAS	Household Food Insecurity Access Scale
HIV/AIDS	Human Immune Deficient Virus /Acquired Immunodeficiency syndrome
IDA	Iron Deficiency Anemia
MDG	Millennium Development Goals
NGOs	Non-Governmental Organizations
SPSS	Statistical Package for Social Science
USAID	United State Agency for International Development
WHO	World Health Organization
YLDs	Years lived with Disability

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1. Introduction

1.1. Background.

Anemia is a decrement in the concentration of circulating red blood cells or haemoglobin (hgb) concentration in the blood and reduced level of oxygen transportation(1). The World Health Organization (WHO) defines anemia based on hemoglobin, by considering age, sex, pregnancy status, altitude, and smoking. For Children aged (0.50–4.99 yrs), (5.00–11.99 yrs) and (12.00–14.99 yrs) anemia is considered when hgb is below 11gm/dl, 11.5 gm/dl and 12.0 gm/dl, respectively while for Non-pregnant women whose age is ≥15.00 yrs it is <12.0gm/dl and for Pregnant women< 11.0 and for Men whose age is ≥15.00 yrs <13.0 gm/dl (2).

According to the 2015 World health organization (WHO) report, globally it is estimated that roughly 38% of pregnant women and 29% of non pregnant women and 29% of all women of reproductive age were anemic, corresponding to 496 million non-pregnant women and 32 million pregnant women (4). On the other hand, the 2011 EDHS report, 17% of Ethiopian women aged 15-49 are reported anemic suggesting that magnitude of anemia in Ethiopia is of moderate public health problem (3, 5).

Anemia increases risk for maternal and child mortality and it has negative health consequences on the cognitive and physical development of children and on work productivity of adults (3, 11). Although various factors are contributing to anemia, inadequate intake of iron due to food insecurity (FI) and infections are the commonest causes for anemia. To date, the number of food insecure people in the world is yet high and at least 805 million people or one in nine; globally do not have enough food to eat. Most of the food insecure people live in developing countries, with an estimated of 791 million people was chronically food insecure in 2012–14 and today nearly one seventh of the world populations go to sleep without eating food indicating their vulnerability to develop anemia is high (14, 15). Such information however, in the proposed study site is little or unavailable and thus needs to be studied.

1.2. Statement of the Problems

Anemia is a global public health problem affecting both developed and underdeveloped countries with major outcome for human health as well as social and economic development. It occurs at all stages of the life cycle, but more common in children, adolescents, pregnant women and other women of reproductive age (2).

The global burden of anaemia is 24.8% (95% CI 22.9, 26.7 %), in which 1.62 billion people (95% CI 1.50, 1.74 billion) are affected. In numbers, non-pregnant women are the most affected (468.4 million, 95% CI 446.2, 490.6) and the highest being in pregnant women (1).
In 2002, WHO identified the ten most common contributing factors to the global burden of disease and anemia due to iron was among the documented culprit that increased morbidity and mortality in pregnant women (1, 10, 11).

Although the global prevalence of anemia decreased between 1990 and 2010 (from 40.2% to 32.9%), the disease remains a major significant burden on society, with an increase in global Years lived with Disability, from 65.5-68.4 million over the 20-year period. this indicates the burden is greater than burden associated with depression (63.2 million YLDs), chronic respiratory diseases (49.3 million YLDs) and general injuries (47.2 million YLDs) (10, 12).

In Ethiopia, the magnitude of anemia at national level is 17% in women of reproductive age and the problem in Somali region exceeds the national figure by nearly three folds based on the 2012 Ethiopian Central Statistical Agency report (5). It is expected that anemia could even be more in areas where food insecurity prevails and requires to establish the relation between HFI and anemia as there are no studies done particularly the study area where high prevalence of anemia and drought occurs (5, 17).
Currently more than 10.2 million people require food assistance in 2016 than any other time in the past (17) indicating the severity of Household food insecurity (HFI) which is related with a variety of unwanted health outcomes. Studies have documented that HFI could lead to NCDs such as diabetes, hypertension and other chronic diseases, in addition to stress and maternal depression and poor social support, unhealthy food choice and various micronutrient deficiencies among which iron, folate, vitamin B12 and zinc are commonly reported (7, 18,20).

Although the impact of food insecurity and anemia have been shown to be more pronounced among women of reproductive age, a growing number of studies suggest that women are vulnerable to other negative consequences of HFI (21, 22 23) underscoring the need for further study that examines the effect of HFI on anemia and other health related issues. Hence there is a need to fill this gap and avail evidences on magnitude of anemia in food secured versus insecure households for plausible intervention.

1.3. Significance of the study

- The study uncovered the level of anemia and the effect of household food insecurity on anemia in the region which can be by Somali regional health bureau, district health office, policy makers and NGOs (non-governmental organizations) and food and agricultural bureau for future planning and interventions of appropriate strategies to promote and maintain food security and reduce anemia.
- The study could be also used as baseline information for future studies.

2. Literature Review

2.1 Anemia

Anemia is one of the most global nutritional deficiencies affecting women of reproductive age (15-45), particularly the pregnant and is the commonest cause of maternal death (24). It is a complex condition characterized by a low level of hemoglobin, the protein that binds to oxygen in the lungs and carries it to all parts of the body. A low level of hemoglobin leads to impaired delivery of oxygen to the body and causes symptoms such as weakness, fatigue, and difficulty concentrating as well as unwanted impacts on social and economic development (10). Nutritional anemia is a condition in which the hemoglobin content of the blood is lower than the normal as a result of deficiency of one or more essential nutrients, regardless of the cause of such deficiencies (24).

Aetiology of anemia

The most common causes of anemia are nutritional deficiencies, due to iron, folate and vitamin B12 deficiencies and vitamin A as well as bone marrow disease including haemolytic anemia and infections (24, 25, 36). Study done in southern Malawi reported that anemia is mostly caused by nutritional anemia like iron, folate, VB12 deficiencies and also parasitic infection like malaria HIV/AIDS and hemoglobinopathies (26, 11).

Globally, anaemia is mostly caused by iron deficiency (IDA) and anaemia are occasionally used exchangeable and the magnitude of anaemia has often been used as indicator for iron deficiency anaemia (IDA). Fifty percent of the case of anaemia is due to iron deficiency with proportion of anemia being different among population groups and areas (2,9). According to Haidar et al, the main risk factors for IDA in Ethiopia include a low intake of iron, consuming inhibitors of iron absorption that lead to poor absorption of iron (i.e. diets high in phytate or phenolic compounds, and periods when iron demand is high (i.e. growth and pregnancy) (2). WHO report indicated that anemia is mostly nutritional indicating that inadequate intake of iron is the commonest causes followed by folate and vitamin B_{12} deficiencies. Other significant causes of anemia differ from country to country and include malaria and congenital haemolytic anemia, sickle cell disease and HIV/AIDS particularly in Africa (24). In contrast to the previous studies, WHO 2014 report stated that anaemia is mostly caused by iron deficiency, infectious disease like malaria, helminthes, and chronic infections like tuberculosis, HIV/AIDS (11).

Other study done in Ethiopia mentioned that anemia mostly a result of heavy blood loss due to menstruation, parasitic infections such as hookworm infestations, ascaris, schistosomiasis, acute and chronic infections (malaria, cancer, tuberculosis and HIV) and congenital haemolytic diseases (3).

Global burden of anaemia

The WHO Global Database on Anaemia for 1993–2005, covering almost half of the world's population, estimated the magnitude of anaemia at 25% with more cases from developing (43%) than developed (9%) countries. The most commonly affected groups are women of reproductive age of which 42% of them are pregnant women and 30% in non-pregnant women(1, 27).

In year 2011, globally it is estimated that the magnitude of anemia among pregnant women, non pregnant women and all women of reproductive age group are 38%, 29% and 29% respectively which corresponds to 496 million of non-pregnant women and 32 million of pregnant women (4).

During 1993-2005, WHO report estimated globally, that anaemia affected 1.62 billion people (95% CI: 1.50–1.74 billion), which corresponds to 24.8% of the population (95% CI: 22.9–26.7%). The highest proportion of individuals affected by anemia in both pregnant and non pregnant women are found in Africa (47.5–67.6%), with the greatest numbers affected are found in South-East Asia where 315 million (95% CI: 291–340) individuals in these three population groups are affected (2).

In 2004, World Health Organization (WHO) estimated that anemia is affecting one in four people globally among pregnant and non pregnant women and most of them are found in Africa and Asia with the highest proportion of individuals affected are found in Africa (1).

Study done in Peru reported that anaemia is a severe public health problem in Peru and affects more than 42% of pregnant women and 40% of non-pregnant women of reproductive age (28).

According to the 2011 Ethiopian Central Statistical Agency report, nationally that 17% of women aged 15-49 were anemic indicating that anemia is a moderate public health problem in Ethiopia; of which 13% had mild anemia, 3% were moderately anemic and less than 1% was severely anemic with some regional variations. The prevalence of anemia in Somali

regional state is 44% and was ranked as one of the most affected in Ethiopia (2, 5, 28). Some other studies in Ethiopia reported that anemia is of moderate public health problem for both pregnant and non-pregnant women of reproductive age **(**3, 5).

Consequence of anemia

Anaemia has major outcome on human health as well as on social and economic development. in addition to the outcome of social and economic development, anemia also increases risk of maternal and child mortality and has negative outcome on the cognitive and physical development of children and on work productivity in adults (1, 3).

Some study reported that anaemia contributes directly or indirectly to death and disability and increases risk related with infant mortality, maternal mortality, prenatal mortality, low birth weight and reduces productivity and cognitive impairment, which in turn affects the quality of life and sufferers for the rest of their existence (29). WHO tabulation reported that anemia affects psychological and physical behaviour even a mild form of it affects a sense of well being, alleviates resistance to exhaustion, aggravate other disorders and affects work capacity (24). According stoltzfus Mullany and black (2004) find that iron deficiencies anemia lead to neurological impairment, which may not be fully reversible and anemia also decrease immune function as well as permanent loss of intelligence in latter life and shortened attention span of women with anemic at age of 15 years(35,36).

2.2 food insecurity

The World Food Conferences of the 1970's and 80's made one of the best declaration of "food for all within a decade that stated no child will go to bed hungry, no family will fear for its next day's bread, and no human being's future and capacities will be stunted by malnutrition" Since these declarations, however, the world has faced the most uneven distribution of food (both quality and quantity) ever seen in the history of the world (UN, 1996) (30). In 1970 the State of Food Insecurity in the World shows that, more than one billion people about which more than 100 million in the last year and around one sixth of all people– were food insecure (31).

The concept of Food security has evolved during 1990s far beyond a traditional focus on the supply of food at national level (USAID 1995). Countries that have participated in the World Food Summit conference of 1996 and reconfirmed in 2002 defined food security based on the followings concepts: i) food availability ii) food access iii) food utilization and (iv) risks that

can disrupt any one of the first three factors that Households become food insecure when they are unable to mitigate negative impacts on food availability, access, and/or utilization (32).

Although the progress in hunger reduction at the global level has reduced still food insecurity is remained a challenge since the number of food insecure people in the world is still High and globally at least 805 million people or one in nine, do not have enough food to Eat (14). Global trends in food insecure reduction mask differs within and among regions in which Africa is facing high amount of food insecure while Northern Africa has low prevalence of food insecure (5%) than Sub-Saharan Africa (20%) (14). The food security of over 13 million people was threatened by a combination of drought and conflict since the last nine years uprooted more than a million people from their homes. Other regions like Ethiopia, Eritrea, Somalia, Uganda and Kenya are facing recurrent drought that caused crop failures and heavy livestock losses (31).

In Ethiopia, Food insecurity was a chronic problem, during 2002/03 and continued as chronic and transitory during 1984/85, 1991/92, 1993/94, 1999/2000 especially in the lowland areas (16). According to the government and humanitarian agencies, more than 10.2 million of Ethiopian people are currently food insecure and they need food assistance in 2016 than any other previous crises with Somali region is facing hundred of thousand of drought-related livestock deaths (17).

Causes of food insecurity

Food insecurity is mostly caused by natural disasters like (Climatic change, Natural resource, mining and degradation, Asset depletion, Neglect of natural disaster) and economical risk like (income fluctuation and increase inflation, collapsed terms of trade, Savings depletion employment insecurity, price volatility, high transaction costs, Information asymmetry), as well as social and health risk like (epidemics, HIV/ADIS, unintended widespread malnutrition, Corruption, conflict and social discrimination) (32).

Study done in Canada reported that lack of Sufficient income is the most important determinant of food insecurity and Lack of access to a store to purchase food (i.e. no transportation) and lack of skills to cook and prepare food (33).

Whereas**,** study= done in Ethiopia reported that food insecurity is a result of combination of different factors like Drought, high population growth and environmental degradation on the

one hand, and lack of technological, policy and institutional factors that is important for labour to produce good productivity which is more common in rural areas (34).

Health consequences of food insecure

Food insecure households (FIH) or individuals are at high risk of poor health like poorer physical, social and mental health problem and nutrient inadequacy like (anemia) and obesity and metabolic syndrome and chronic diet related disease like hypertension and hyperlipidemia, Type 2 diabetes and impaired ability to learn and work and low birth weight and anemia (33).

Similar study reported that Inexperience of unwanted health outcome such as increased rates of iron-deficiency anemia, hyperlipidemia, developmental and mental health problems like depression, stress & anxiety as well as heart disease, food allergies lending to acute and chronic malnutrition (18, 20). Nevertheless such information in the proposed study site is little and thus the present study addressed the gap.

3. Objectives

3.1. General objectives

- To compare the level of anemia in food secured versus non secured households among women of reproductive age group in Fafan zone

3.2. Specific objectives

- To assess level of anemia in food secured versus non secured households among women of reproductive age group Jigjiga rural area.

- To compare to what the extent food insecurity contributes to anemia among women of reproductive age group.

4. Conceptual frame work.

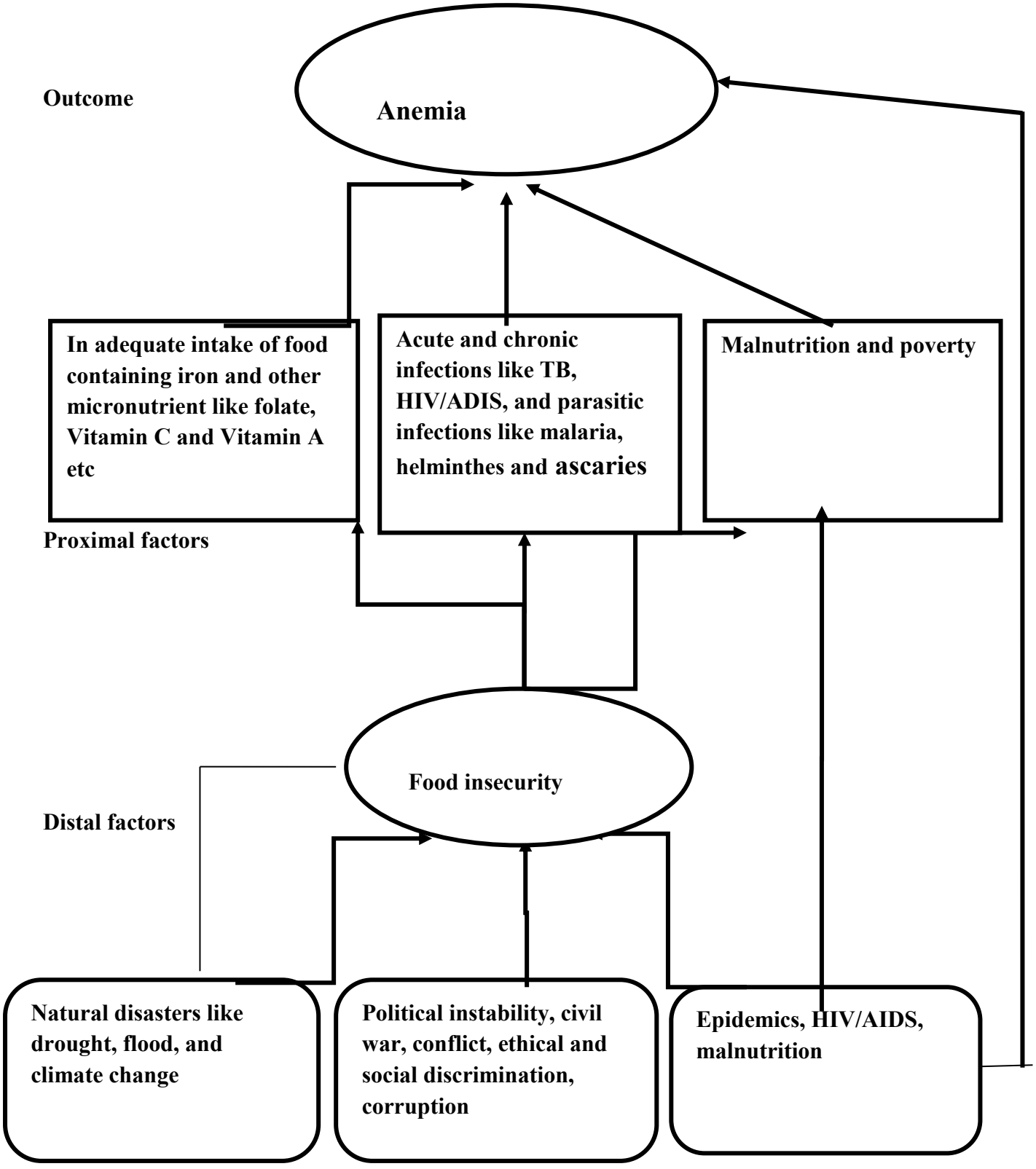

Fig: 1 conceptual frame work which shows the association between food insecurity and anemia.

5. Methods

5.1. Study area

The study was conducted in Jigjiga woreda, Somali regional state of Ethiopia which is 628 kilometres to the east of Addis Ababa. Based on the 2007 census, the zone has a total population of 967,652 of whom 526,398 were men and 441,254 women. While 203,588 (21.04%) are urban inhabitant and 112,153(11.59%) are pastoralist. The largest ethnic group reported in Jigjiga was Somali (95.6%) and 4.4% were other ethnic groups consisting of Amhara, Oromo, Tigre and Gurage (5). There are 30 kebeles in the woreda consisting of 20 urban kebeles found in the city and 10 rural kebeles. It has also one regional hospital and 10 health centers and 30 health Posts.

The zone was selected because it comprises both food secured and insecured households in addition to the unavailability of anemia information and HHs food security status.

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5.2. Study period

The study was conducted from February 2017-aprill 2017.

5.3. Study design

Comparative Community based cross sectional study design was used.

5.4. Population

5.4.1 Source population

The source population was all women of reproductive age group (15-45) living in food secured and insecure households of Jigjiga woreda and Jigjiga council.

5.4.2 Study population

All women residing in the selected kebeles who were selected by systematic random sampling.

5.4.3. Sample population

All selected women in the household from the selected kebeles of the study area.

5.4.4. Inclusion criteria

All reproductive age women (15-49 years) found in the Households.

5.4.5 Exclusion criteria

Women with chronic illness and who refuse to participate.

Pregnant and lactating women.

5.5. Dependent variables

The main dependent variable was women's anemia status as determined by Hemoglobin.

5.6. Independent variables

The independent variable of interest was the degree of HFI, based on Household Food Insecurity Access Scale (HFIAS) and other socio-demographic characteristics.

5.7. Sampling methods and sampling procedures

5.7.1. Sample size determination

The sample size required for the study was calculated using a double population proportions formula.

$$n_1 = \frac{\left[Z_{\frac{\alpha}{2}} \sqrt{\left(1 - \frac{1}{r}\right) P(1-P)} - Z_{\beta} \sqrt{P_1(1-P_1) - \frac{P_2(1-P_2)}{r}} \right]^2}{(P_1 - P_2)^2}$$

Where:

n_1: was sample size of women's with food insecured

n_2: was sample size of women's with food secured

r: n_1 / n_2:1 that was taken one to one ratio

$Z\alpha_{/2}$=was 1.96 for the standard scale of 95% level of confidence, Z_B =was 0.84 by considering 80% of Power to detect at least the difference between two groups (P1-P2) 18%.

P_1: proportion of anemic women who were food insecured was 42% ((Nils C Fischer et.al 2014,) (7).

P_2: proportion of anemic women who were food secured was 24 % (Nils C Fischer et.al 2014,) (7).

P (pooled population proportion): $P_1+rP_2/1+r = 0.42+ (1)0.42/1+1 =0.66/2=0.33$

The sample size calculated was $n_1=n_2=105$ giving a total of 210 and adding 10% of non response rate gave us **231** and added a design effect of 2 yields a total sample size of **462(Table 1).**

Table 1: Tabular presentation of total sample size needed to investigate each stratum variables.

variables to be studied	Assumption				Total sample size with 10% non response rate and design effect of (2)	
	Confidence level	Power	Ratio	Proportion of exposed	Exposed	Total sample size
Proportion of anemic women with food insecurity	95%	80%	1	42%	105	462
Proportion of anemic women with food secured	95%	80%	1	24%	105	

5.7.2. Sampling procedures

A two stage sampling was employed to sample the study participant. In the first stage, fafan zone was purposively selected. From this zone, Jigjiga woreda and Jigjiga council were included by considering their food security status. From the available rural and urban kebeles found in the woreda were then stratified into two areas namely rural and urban areas assuming that there were a difference in food security status between the two groups. And two kebeles from council of Jigjiga town and two kebeles from rural area of Jigjiga woreda were selected by simple random sampling method (first stage). Then household food insecurity access scale was measured in both group to differentiate household's food security status, by assuming that the numbers of the households from both areas (food secured and insecure) were taken proportionally to their population size (second stage sampling). And Households were selected by systematic random sampling, when more than one woman whose age was in between (15-49) was found in the same house, only one women was selected using lottery method. When eligible woman was absent revisit was done, and if again absent on 2 occasions they were considered as non respondents **(Figure2).**

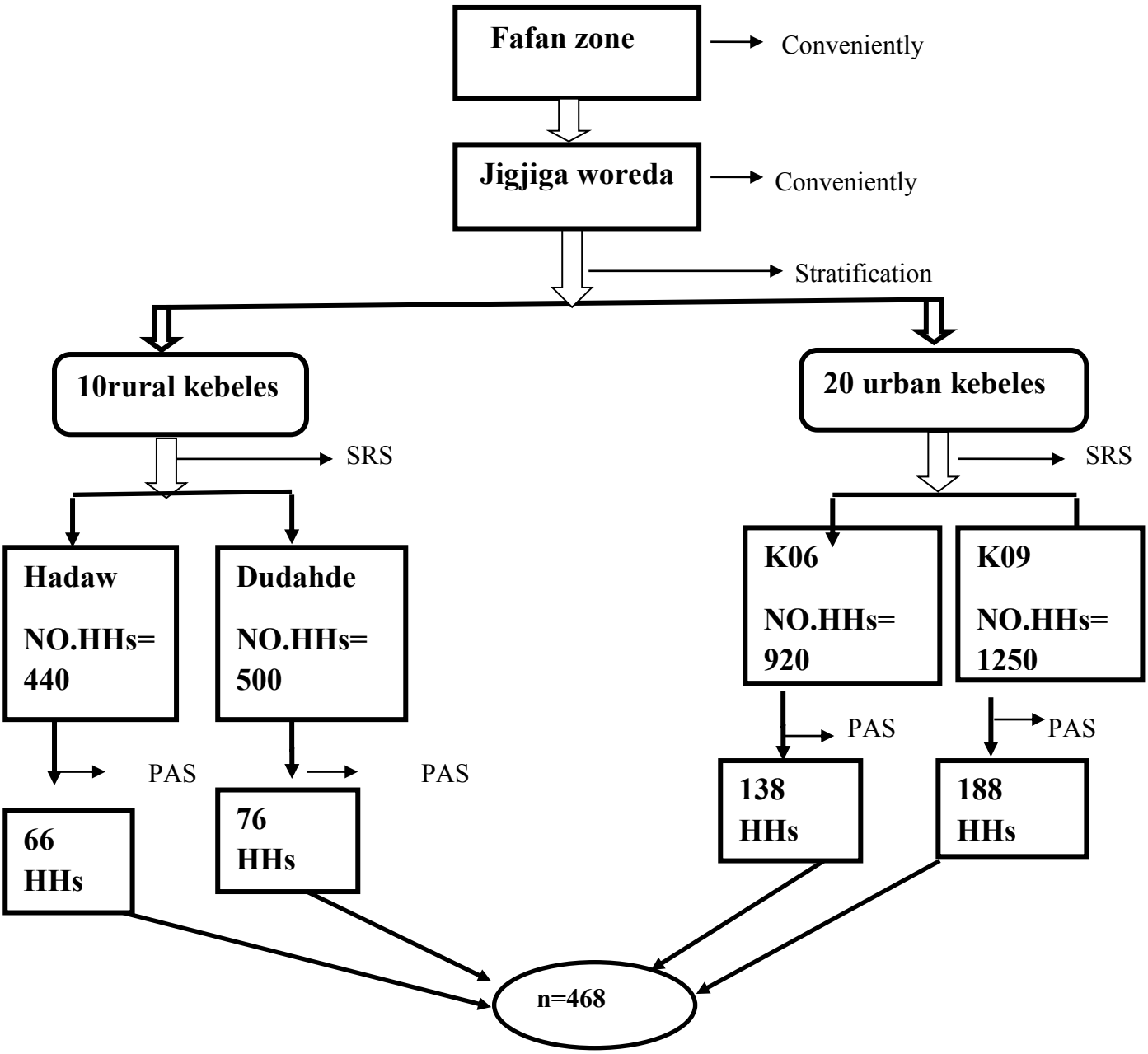

Fig2: procedure of stratification in Jigjiga council and Jigjiga woreda by simple random sampling(2017).

5.8. Operational and standard definitions

Anemia: anemia was considered by using WHO guidelines a concentration of hemoglobin less than 12g/dl for non pregnant woman of reproductive age & Hemoglobin concentrations was adjusted for altitude with the use of the equation published by Cohen and Hass.

Reproductive age group in women: was women's age between 15-49 years old found in the household.

Food secured: was when the households experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely that means when labelled all to 0 score.

Household food insecured: A household was considered food insecure if all occurrence and frequency of occurrence questions gave a response of yes with their grades based on HFIAS developed by FANTA.

Household: household mean those of people that slept under the same roof and took meals together at least four days a week.

Literate: was those who not attended formal school and can't read and write.

Illiterate: was those who attended formal school and have certificate and above.

Status of menarche: mean women who were in a cyclic period during data collection.

Contraceptive devices: were something to delay or avoiding pregnancy.

5.9. Data collection

5.9.1 Instrument and measurements

A structured interviewer administered questionnaire was used to collect data from participants. The tools were constructed by modifying the Household Food Insecurity Access Scale (HFIAS) to measure degree of household food insecurity status. Originally developed by USAID funded Food and Nutrition Technical Assistance (FANTA) project.

Household food insecurity access scale was used first to identify household food security status. Once the household food security status (FS Vs FIS) was identified, eligible HHs were invited to participate in the study. After obtained their consents, they were interviewed face to face. And then hemoglobin was measured in both groups of study participants using portable HemoCue aseceptically following standard procedures and finger prick method was done to obtain a blood of sample following aseptic techniques and then measures their hemoglobin status.

First, the English version of the questionnaire was prepared. Then it was translated to Somali version (local language) and back to English.

5.9.2 Data collectors

Two Bsc nursing and one supervisor who had previous experience of data collection and supervision respectively were recruited as data collector. The Data collectors were residents of the region and were fluent sin the local language, Somali fluently and Amharic language.

5.9.3 Data collectors' training

Data collectors were given two days training which focused on administration of the questionnaires, interviewing techniques and taking blood samples for measuring the status of anemia and making standardization of HemoCue and agreeing on the way of asking respondents in Somali language.

5.10. Data quality control

Before the actual data collection took place, the questionnaire was subjected to a pre test, so it was revised by one supervisor and the recommended modifications to specific items were done to suit the study objectives. In order to pre-test the questionnaire on the length, content, question wording, and language, 23 respondents (5% of the total sample) from the study area were interviewed and were not included in the sample. Data collectors were exposed to a Practical experience in conducting the interviews during the pre-testing of the Questionnaires and the responses recorded by the data collectors were compared with those Recorded by the investigator himself and appropriate advices were given to the data collectors on areas needed to improve.

All the questionnaires were checked daily to ensure whether they were appropriately filled or not and any missing data were confirmed before we started next day's of interviews. In addition the quality of data collection was ensured through close supervision of the data collection team daily by the principal researcher. About 10% of the data were re-entered in order to compare and assure the quality of the data entered by the PI.

5.11. Data processing and analysis

The data were entered and cleaned by using EPI data version 3.1 and was analyzed by Stata 14. Descriptive statistics was used to generate frequencies, percentage, mean and standard deviation. Bivariate analysis was done to measure the strength of association between the dependent variables which was anemia and household food security status (HFI). HFI was entered as 4- level categorical variable as food secured and mild, moderate and severely food insecure with their cut off points based on the HFIAS.

Multivariate analysis was made to calculate for adjusted odds ratio by controlling for confounding variables using multiple binary logistic regression models with 95% confidence interval and statistical significance was set at p-value less than 0.05.

5.12. Ethical considerations

Ethical clearance was obtained from Addis Ababa University, college of health sciences, research and ethics committee of the school of public health and a formal letter of permission was obtained from each concerned bodies. A written consent was obtained from the respondents before the interview. Data collectors explained to the respondents the reason of the study and the information obtained from them were kept confidential and were used for research purposes only and they were told that participation in the study was voluntary and the right to discontinue their participation at any time if they feel uncomfortable was respected. All participants were briefed that there were no payment for participating this study. However, those participants with anemia were referred to the near health centers for appropriate treatment.

5.13. Dissemination of result

The finding of this study is submitted to the concerned bodies like school of public health, Addis Ababa University and federal and Somali regional health bureau as well as Jigjiga University, NGO's etc. attempts will be made to publish the findings in reputable journals.

5: RESULTS

5.1. Socio-demographic characteristics

Out of 468 eligible women of reproductive age group, 429 agreed to participate in the study, which made a response rate of 91.67%. The mean age of respondents was 25.76 years (SD±6.05). Less than half 194(45.22%) of women were in age between 15-24 years, which ranged from 15-45 years. More than three-fourth were married 327(76.22%) and 299(69.70%) were from urban and vast most of them had children 324(75.52%), with mean number of child of 4.807.

The dominant religions of the participants were Muslim followers 401(93.47%), followed by orthodox , catholic and protestant 12(2.80%),9(2.10%),7(1.63%), respectively.

Majority 383(89.28%) were from ethnic of Somali followed by Oromo 24(5.59%) and 258(60.14%) were illiterate while 171(39.86%) had some formal education. Less than half 209(48.72%) had a size family of 6-10members, and mean size (±SD) of respondent's family was 8.6(±3.7). Over half 223(51.98%) were Housewife followed by Daily laborer 75(17.48%) **(Table 2).**

Table 2: Socio-demographic characteristics of study participants(n=468) in rural & urban areas of Jigjiga woreda, Somali regional state of Ethiopia,2017.

Variables	Category	Frequency	Percent (%)
Residence	Rural	130	30.30%
	Urban	299	69.70%
Age of women	15-24	194	45.22%
	25-34	187	43.59%
	35-44	43	10.02%
	≥45	5	1.17%
Ethnicity	Somali	383	89.28%
	Oromo	24	5.59%
	Amhara	13	3.03%
	Gurage	5	1.17%
	Tigre	4	0.93%
Religion	Muslim	401	93.47%
	Orthodox	12	2.80%
	Catholic	9	2.10%
	Protestant	7	1.63%
Marital status	Single	70	16.32%
	Married	327	76.22%
	Divorced/ Widowed	32	7.45%

whom they live with	Husband	305	71.10%
	Father & mother	88	20.51%
	Relatives	18	4.20%
	Others	18	4.20%
Women's occupation	Daily labourer	95	22.14%
	House wife	223	51.98%
	Farmer	35	8.16%
	Student	42	9.79%
	Government employed	33	7.69%
	Others	1	0.23%
Husband's occupation	Daily labourer	62	17.22%
	Merchant	83	23.05%
	Farmer	107	29.72%
	Students	7	1.94%
	Government employed	51	14.16%
	Others	50	13.89%
Having children	Yes	324	75.52%
	No	105	24.48%
Owner of property	Private	314	73.19%
	Government	29	6.76%
	Rent	85	19.81%
	Others	1	0.23%
Women's educational status	Literate	171	39.86%
	Illiterate	258	60.14%
Husband's education	can't read and write	105	29.57%
	can read and write	117	32.95%
	primary school(1-8)	34	9.57%
	grade 9-12	26	7.32%
	certificate/diploma	26	7.32%
	degree& above	47	13.23%
Total size of family	1-5	89	20.75%
	6-10	209	48.72%
	11-15	113	26.34%
	≥16	18	4.20%

5.2. Obstetric related characteristics.

The majority 366(85.31%) were not in menses while 63(14.69%) were in a menses during data collection, with mean blood flow of 4.73(1.46±SD) and range 2-7days and almost all 412(96.04%) were not having malaria infection. Majority of participants 366(85.31%) did not use family planning/contraceptive methods of theses, implants and pills were the one which they commonly used and 76.19% did not use for a period of months.

Less than half 173(40.33%) of women received their ANC services during their pregnancy of which, 74(42.77%) got the service from governmental hospital and less than a quarter

41(23.70%) who had ANC were counselled on anaemia. The majority 398(92.77%) did not give history of chronic diseases and less than quarter mentioned to take iron supplementation **(Table3).**

Table 3: Obstetric related characteristics of study participants(n=468) in rural & urban areas of Jigjiga woreda, Somali regional state of Ethiopia,2017.

Variables	Frequency	Percent (%)
Status of menarche		
yes	63	14.69%
No	366	85.31%
Contraceptive devices		
Yes	63	14.69%
No	366	85.31%
Which methods		
Injectibles	8	12.70%
Implants	25	39.68%
Pills	25	39.68%
Others	5	7.93%
How long		
Months	48	76.19%
Years	15	23.81%
Receiving ANC services		
Yes	173	40.33%
No	256	59.67%
Where did you receive		
Governmental hospital	74	42.77%
Private clinic	8	4.62%
Health center	49	28.32%
Health post	42	24.28%
Counselling concerning anaemia during ANC visit		
Yes	41	23.70%
No	132	76.30%
Getting iron supplementation		
Yes	76	17.72%
No	353	82.28%
History of warm infection for the last three month		
Yes	23	5.36%
No	406	94.64%
Diagnosed with chronic diseases		
Yes	31	7.23%
No	398	92.77%
Which one have you been diagnosed		
Hypertension	17	54.84%
Diabetes millets	5	16.13%
Kidney disease	9	29.03%

5.3 .Nutrient and diet characteristics

The most stable food that participants consumed, was maize 192(44.76%), followed by Rice/spaghetti 153(35.66%). About three quarter 24(75.52%) had a meal pattern of three times per day. About two-thirds 275(64.10%) consumed meat, in which 103(37.45%) ,consumed every two week and 102(37.09%) once a month.

Less than half of them 210(48.95%) consumed green leafy vegetables, in which 100(47.62%) consumed every two day and 231(53.85%), drunk tea after meal and fruit consumption was mentioned 68(15.85%) **(Table 4).**

Table4: Nutrient and diet characteristics of study participants(n=468) in rural & urban areas of Jigjiga woreda, Somali regional state of Ethiopia,2017.

variables	categories	Frequency	Percent(%)
Staple food	Teff	35	8.16%
	Maize	192	44.76%
	Ensete	39	9.09%
	Sorghum	10	2.33%
	Rice/basta/macaroni	153	35.66%
Meals per/day	two times	92	21.45%
	three times	324	75.52
	four and above	13	3.03%
Eating meat	Yes	275	64.10%
	No	154	35.90%
How many times	Daily	37	13.45%
	every two day	33	12.00%
	every two week	103	37.45%
	Once a month	102	37.09
Eating green leafy vegetables	Yes	210	48.95%
	No	219	51.05%
How many times	daily	41	19.52%
	every two day	100	47.62%
	every two week	47	22.38%
	Once a month	22	10.48%
Drinking tea & coffee after meal	Yes	231	53.85%
	No	198	46.15%
Eating fruit after meal	Yes	68	15.85%
	No	361	84.15%

5.4. Households food security status

The proportion of food secured households was 53.85% while the proportion of insecured households was 46.15%. From the secured households, majority 204(88.31%) were from urban while from the insecured households over half 103(52.02%) were from rural residence. Over half (53.8%) [95% CI (0.4901-0.585)] households were food secured. The proportion of households suffered severe, moderate and mild food insecurity was 129(30.07%), 31(7.23 %) and 38(8.86%), respectively. And the overall proportion of food insecurity in households was 46.15%[95% CI (.415-0.509)] **(fig3).**

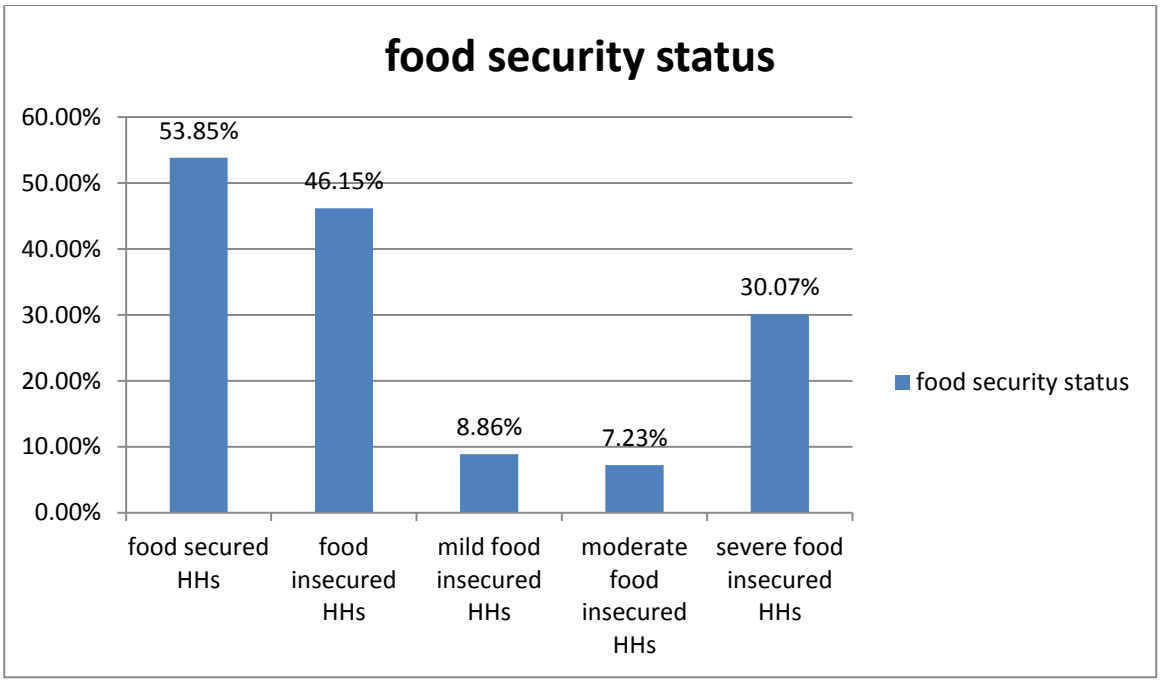

Figure 3: Proportion of households by food security status of participants (n=429), in rural and urban area of Jigjiga woreda, Ethiopian Somali regional state, April 2017.

5.5 Anaemia status of study participants.

The overall proportion of anemia in this study was 39.86%. The mean Hgb level(adjusted for altitude) was 12.01(±2.1SD)g/dl & ranging from 7-16gm/dl. However, The overall prevalence of anaemia among women was 39.86% [95 CI (0.353-0.446)]. Of the anemic women, 25.17%, 13.29%,1.40% had mild, moderate and severe anaemia respectively **(fig.4).**

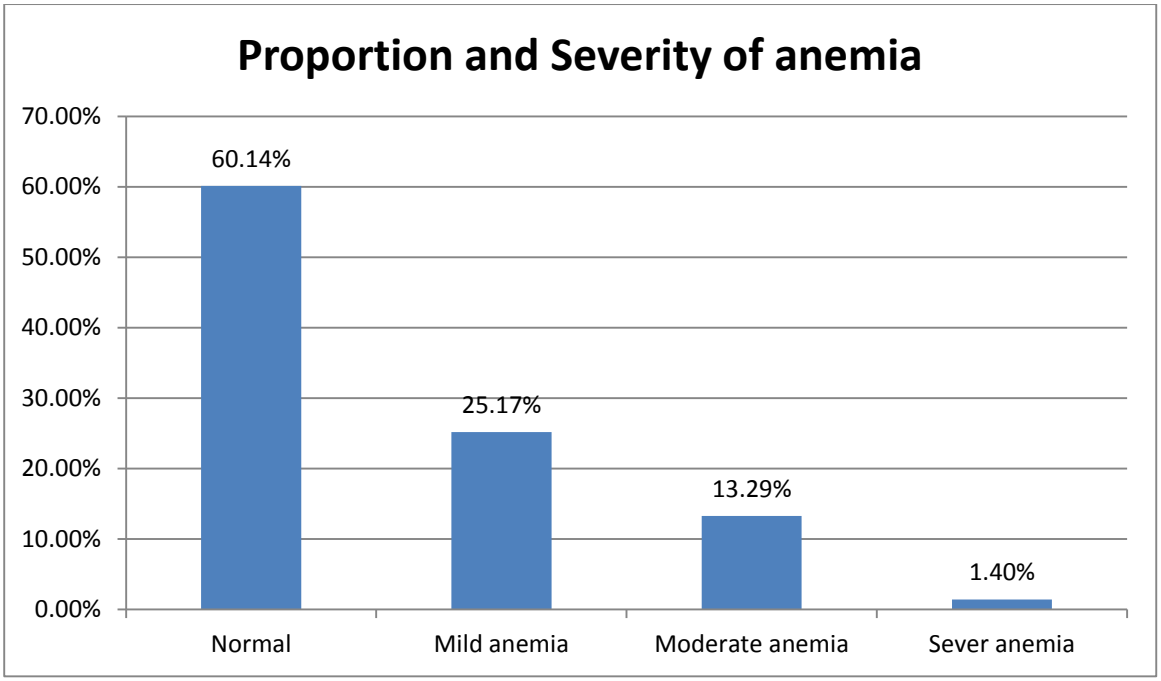

Figure 4: level of anaemia & severity of anaemia among women of reproductive age group(n=429), in rural and urban area of Jigjiga woreda, Ethiopian Somali regional state, April 2017.

5.5. Anaemia by food security status

The proportion of anemia was higher in households who experienced FI 136(79.53%) than secured households 35(20.47%). Severe anaemia(hgb≤ 7 mg) was not seen in food secured households but seen in food insecured households**(table5).**

Table 5: shows anemia by food security status of study participants(n=468) in rural & urban areas of Jigjiga woreda, Somali regional state of Ethiopia,2017.

	Food secured	**Food insecure**
Anemia	35(20.47%)	136(79.53%)
Mild anemia	19(11.11%)	38(22.22%)
Moderate anemia	16(9.35%)	92(53.8%)
Severe anemia	(0.00%)	6(3.51%)

5.6. Results of bivariate and multivariate analyses

To identify factors associated with anaemia, each variable were assessed independently whether they were predictor of anaemia or not. So each independent variables were tested first by using bivariate analysis and independent variables in the bivariate analysis (P<0.2) were: Residence [COR= 0.224, 95% CI (1451-0.348)], marital status[COR=0.3298, 95% CI (0.179-0.607)], whom they live with[COR= 0.346, 95% CI (0.203-0.599)],occupation of women [COR= 0.119, 95% CI (0.0388-0.364)],occupation of husband[COR= 0.148, 95% CI (0.627-0.354)],having children[COR=0.46, 95% CI (0.2834-0.7475)],education of women [COR=0.255, 95% CI (0.1648-0.396)],source of drinking water [COR=0.263 95% CI (0.106-0.653)],making water safer [COR=0.415,95% CI (0.277-0.619)],washing hand after toilet [COR=0.425,95% CI (0.248-0.726)],meals per day [COR=0.167,95% CI (0.431-0.652),low consumption of meat [COR=0.324, 95% CI (0.2151-0.4885), low consumption of green leafy vegetables [COR=0.242, 95% CI (0.159-0.366),how many times they consume[COR=0.24, 95% CI (0.77-0.75)], low consumption of fruits [COR=0.53,95% CI (0.3016-0.942), Contraceptive usage [COR=2.37 95% CI (1.28-4.399)],type of contraceptives [COR=4,95% CI (0.849-18.8362)],iron supplementation [COR=0.646,95% CI (0.381-1.096)],food security status[COR=0.081, 95% CI (0.051-0.1301)], food security level[COR=0.306, 95% CI (0.1445-0.648)].

Independent variables that had association in the bivariate analysis were fed to the multivariate analysis to see their final significant association with anaemia.

After adjusting for potential confounders in multivariate analyses only: moderate and severe food insecurity level [0.00109, 95% CI(0.000018-0.0657)], 0.00030,95% CI(7.01e-06-0.0135)] respectively, food insecured households[0.147,95% CI(0.0022-0.1001), low consumption of meat [38.61,95%CI(2.435-612.1)] , low consumption of fruits after meal[38.61,95% CI(2.435-612)], remained significant with anaemia in the model, while other variables that were associated in the binary logistic regression were out in multivariate analyses**(table6)** .

Table6: Results of bivariate and multivariate analyses of respondents in Jigjiga woreda and council of Somali regional state of Ethiopia, June 2017.

Characteristics	Anaemia		COR(95%CI)	AOR(95%CI)
	Yes (n, %)	No(n, %)		
Residence				
Rural	84(49.12)	46(17.83)	0.224(.145-0.34)*	0.54 (0.01-40.33)
Urban	87(50.88)	212(82.17)	1.00	-
Marital status				
Single	15(8.77)	55(21.32)	1.00	1.00
Married	148(86.55)	179(69.38)	0.33(0.17-0.60)*	4.44(0.14-139)
Divorced	8(4.68)	24(9.30)	0.82(0.30-2.18)	1.16e+10 (0)
Whom do you live				
Husband	140(81.87)	165(63.95)	0.346(0.203-0.59)*	15.23(0.35-657.2)
Father & mother	20(11.70)	68(26.36)	1.00	1.00
Relatives	4(2.34)	15(5.81)	1.103(0.33-3.70)	0.007(0.0000958-0.576)
Alone	7(4.09)	10(3.88)	0.42 (0.15-1.25)	5.85e-13(0)
Women's occupation				
Daily laborer	51(29.82)	44(17.05)	0.12(0.04-0.36)*	0.25 (0.02-3.34)
House wife	84(49.12)	139(53.88)	0.23(0.77-0.67)	0.47 (0 .06- 3.70)
Farmer	23(13.45)	12(4.65)	0.72(0.02-0.25)*	0.2 (0.02-2.49)
Student	8(4.67)	34(13.18)	0.59(0.16-2.15)	0.32(0.01- 19.09)
Government	5(2.93)	29(11.24)	1.00	1.00
Husband's occupation				
Daily laborer	39(24.22)	27(13.56)	0.15(0.63-0.35)*	1.51 (0. 07-32.1)
Merchant	24(14.90)	59(29.64)	0.53(0.22-1.25)	0. 54(0.07-4.21)
Farmer	74(45.96)	33(16.58)	0.96(0.42-0.22)*	0.044(0.002-11.167)
Government employed	9(5.59)	45(22.61)	1.00	1.00
Others	15(9.31)	35(17.58)	0.5(0.19-1.28)	107.14(0.67- 16922.22)
Having children				
Yes	143(83.63)	181(70.16)	0.46(0.28-0.75)*	1.58(0.27-9.19)
No	28(16.37)	77(29.84)	1.00	1.00
Women's educational				
literate	37(21.64)	134(51.94)	1.00	1.00
Illiterate	134(78.36)	124(48.06)	0.25(0.17-0.4)*	0.59(0.14-2.46)
Husband's education				
Can't read and write	67(42.14)	38(19.38)	0.13(0.59-0.31)*	1.18(0.04-32.09)
Can read and write	58(36.47)	59(30.10)	0.24 (0.12-0.54)*	0.98(0.09-10.85)
Primary school(1-8)	13(8.18)	21(10.71)	0.38(0.14-1.04)	2.89(0.17-50.37)
Grade 9-12	7(4.40)	19(9.69)	0.65(0.21-1.99)	2.03(0.096-42.99)
Certificate	5(3.12)	21(10.71)	0.99 (0.29-3.36)	0.714(10054-5.08)
Degree and above	9(5.66)	38(19.38)	1.00	1.00
Source of drinking water				
Piped in to dwelling	23(13.45)	95(36.82)	1.943(0.75-5.05)	-
piped in to yards	0(0)	10(3.88)	1.00	-
public tape	47(27.49)	83(32.17)	0.83(0.33-2.07)	-
Tanker truck	101(59.06)	70(27.13)	0.26 (0.11-0.65)*	-
Making water safer				

Yes	57(33.33)	141(54.65)	1.00	-
No	114(66.67)	117(45.35	0.42(0.28-0.62)*	-
Wash hands after toilet				
Always with soap	41(23.98)	119(46.12)	1.00	1.00
Sometimes with soap	20(11.70)	51(19.77)	0.88(0.47-1.65)	15.87(1.44-144.45)
Without soap	43(25.15)	53(20.54)	0.43 (0.25-0.73)*	0.913(0.2-4.2)
Do not wash	67(39.18)	35(13.57)	0.18(0.11-0.31)*	0.09(0.01-1.22)
Meals per day				
Two times	59(34.50)	33(12.79)	0.17(0.43-0.66)*	1.52(0.07-33.31)
Three times	109(63.74)	215(83.33)	0.59(0.16-2.19)	1.58(0.22-11.157)
Four and above	3(1.75)	10(3.88)	1.00	1.00
Consumption of meat				
Yes	83(48.54)	192(74.42)	1.00	-
No	88(51.46)	66(25.58)	0.32(0.21-0.49)*	9.87(1.28-76.16)**
Green leafy vegetables				
Yes	49(28.65)	161(62.40)	1.00	-
No	122(71.35)	97(37.60)	0.25(0.16-0.36)*	-
How many times they eat				
Daily	8(16.33)	33(20.50)	1.00	1.00
Every two day	21(42.86)	79(49.07)	0.91 (0.37-2.27)	1.99(0.458-8.68)
Every two week	9(18.37)	38(23.60)	1.02(0.35-2.96)	1.69(0.29 -9.94)
Once a month	11(22.45)	11(6.83)	0.24(0.78-0.76)*	0.355 (0.05-2.77)
Consumption of fruits				
Yes	19(11.11)	49(18.99)	1.00	1.00
No	152(88.89)	209(81.01)	0.53(0.32-0.94)*	5.46 (1.84-20.15)**
Using contraceptives				
Yes	15(8.77)	48(18.60)	2.38(1.28-4.39)*	0.62(0.13 -2.95)
No	156(91.23)	210(81.31)	1.00	1.00
Methods(type)				
Injectables	4(26.67)	4(8.33)	1.00	-
Pills	10(66.67)	40(83.33)	4(0.84-18.83)*	-
Natural methods	1(6.67)	4(8.33)	4(0.29-53.47)	-
Iron supplementation				
Yes	24(14.04)	52(20.16)	1.00	1.00
No	147(85.96)	206(79.84)	0.65(0.38-1.09)*	0.29(0.75-1.2)
Food security level				
Food secured	35(20.47)	196(75.97)	1.00	1.00
Mild food insecured	14(8.19)	24(9.30)	0.31(0.14-0.65)*	0.37(0.23-5.98)
Moderate food insecured	23(13.45)	8(3.10)	0.06(0.02-0.15)*	0.0011(0. 000018-0.0657)**
Severe food insecured	99(57.89)	30(11.63)	0.05(0.03-0.93)*	0.00030(7.01e-06 0.014)**

1=reference *= Significant at p-value of ≤ 0.2 & ** Significant at p-value of ≤0.05

6. DISCUSION

The present study assessed the level of anaemia by food security status among reproductive aged women from hot spot areas and found an overall prevalence of anemia of 39.86%. The level of anemia was significantly higher in food insecured households (79.53%) (FIH) than secured households (20.47%). Higher level of anemia in FIH is expected since the type of food consumed are donated which in most cases are less in iron content and affordability of consuming iron rich food is low. However, this finding is consistence with EDHS 2011,which reported 44.0% in women of Somali region(5), in north west Vietnam(37.57%)(40), north western zone of Tigray (36.1%) (43).

Nevertheless, when compared with the 2016, Ethiopian Demographic Health Survey report for Somali region which reported 59.0% (44), by haidar et al, in Afar (79.4%) and Dire-Dawa(55.7%)(37), Kumarverma et al (49.82%)(27), Meda et al (59%) (38),Abdullahi et al(56.8%)(39) and Patavegar et al (51.92%)(43),the present figure was lower. This may be due to deference in socio demographic features , sample size as well as way of measuring anemia and some of the areas done on these research had endemicity of malaria and difference in study subjects might increase the proportion of anemia in their study. For example, haidar et al, used large sample of women from nine of the eleven regions in Ethiopia and also observed clinical, dietary pattern of individual, and type of parasite that had associated with anemia, these might be possible that lowers the prevalence of anemia in our study.

On the other hand, when compared with study done by Gebremedhin et al (27.5%)(25), haider et al (29.4%)(3) and Kefiyalew et al (27.9%)(29), the present figure was higher. This probably attributed to difference in socio-demographic and ecological factors as well as different methods and sample size that have been used. And the current drought that affected the region. These might possible increased the prevalence of anemia in our study.

The severity of anemia in our study found, mild, moderate and severe anemia(25.17%, 5713.29%, 1.40%), respectively. And this is consistence with study done by Gebremedhin et al (25), but inconsistence with study done by Kefiyalew et al (55%, 32.5% and 12.5%) respectively (29).This may be due to different study designs, inclusion subjects and study seating might increased the severity of anemia in their studies as compared to our study.

Among the participants, more than one-third(39.86%), were suffering from different level of anemia and almost half of them(46.15%), were in food insecured conditions. And Foodinsecured households were significantly associated with anemia (P=0.000),in this study, however, households who were food insecured were 0.147 times more likely to be anemic than those households who were foodsecured[0.147,95% CI(0.0028-0.1001)]. This is consistent with the study done in Bangladesh and Mexico which showed that food insecurity was associated with anemia(22,7). In contrast to our find, research done in Nepal revealed that food insecurity was not associated with anemia. This difference may be due to the different methods, sample size and tolls that have been used. For example, secondary data (DHS) 2001,nepal and other tolls were used in their study, while primary data in community and HHFIAS were used in this study.

Moderate and Severe food insecured households were found to be predictor of anemia. This study found that households who were moderate and severe food insecured were more likely to be anemic 95%CI(0.000018-0.0657), 95%CI (7.01e-060.0135),respectively than those households who were mild food secured or food secured at all. This study is consistence with study done in Bangladesh(22).

Low consumption of meat showed significant association with anemia in our study. So women who consumed inadequate amount of meat were 9.87 times more likely to be anemic than those who were consumed adequate amount of meat [AOR: 9.87, 95% CI (1.28-76.16)]. This is similar to finding by haider et al (40.2%) and north west of Vietnam(P=0.020) (3,40). This may be due to that meat contain iron and nutritional anemia in the form of iron deficiency anemia is a problem in Ethiopia(3).

Low consumption fruits showed significant association with anemia(P=0.011), in this study. So women who consumed inadequate amount of fruits were 5.46 times more likely to develop anemia than their counterpart [AOR: 5.46,95% CI (1.48-20.15)].
This is similar to study done by Péneau et al, reported that low consumption of fruits were associated with anemia (P<0.001)(41).

7. STRENGTH AND LIMITATION OF THE STUDY

Strength

- The study included both urban and rural residence and yielded RR of 91.67%,in addition heamoglobin was measured using a HemoCue (HemoCue hb301+) which is an appropriate test in field setting and adjusted the HGB for altitude. Other than these, validated tool of HHFI scale developed for Africa and validated in Ethiopia by FANTA project was used.

Limitation

- First, due to the nature of cross sectional study design, it was difficult to know whether anemia preceded the predisposing factors or the vice verse and was not possible to verify the cause and effect phenomenon.
- The exclusion of participants' due to difficulty of getting venous sample might have underestimated the prevalence of anemia.
- Failure to estimate worm burden and measuring of the micronutrient status including interactive 24hr recall methods are other limitations of this study.
- In addition, information on chronic disease and pregnancy were recorded qualitatively and this might have been subjected to biases.

8. CONCULUSION AND RECOMMENDATION

Conclusions

The proportion of anemia among women of reproductive age group was 39.86%, which is moderate public health problem in region and the proportion of food insecurity was 46.15%.
Level of anemia among food secured was (20.47%) and that of food insecured was (79.53%).
The level of anemia was significantly associated in households suffered food insecured as well as moderate and severe food insecured households.

Food insecured households, moderate and severe households, low consumption of meat and low consumption of fruits were found to be significantly associated with anemia in our study.

Our study suggest interventions that target HFI especially moderate and severity effectively may improve the health of women of reproductive age group in Jigjiga woreda by reducing the prevalence of anemia and its serious consequences of anemia.

9. Recommendations

- Since almost all women were not given counselling concerning about anemia during their ANC follow up, health professionals need to improve the situation through counselling.
- NGO's and government should give food containing iron, when they are supplementing foods.
- Further study on measuring micronutrients and advanced dietary diversity should be recommended so as to know which exactly deficiency and diet type relate with anemia.
- It is recommended that policymakers need to reinforce the ongoing food supplementation that contains iron and consider subsidizing nutritious foods for poor households.

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10.ANNEXES.

10.1 Participant information sheet and informed consent form

My name is _____. Currently I am a master degree graduate candidate student at Addis Ababa University, College of Health Sciences, School of public health, Department of nutrition. And now I am conducting a research to assess the magnitude of anemia among food secured versus non secured households among women of reproductive age group in fafan zone.

The study title:

Magnitude of anemia among food secured versus none secured households among women of reproductive age group in Fafan zone, Jigjiga woreda, Somali regional state of Ethiopia: A cross sectional study

Purpose of the study

The finding of this study will provide baseline information to the Somali regional health bureau, district health office, policy makers and NGOs (non-governmental organizations) and food and agricultural bureau with relevant information for future planning and interventions of appropriate strategies to promote and maintain food security and reduce anemia.
It will also assist the government to develop programs to prevent and treat anemia.
The study will also be used as baseline information for future studies and uncover the level of anemia and the effect of household food insecurity. Moreover, the aim of this Study is to write a thesis as a partial requirement for the fulfilment of a Master's Program in Public Health Nutrition.

Procedure and duration:

I will be interviewing you using a questionnaire and taking a few drop of blood from finger as sample to provide me with pertinent data that is helpful for the study and there are questions to answer where I will fill the questionnaire by interviewing you, the interview will take few minutes, so I kindly request you to spare me this time for the interview.

Risks and benefits:

The risk of being participating in this study is very minimal, except few minutes of interview and small pain from finger during blood taking and the equipment used in taking the blood is clean and completely safe. It has never been used before and will be thrown away after each test There will not be any direct payment for participating in this study; the findings obtain from the study is useful for planning intervention programs.

Confidentiality:

The information you will provide us will be confidential. There will be no information that will Identify you in particular. The findings of the study will be general for the study community and Will not reflect anything particular of individual persons or housing, the questionnaire will be Coded to exclude showing names, no reference will be made in oral or written reports that could Link participants to the research, the blood will be tested for anemia immediately, and the result told to you right away so the result will be kept strictly confidential and will not be shared with anyone other than members of our survey team.

Rights:

Participation for this study has fully voluntary. You have the right to declare to participate or not. In this study, if you decide to participate, you have the right to withdraw from the study at any Time and this will not label you for any loss of benefits which you otherwise are entitled. You do Not have to answer any question that you do not want to answer.

Contact address:

If there are any questions or enquires at any time about the study or the procedures, please contact in this address, Principal investigator: Sahardiid Ali: E-mail Sahardiid4all@gmail.com or
Mobile: 0913957378

Declaration of informed voluntary consent:

I have read/ was read to me the participant information sheet. I have clearly understood the Purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries, I have been given the opportunity to ask questions for things that may have been unclear, I was informed that I have the right to withdraw From the study at any time or not to answer any question that I do not want, therefore, I declare my voluntary consent to participate in this study with my signature as indicated below.

Signature of participant: ---------- Signature of data collector ----------

N.B: this is to be signed face to face in the presence of the data collector. Please provide a copy Of this signed consent to the participant.

10.2 Appendix questioners.

Questionnaires on the magnitude of anemia among food secured versus non secured households among women of reproductive age group in Jigjiga woreda and Jigjiga council of Ethiopian Somali Regional State.

To be filled by data collectors.

Region _____ Zone _____Woreda_____

Questionnaires ID NO_____ Name of Kebele_____

Name of the interviewer_____

Date of interview_____ Time started _____Time finished_____

Questionnaire checked_____

SNO	**Questions and filters**	**coding categories**	**Skip**
Part one : women's records on socio-demographic information			
001	age in completed years?	_____ ___years	
002	Where is your residence?	Rural……..1 Urban……2	
003	What is your ethnicity?	Somali……..1 Amhara……2 Oromo…….3 Tigre…….4 Gurage …….5 Others(specify)_____6	
004	What is your religion?	Muslim……1 Orthodox…….2 Catholic……3 Protestant…….4 Others(specify)_____5	
005	What is your marital status?	Single……..1 married……2 divorced……..3 widowed…….4 Others(specify)_____5	
Part two: socio economic aspect of women			
101	With whom do you live now?	Husband……1 Father and mother ……...….2 Relatives……...…….3 Alone ……..4 Others (specify)_____5	
102	What is your occupation?	Daily laborer……1 House wife……..2 Farmer…….3 Student……4 Governmental employed……..5 self employed……6 others (specify)_____7	
103	What is your husband's occupation?	Daily laborer……1 Merchant……..2 Farmer……..3 Student……..4 Governmental employed……5 self employed……..6 unemployed ……7 Others (specify)_____8	
104	Do you have children?	Yes ……1 NO …… →2	if no skip to Q106

105	if yes for Question 104 Wright in number	_____	
106	What is average monthly income of the households?(in ETH birr)	_____ETH birr……..1 I don't know…….2	
107	Whose is property owner of the house in which you live?	private …….1 government ……..2 Rent ……..3 Others (specify)_____4	
108	Have you ever attended school?	Yes …….1 NO……..2 →	If NO go Q no 110
109	What is the highest level of school you attended: Primary, secondary, technical/vocational or higher?	can't read and write……...1 primary school(1-8)……2 grade 9_12……..3 certificate/diploma……..…4 degree and above…….5	
110	What is your husband's educational level?	can't read and write…….1 primary school(1-8)……..2 grade 9_12……3 certificate/diploma……4 degree and above……..5	
111	How many persons live in the house hold (total family size)?	_____	
Part three : Hygiene and sanitation condition			
201	What is the main source of drinking water for members Of your household?	Piped in to dwelling ……1 piped in to yards…….2 public tape ……..3 rain water ……4 tanker truck…….3 car with small tank ……6 Others (specify) _____7	
202	What is the main source of water for washing and other purpose?	Piped in to dwelling ……1 piped in to yards…….2 public tape ……..3 rain water ……4 tanker truck…….3 car with small tank ……6 Others (specify) _____7	
203	Do you do anything to the water to make it safer to drink?	Yes…….1 No ……....2 →	if NO go Q205
204	What do you usually do to make the water safer to drink?	Boiling……1 Add chlorine/bishan gari……..2 filtration ……...3 let it stand and settle……..4 other (specify)_____5	
205	What kind of toilet facility do members of your household	flush to septic tank……1 flush to pit latrine ……...2	

	usually use?	ventilated pit latrine…….3 pit latrine …….4 pit latrine with slab……5 composting toilet…….6 bush /field…….7 Other(specify)_____8	
206	Do you wash hand after toilet?	Always with soap……..1 Sometimes with soap……2 Without soap…….3 Do not wash……4	
207	Does your household own any livestock, herd or any animals?	YES…….…….1 NO…….……2	if NO go Q209
208	Which one do you have? Multiple answers are possible.	camel……..1 cows/oxen/bulls……..2 horses/donkey/mules……..3 goats……...4 sheep…….……..5 Others (specify)_____6	
209	Does your household have any one of the followings, if Yes chose one? Multiple answers are possible.	Electricity/solar…….1 watch/clock……2 Radio……..3 television……....4 mobile telephone ……...5 refrigerator.....……6 bed with cotton/sponge/spring mattress.....7 kerosene lamp/pressure lamp....8 Others (specify)_____9	
Part three : Hygiene and sanitation condition			
201	What is the main source of drinking water for members Of your household?	Piped in to dwelling ……..…1 piped in to yards…….2 public tape ……..3 rain water ……4 tanker truck…….....5 car with small tank …….....…6 Others (specify) _____7	
202	What is the main source of water for washing and other purpose?	Piped in to dwelling ……...1 piped in to yards…….2 public tape ……..3 rain water ……4 tanker truck…….....5 car with small tank …….6 Others (specify) _____7	
203	Do you do anything to the water to make it safer to drink?	Yes…….1 No ……....2	if NO go Q205
204	What do you usually do to make the water safer to drink?	Boiling……1 Add chlorine/bishan gari……..2 filtration ……...3 let it stand and settle……..4	

		other (specify)_____5	
205	What kind of toilet facility do members of your household usually use?	flush to septic tank……...1 flush to pit latrine ……....2 ventilated pit latrine…….3 pit latrine …….4 pit latrine with slab……..…5 composting toilet…….6 bush /field…….7 Other(specify)_____8	
206	Do you wash hand after toilet?	Always with soap……....1 Sometimes with soap……2 Without soap…….3 Do not wash……..4	
207	Does your household own any livestock, herd or any animals?	YES…….…….1 NO…….……2 →	if NO go Q209
208	Which one do you have? Multiple answers are possible.	camel……..1 cows/oxen/bulls……..2 horses/donkey/mules……..3 goats……...4 sheep…….……..5 Others (specify)_____6	
209	Does your household have any one of the followings, if Yes chose one? Multiple answers are possible.	Electricity/solar…….1 watch/clock……2 Radio……...……..3 television……..…….4 mobile telephone ……..…5 refrigerator.....…….6 bed with cotton/sponge/spring mattress.....7 kerosene lamp/pressure lamp....8 Others (specify)_____9	
210	What type of fuel does your household mainly use For cooking?	Electricity……..1 Natural gas…….2 Biogas……3 Kerosene……4 Charcoal…….5 wood……..7 grass……...……8 Agricultural crop……...…9 Animal dung……10 Others (specify)_____11	

part four :Nutrition and Diet			
301	What is your staple food? (more than one answer is possible)	Teff……1 Maize……..2 Ensete……..3 Sorghum……4 Others (specify)_____5	
302	How many meals per day are you getting?	One times ……..1 Two times ……..2 Three times……..3 Four and above…….4	
303	Do you eat meat and animal products?	Yes ……..1 No…….2	if NO skip to Q305
304	IF yes, for Q303 how many times?	Daily……...1 Every 2 day…….2 Every two week……..3 Once a month……..4	
305	Do you eat green leafy vegetables?	Yes……1 No ……..……..2	if NO skip to Q307
306	If yes, for Q305 how many times?	Daily……1 Every 2 day……..2 Every two week…….3 Once a month…….4	
307	Do you take tea or coffee immediately after meal?	Yes……1 NO……..2	
308	Do you eat fruits after meal?	Yes ……..1 NO ……..2	
309	Do you have history of warm infestation in past three months	Yes……...1 NO……...2	
310	Do you get iron supplementation?	Yes ……..1 NO…….2	

Part five : Obstetric History			
401	Status of menarche	Yes ……1 NO…….2	
402	If yes, Duration of blood flow?	_____	
403	How do you rate your menstrual bleeding?	Average……..1 some……..2 profuse……3	
404	Do you have any history of abnormal menstrual bleeding?	Present……1 Absent…….2	
405	If yes, Duration of blood Flow?	_____	
406	What is your physiological state, means are you currently one of the followings, if yes which one are you?	pregnancy…….1 lactating……2 both……3 none ……..4	
407	How many times you become pregnant in your life?	_____	
408	Have you become infected with malaria from the last one year to today?	YES……1 NO…….2	
409	Do you have anti-malaria treated bed net?	YES…….1 NO ……..2 →	IF NO Skip to Q411)
410	How often do you use?	sometimes ……..1 always …….2 not used ……3	
411	Are you currently using, doing something or any method to delay or avoid getting pregnant?	Yes ……..1 No ……2 →	If NO go Q413
412	Which method?	IUD…….1 Injectables ……..2 implants ……..3 pills……4 condom…….5 natural method……6 Others (specify)_____7	
413	For how long have you been using (current method) now without stopping?	Months ……1 Years…….2	
414	Do you walk barefoot at school or market and home?	YES……..1 NO…….2	

415	Do you smoke cigarettes?	YES……..1 NO……2	
416	Did you receive ANC service in your last pregnancy?	YES……..1 NO……2	if no skip to Q 419
417	where did you receive ANC services	governmental hospital……..1 private hospital ……..2 private clinic ……..3 health center……4 health post……..5	
418	Did you receive counselling concerning about anemia during your ANC?	YES……..1 NO……2	
419	Have you ever been diagnosed with chronic diseases?	YES…….1 NO ……...2 →	if NO skip to part 6
420	Which have you been diagnosed?	tuberculosis……1 hypertension……2 diabetes millets……3 kidney diseases ……4 Others (Specify)_____5	

part six : knowledge about anemia			
501	Do you know anemia?	Yes ……..1 NO……2 I don't know ……3	
502	Do mineral deficiencies in body cause anemia?	Yes ……..1 NO……2 I don't know ……3	
503	Does heavy blood due to menstruation cause anemia?	Yes ……..1 NO……2 I don't know ……3	
504	Do anemic women have weakness?	Yes ……..1 NO……2 I don't know ……3	
505	Do anemic women become breathless easily?	Yes ……..1 NO……2 I don't know ……3	
506	Do anemic women have pale eyes, pale tongue and pale nails?	Yes ……..1 NO……2 I don't know ……3	
507	Can anemia be prevented?	Yes ……..1 NO……2 I don't know ……3	
508	Can anemia be treated by iron tablets?	Yes ……..1 NO……2 I don't know ……3	
509	Avoiding consumption of tea, coffee after food can improve absorption of iron, is this true?	Yes ……..1 NO……2 I don't know ……3	
510	Is severe anemia life	Yes ……..1	

	threatening?	NO……2 I don't know ……3	
511	If severe anemia not treated on time, needs blood transfusion?	Yes ……..1 NO……2 I don't know ……3	
512	Do you have any knowledge about anemia prophylaxis programme?	Yes ……..1 NO……2 I don't know ……3	

part seven : Assessing food insecurity

601	In the past four weeks, did you worry that your household would not have enough food?	YES……1 NO……..2 →	if NO skip Q603
602	How often did this happen?	Rarely (once or twice in the past four weeks)……...1 Sometimes (three to ten times in the past four weeks)……....2 Often (more than ten times in the past four weeks)……....3	
603	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack Of resources?	YES ……1 NO.....2 →	if NO skip Q605
604	How often did this happen?	Rarely (once or twice in the past four weeks) ……..1 Sometimes (three to ten times in the past four weeks)…….2 Often (more than ten times in the past four weeks)…….3	
605	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	Yes ……1 NO…….2 →	if NO skip Q607
606	How often did this happen?	Rarely (once or twice in the past four weeks)……..…….1 Sometimes (three to ten times in the past four weeks)……2 Often (more than ten times in the past four weeks)……3	
607	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other type of food?	YES ……1 NO……..2 →	if NO skip Q609

608	How often did this happen?	Rarely (once or twice in the past four week)…….....1 Sometimes (three to ten times in the past four weeks)…….....2 Often (more than ten times in the past four weeks)…….....…..3	
609	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	YES……..1 NO……2 →	if NO skip Q611
610	How often did this happen?	Rarely (once or twice in the past four weeks) …….....1 Sometimes (three to ten times in the past four weeks)…….....2 Often (more than ten times in the past four weeks)…….....3	
611	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	1. YES……..1 2. NO……2 →	if NO skip Q613
612	How often did this happen?	Rarely (once or twice in the past four weeks) …….....1 Sometimes (three to ten times in the past four weeks)…….....…..2 Often (more than ten times in the past four weeks)…….....3	
613	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	YES…….....…1 NO…….....2 →	if NO skip Q615
614	How often did this happen?	Rarely (once or twice in the past four weeks)…….....……1 Sometimes (three to ten times in the past four weeks)…….....….2 Often (more than ten times in the past four weeks)…….....…….3	
615	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	YES ……...1 NO……..2 →	if NO skip Q617

616	How often did this happen?	Rarely (once or twice in the past four weeks)……..1 Sometimes (three to ten times in the past four weeks)…….....2 Often (more than ten times in the past four weeks)…….....….3	
617	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	Yes ……1 No……...2 →	if NO ends and thank you
618	How often did this happen?	Rarely (once or twice in the past four weeks) ……...1 Sometimes (three to ten times in the past four weeks)……..……..2 Often (more than ten times in the past four weeks)……3	

NB: Record hemoglobin level here: _____gm/dl

Reasons of refusal for blood taking

1. Not present
2. Refused
3. Others (specify)_____

10.3 Appendix Somali language translated questionnaire

Su'aalooyinka muujinaya cunta la'anta ka jirta qoyska iyo dhiig yarida iyo waxyabaha la xidhidha hawenka da'dodu uudhaxayso 15-45 jir ee ku dhaqan gobalka fafan, dagmada, jigjiga iyo ismamul magaledka jigjiga ee Dawlada Deegaanka Soomaalida Itoobiya.

Kala so xidhidh:

Hadi ad qabto waax sual ah wakhti walboy noqoto o kusabsan cilmii badhistan, fadlan kala so xidhidh ciwankan hosku qoran iyo magaca badhaha cilmi badhistan: Saxardiid Cali: ama iimelka ah Sahardiid4all@gmail.com iyo sido kale talefon numberka: 0913957378

Shacaa ka qadiida wargalinta cilmi badhistan

Waa la ii akhriyey wana laa'iishegay inan ikhtiiyar leyahay kana bixii karo xiligan rabo iyo hadan ku qanci wayo sualahan iyo inaan xaq uleyahay inan sual walba waydin karo, wanan fahmay ujedaada cilmii badhistan iyo qabka loo qabanayo wana la iishegay inun iga so gaadhayn wax dhibata ah iyo inaan la isiinayn wax guuno ah iyo waliba in la ii ilalinayo sirtaydaa Waxan ku caadaynayaa ka qayb gaalkayga saaxexayga sida hoos ku caad

Saaxexa ka qaybqaatahaa: _____ Saaxexa sual waydiiyaaha_____

Su'aalooyinka muujinaya cunta la'anta ka jirta qoyska iyo dhiig yarida iyo waxyabaha la xidhidha hawenka da'dodu uudhaxayso 15-45 jir ee ku dhaqan gobalka fafan, dagmada, jigjiga iyo ismamul magaledka jigjiga ee Dawlada Deegaanka Soomaalida Itoobiya

Kilil _____ Gobol _____ Degmo_____

Lambarka su'aalaha ee waraaqda_____MagacaQabalaha_____

Magaca su'aal waydiiyaha_____

Taariikhda laweydiiyay _____Saacada la bilaabeen _____
Saacada la dhameeyeen_____dib u eegida su'aalaha _____

Tiro	Su'alaha laaga jawabayo	Lanbarka jawab celinta	Ku bood
qaybta 1aad : Kusabsan xogta haweenayda			
001	Waa imisa da'dadu?	_____ Sanadka	
002	halked ku noshahay	Miyiga……1 Magalo ……..2	
003	Qowmiyadadu wa maxay?	Somali……..1 Amhara…….2 Oromo……..3 Tigre……..4 Gurage ……..5 Kuwakale(cade)_____6	
004	Waa maxay dintadu?	Muslim……1 Orthodox…….2 Protestant……3 Kuwakale(cade)_____4	
005	Hada waa side xalada lamane?	Aan la guursan (kali)……...1 La guursaday……2 La furay……3 Carmali……4 Kuwakale (cadee)_____5	
qaybta 2aad: Kusabsan dhaqalah iyo bulshada hawenayda			
101	Hada yaad la noshahay?	Odaygayga(ninkayga)……1 Hoyo iyo aboo……2 Qarabada……....3 Kali ban nolahay……..….4 Kuwakale(cadee_____5	
102	Maxad ka shaaqaysa?	Xoogsato……..1 Guri joog ……2 Beeralay(bero qodoto)…….3 Ardaay ban ahay……4 Shaqale dawladed…….5 Iskayban ushaqaysta……..6 Kuwakale (cadee)_____7	
103	Odaygagu ama ninkagu muxu ka shaqeyaa?	Xoogsato……1 Ganacsade……..2 Beeralay…….3 Aarday……..4 Shaqale dawladed…….5 Iskii uu uushaqaysta……...6 Ma shaqeyo…….7 kuwakale(cadee)_____8	

104	Caruur miyad ledahay?	Haa……1 Mayaa…….2	haday maya tahay J ku bood S 106
105	Haday Haa tahay jawabtu Suasha 104 ku qor tiro ahan	_____	
106	Imisaa dhaqale ahaan so gasha qoyska bishi celcelis ahan?	_____ETH birr ahan …….1 Ma garanayo ……..2	
107	Yaa is ka leh guriga aad hada ku noshiihin?	Anaga iskaleh…….1 Dawlada……2 Kiiro ……....3 Kuwakale (cadee)_____4	
108	Waaliga iskul miyad dhigataay?	Haa……..1 Maya……2	Haday Maya tahay ku bood S110
109	Halked ka gadhaay heerka waxbarasho?	Ma qoro mana akhriyo……1 Waan akhrin kara wanan qori kara...2 Dugsi hoose(1-8)……....3 Fasalka 9_12……...4 Shahadada diblomaha……..5 Shahadada degree iyo wax ka sareya…6	
110	Waxbarashadaa odaygagu halkay gadhsisantahay?	Ma qoro mana akhriyo…….1 Wuu akhrin kara iyo wu qori kara……2 Dugsi hoose(1-8)…….....3 Fasalka (9_12)…….4 Shahadada diblomaha……..5 Shahadada degree iyo wax ka sareya…6	
111	Imisa qof ayaad kuwada noshin guriga qoyska?	_____	

qaybta 3aad : Kusabsan nadafada

201	Halked ka so dhansatan biyaha uu qoysku cabayoo?	qasabada xafada ku dhax tala ……1 qasabad toos ugu dhacday barkada…2 qasabadaha sii guud xafaduhu uu isticmalan ……3 biyaha roobka ……4 Haan…….5 gadhi damer ……6 Mel kale (cadee) _____7	
202	Halked ka so dhaansatan biyaha uu qoysku kumaydhoo ama lo isticmalo siyabo kale?	qasabada xafada ku dhax tala ……1 qasabad toos ugu dhacday barkada…2 qasabadaha sii guud xafaduhu uu isticmalan ……3 biyaha roobka ……4 Haan…….5	

		gadhi damer …….6 Mel kale (cadee) _____7	
203	Miyad iska dawaysan biyaha aad cabaysan?	Haa…….....1 Maya……2	haday Maya tahay ku bood S205
204	Haday haa tahay, maxad iskaga dawaysan biyaha?	Waxan isticmalna chlorine…….1 Wan karkarina ……2 Waxan is ticmalna biyo sifaysan …….3 kuwakale(cade)_____4	
205	Miyad qamcaha maydhata markad suliga kaso baxdo? haday haa tahay jawabtu sided uu maydhata	Had iyo jer samun ban isticmala…….1 Marmar samun ban isticmala……..2 Bila samun ban iska maydha……3 Maba maydho ……4	
206	Suli nucee ah ayey qoysku isticmalan?	Suli gudaha guriga kuyala o leh qasabadi biyaha……..1 Suli ka baxsan guriga oo leh qasabadi biyaha…….2 Suli sibidh ka samaysan oo leh hawo mel ay ka baxdo……3 Suli an lahayn mel hawa ka baxdo dabollan……4 Suli ka samaysan caro dusha…….5 Suli laga sameyay dusha ged…….6 Baanaanka …….7 Kuwakale(cade)_____8	
207	Miyu qoysku leyahay wax xola ah?	Haa……1 Maya…….2	haday maya tahay ku bood S209
208	Kee bay leyihiin?	Geel……1 Saco/dibii……2 Fardoo/damero……3 Adhii……4 Iido……5 Kuwakale (cade)_____6	
209	Miyu qoysku isticmala mid ka mida ah kuwan so socda? haday jawabtu haa tahay kee	laydh/solar……1 Sacaad……2 Rikodh……..3 Telefishin……4 Mobile telephone ……5 Talajad ……6 Sariir……7 Faynus ama lanbad…….8 Kuwakale(cade)_____9	
210	Maxay qoyskuu intaa ugu badan ay isticmalan markay	Laydh…….1 Gass ka cad……2 Gass ka cas……3	

	kaarinayan cuntadaa?	Dhuxul ……..4 Geedo……5 Caws……..8 Diigoo…….9 kuwakale(cadee)_____10	

part four : Naafaqada iyo cuntada

301	Waa maxay cuntada inta ugu badaan aad isticmashin? (hal jawab ah kabadan wad doran kartan)	dafii……1 gaalay……..2 Ensete……..3 Sareen……4 kuwakale (cadee)_____5	
302	Imiisa jeer ayad malintii wax cuntaa?	haal mar ……..1 Two times ……..2 Three times……..3 Four and above…….4	
303	Miyad cuntaa hilib iyo waxyabaha xolad?	Haa……1 Maya…….2	Haday Mayaa tahay J ku bood S305
304	Haday jawabtu sare S303 haa tahay, imisa jeer ayad cunta?	Malin walba……....1 labadii cishaba…….2 labadii todobadba…….3 bishi hal mar……4	
305	Miyad cuntaa khudaarta cagaran?	Haa……1 Mayaa ……..……..2 →	Haday Mayaa tahay J ku bood S307
306	Haday jawabtu sare S305 haa tahay, imisa jeer ayad cunta?	Malin walba……....1 labadii cishaba…….2 labadii todobadba…….3 bishi hal mar……4	
307	Miyad cabtaa shah ama bun cunada ka bacdii?	Haa……..1 Mayaa ……..……..2	
308	Miyad cuntaa khudaarta miraha cuntada ka bacdii?	Haa……1 Mayaa ……..2	
309	Miyaad waliga lagugu shegaay xanunada dacunka (goryaan) sadaxdii bilood ee laso dhaftay?	Haa……1 Mayaa……..2	

310	Miyaad heshay kiniinka iron ta ah?	Haa……1 Mayaa …….2	
qaybta 5aad : kusabsan haweenayda			
401	Miyad ledahay dhigaga cadaada?	Haa……..1 Maya……2	
402	Imiisay ayuu ka socda dhiga cadadu?	_____	
403	Imisa jer ayad uur qaday intad noshahay?	_____	
404	Miyu kugu dhacay cudurka dumada la dhaho sanadki ugu danbeyay ila hada?	Haa…….…..…1 Maya…….…...2	
405	Miyad haysataa marakaneco aad iskaga celiso?	Haa……1 Mayaa ……..2 →	Haday maya tahay J ku bood S407
406	Imiisa jer ayad isticmasha?	Marmar……..1 Badana ……..2 Ma isticmalo……...3	
407	Miyad wakhti xadirkan aad isticmashaa wax ad kaga hortagtiid uurka?	Haa ……..1 Maya……2 →	Haday maya tahay J ku bood S410
408	Teed isticmashaa?	Ta makanka la galiyo(IUD)…….1 Irbada (Injectables)…….2 Ta la isku bero(implants) ……3 Kininka (pills)……..4 Condom……5 Sii cadi ah(natural method)……6 Waxkale (cade)_____7	
409	Ilaa imiisa bilod ama sano ayad isticmalaysay tan ad hada isticmashid adon kaala joojin?	Billo……..1 Sanado……..2	
410	Miyad bila kobo socota markad suqa tagaysid ama mel kale?	Haa……..1 Maya……2	
411	Miyad sigar caabtaa ama shishada?	Haa…….1 Maya……..2	
412	Miyad wakhti xadirkan aad tahay/leedahay mid ka mid kuwan so socda?	Uurley ……1 Ad naska nujinaysa ……2 labada……..3 midna ……4	
413	Siidebaad ku qiyaasta cadaada dhiga markay kasocoto?	inkoban…….…..1 waxoga…….2 inyar…….3	

Qaybta 5aad: kusabsan qimaynta cuntadaa.			
501	Afarti todobad ee laso dhafay, miyad ka walacday in uu qoysku haysan cuntoo ku filan?	Haa…….1 Maya …….2 →	haday Maya tahay ku bood S503
502	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……....1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)……...2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……3	
503	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida qoyska uu heli ama awodi wayey cuntadaa uu jecelyahay sabato ah wax laan?	Haa…….1 Maya ……..2 →	haday Maya tahay ku bood S505
504	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……...1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)…….2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……..3	
505	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida qoyska uu cunay cunto xadidan sababto ah wax lan?	Haa……1 Maya…….2 →	haday Maya tahay ku bood S507
506	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)……..…..2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……..…….3	
507	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida ah qoyska u cunay cuno un rabin inu cunto sababto ah haysasho la'an cuna kale?	Haa…….1 Maya …….2 →	haday maya tahay ku bood S509

508	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay)……....1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)…….2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……3	
509	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida ah qoyska uu cunay cuno ka yar inta u rabay sababto ah haysasho la'an cuno ku filan?	Haa……1 Maya ……2 →	haday haa tahay ku bood S511
510	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……..1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)……2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……3	
511	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida ah qoyska uu cunay cuno yar malin sababto ah haysasho la'an cuno ku filan?	Haa……1 Maya ……2 →	haday haa tahay ku bood S513
512	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……...1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)……2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……3	
513	Afarti todobad ee laso dhafay, miyey wax cuno la'ani ka dhacday qoyska guriga sababto ah wax la'an ka jirta aw ged in la helo conto?	Haa……1 Maya ……..2 →	Haday maya tahay ku bood S515
514	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……..…..1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)……...2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay) ……3	
515	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida ah qoyska uu sexday haben isago gajonaya sababto ah haysasho la'an cuno ku filan?	Haa……..……..1 Maya ……2 →	Haday maya tahay ku bood S517

516	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay) ……1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)…….2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay) …….3	
517	Afarti todobad ee laso dhafay, miyad/miyu qof ka mida ah qoyska uu jogay cuno la'an malin iyo haben sababto ah haysasho la'an cuno ku filan?	Haa……..1 Maya ……..2 →	haday haa tahay ku bood S518
518	Imisa jer ayey dhacday xaladani?	Dhifdhif (mar ama laba Afarti todobad ee laso dhafay)……1 Marmar (sadex ila toban jer Afarti todobad ee laso dhafay)…….2 Badana (in kabadan toban jer Afarti todobad ee laso dhafay)……..3	

Tusmo: halkan ku qor tiraada hemoglobinta: _____gm/dl

Sababta ay udiday Ina laga qado dhiga

1. Jogid la'an guriga
2. Diidid
3. Sabab kale (cadee)_____

Waad ku mahadsantahay ka qaybqadashadadaa!!!!

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