

**PREVALENCE OF ANAEMIA AND ASSOCIATED FACTORS AMONG  
PREGNANT WOMEN IN DOBA WOREDA WEST HARARGE ZONE  
OF OROMIA REGIONAL STATE**

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## ABSTRACT

**Background:** Anemia remains to be the most common nutritional problem worldwide. Pregnant women in Africa are among the most at risk with prevalence reaching up to 60%. In Ethiopia, despite the high occurrence of multiple risk factors, previous studies reported anemia as a moderate public health problem. Dietary factors- relatively higher dietary non heme iron intake-were suggested for the lower prevalence, particularly iron deficiency anemia, than many sub-Saharan countries. However, dietary culture in the country is diverse and anemia could be a serious problem in some communities with typical diet and food insecurity. The aim of this study is to determine magnitude and predictors of anemia among pregnant women in Doba Woreda.

**Methods:** Community-based cross-sectional study design involving both qualitative and quantitative method was conducted from February to March 2013. A total of 552 randomly selected pregnant women living in 13 of the 41 Kebeles in the woreda were assessed for hemoglobin status and anemia risk factors. Hemoglobin concentration was determined using portable HemoCue device whereas nutritional status was assessed by MUAC. Data on socio-demographic characteristics and anemia risk factors were gathered using structured interview whereas qualitative information on socio cultural factors was obtained through focus group discussions with selected participants. Anemia was determined using altitude adjusted hemoglobin concentrations and based on the CDC Atlanta cutoff points. Bivariate and multivariable logistic regression models were used to identify predictors of anemia. Qualitative data was analyzed based on thematic frameworks to support the quantitative results.

**Result:** The prevalence of anemia among the study population was 51.7% where 46.2%, 52.4% and 1.4% had mild, moderate and severe anemia, respectively. Multivariate logistic regression analysis showed that nutritional status (AOR [95%CI]; 0.636[0.544, 0.744], main food source (AOR [95%CI]: 2.262 [1.402, 3.648], women dietary diversity score (AOR [95%CI]: 0.819 [0.705, 0.951]) household food insecurity (AOR=2.001 [95%CI]: [1.127, 3.553] and ANC attendance (AOR [95%CI]: 2.507 [1.533, 4.099] were independent predictors of anemia. In this community pregnant women avoid eating balanced diet due to fear of obstructed labour.

**Conclusion and recommendations:** This study has showed that anemia in pregnancy is a severe public health problem in Doba woreda. Most of the factors were directly related with women's food intake which has been influenced by cultural and social believes of local community and make low intake of iron rich foods. Improving maternal nutrition and reducing iron deficiency anemia through iron-folic acid supplement should be maintained but more attention should be given to adherence counseling and on the improvement of awareness on the need of balanced diet for women especially during pregnancy.

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## ACRONYMS

ANC	Antenatal care
BMI	Body Mass Index
CDC	Centre for Disease Control
DDS	Dietary Diversity Score
EDHS	Ethiopian Demographic Health Survey
EHNRI	Ethiopian Health and Nutrition Research Institute
FGD	Focus Group Discussion
FMOH	Federal Ministry of Health
HC	Health Center
HEW	Health Extension Worker
HFIAS	Household Food Insecurity Access Scale
HIV	Human Immune Deficiency Virus
ITN	Insecticide Treated Net
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MUAC	Mid-Upper Arm circumference
PPH	Post Partum Hemorrhage
SPSS	Statistical Package for Social Science
USIAID	United States Agency for International Development

WHO

World Health Organization

WDDS

Women Dietary Diversity Score

# CHAPTER ONE

## INTRODUCTION

### 1.1. BACKGROUND

Anemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development. It occurs at all stages of life cycle, but is more prevalent in pregnant women and young children. It occurs when the concentration of hemoglobin falls below what is normal for a person's age, gender and environment, resulting in the oxygen carrying capacity of the blood being reduced (1-2).

The mean minimum acceptable hemoglobin level during pregnancy by WHO criteria is taken to be 11g/dl in the first half of pregnancy and 10.5 g/dl in the second half of pregnancy. The World Health Organization further divide anemia in pregnancy into: mild anemia (hemoglobin 10-10.9g/dl), moderate anemia (Hgb 7.0- 9.9g/dl) and severe anemia (Hgb < 7g/dl) (4). It is thought that about half the anemia in pregnant women is due to iron deficiency, but this proportion can vary across geography, socioeconomic status, and other factors. Iron deficiency is caused by high iron requirements during critical periods in the life cycle that are not met by iron absorption in diet, especially in populations consuming foods with low dietary bioavailability of iron from plant-based diets with little meat (3- 4).

Many women are iron deficient anemic even before they become pregnant. In teenage girls menstrual blood losses superimposed with increased iron requirements from adolescent growth, put them at a higher risk for iron deficiency. In pregnancy, iron requirements increase three-fold from expanding maternal red-cell mass and the growing placenta and fetus. This means iron requirements during pregnancy increase by one gram, which is equivalent to four units of blood. This high requirement for iron places pregnant women at a high risk for iron deficiency (5). Anemia has multiple precipitating factors that can occur in isolation but more frequently co-occur. In addition to poor bioavailability of dietary iron, intestinal worm infections (and particularly blood loss from hookworm infections), malaria & HIV infection compound the problem of anemia in many areas. Other important factors include vitamin deficiencies such as folate and vitamin A deficiency; and hemoglobinopathies (5).

## **1.2. STATEMENT OF THE PROBLEM**

Reducing maternal mortality is one of the eight health related Millennium Development Goals (MDG5) adopted at the Millennium Summit in 2000. Within this framework, the international community is committed to reduce Maternal Mortality by three quarters between 1990 and 2015 (6).

Hemorrhage is the leading cause of maternal mortality. Anemia is one of the world's leading causes of hemorrhage and disability and thus is one of the most serious global public health problems (7, 8).

Anemia is the most common nutritional deficiency disorder in the world. There are more than 2 billion people in the world with anemia – one third of the world's population. Anemia prevalence is highest in developing countries. WHO has estimated that prevalence of anemia in developed and developing countries in pregnant women is 14 per cent in developed and 51 per cent in developing countries. About one third of the global populations (over 2 billion) are anemic. The, around half of those with anemia, are suffering from iron deficiency anemia. Anemia resulting from iron deficiency is considered to be one of the top ten contributors the global burden of the disease (11).

Based on WHO most recent estimates, 4 of every 10 pregnant women and 3 of every 10 non-pregnant women are anemic and categorized and emphasized on the significant health consequences based on the prevalence of the anemia. If the prevalence of anemia is 4.9% or less, it is considered as no public health problem for that country. The prevalence of anemia between 5.0% and 19.9% indicates a mild public health problem. Moderate public health problem is been considered when the prevalence is between 20.0% and 39.9% this means iron deficiency exist in 50 percent of the population. If the prevalence is 40.0% or more, it is considered as severe public health problem or the entire population suffer from some degree of iron deficiency (9, 1).

Africa is home to the highest prevalence of anemia in all risk groups with approximately 55 percent of all pregnant women being anemic, followed by Asia where approximately 42 percent of pregnant women are anemic. In absolute numbers, anemia affects 56 million pregnant and 468 million non-pregnant women. Asia, with 31.7 million anemic pregnant and

318.3 million anemic non-pregnant women, followed by Africa, with, 19.3 million anemic pregnant and 82.9 million anemic non-pregnant women (9).

The World Health Organization (WHO) estimates that in Ethiopia anemia is a severe problem for both pregnant (62.7%) and non-pregnant women of childbearing age (52.3%). However, EDHS 2011 report shows that Seventeen percent of Ethiopian women age 15-49 are anemic, with 13 percent having mild anemia, 3 percent having moderate anemia, and 1 percent having severe anemia. A higher proportion of pregnant women are anemic (22 percent) (1, 16).

Anaemia is an indicator of both poor nutrition and poor health .Nutritionally related iron deficiency is the main cause of anemia throughout the world. It is especially common in women of reproductive age and particularly during pregnancy. The demand for iron increases about six to seven times from early pregnancy to the late pregnancy. Besides poor nutrition frequent labor, multiparty, abortions, parasitic infestations, malaria infection, consuming excess tea or coffee after meals, Age, socio cultural determinants (food taboos, perception of the problem anemia, and socioeconomic status of the women) determined as the predictors of anemia in reproductive age women (1,2,3).

Studies well indicated the association of anemia with maternal morbidity and mortality. Worldwide, anemia contributes to 20% of all maternal deaths (9) Anemic mothers do not tolerate blood loss to the same degree as healthy women. During childbirth, a healthy mother may tolerate a blood loss of up to a liter. However, in an anemic mother, the story is different; a loss of as little as 150ml can be fatal (11).

Anemia in pregnancy also leads to premature births, low birth weight, fetal impairment and infant deaths. Most of the studies suggest the effect of maternal anemia on the fetus vary on degrees of anemia that: a fall in maternal hemoglobin below 11.0 g/dl is associated with a significant rise in prenatal mortality rate. A significant fall in birth weight due to increase in prematurity rate and intrauterine growth retardation has been reported when maternal hemoglobin levels were below 8.0 g/dl (4).

Immune depression due to anemia and consequent increased morbidity due to infection, especially urinary tract infection, might be one of the factors responsible for low birth weight babies in anemic women (11).

It reduces the productivity of women. The reduction in women's productivity places an economic burden on the families, communities and the societies (4).

In general Anemia in pregnancy is associated with adverse consequences both for the mother and the fetus. Studies have shown that the adverse consequences of maternal anemia may affect not only the neonate and infant but also increase the risk of non communicable diseases and impair motor and cognitive development when the child grows into an adult and the risk of low birth weight in the next generation (9).

For this reason controlling anemia in these vulnerable groups could significantly reduce maternal and infant mortality and morbidity. It would also enhance intellectual and work capacity, thereby improving family, community and national socioeconomic development (7).

## CHAPTER TWO

### 2.1 LITERATURE REVIEW

As exhaustively documented in different literature anemia in pregnancy is common health problem especially in developing countries. According to Worldwide prevalence of anemia, WHO Vitamin and Mineral Nutrition Information System, 1993-2005. The estimated global anemia prevalence is 24.8 % affecting 6.2 billion people). Estimated anemia prevalence is 47.4 % in preschool-aged children, 41.8 % in pregnant women and 30.2 % in non-pregnant women (1).

A cross sectional study done by Karaoglu *et al* in east Anatolian province of turkey on 823 pregnant women showed 27.1% of pregnant women are anemic. Anemia was more prevalent in women with four or more living children than in women with fewer children. Their finding also was associated with PICA (soil eating habits of pregnant women) anemia was more prevalent among soil eaters (37.0%). Most of the anemia recorded was normocytic-normochromic indicating mixed anemia. A stratified multi-stage probability-proportional-to-size cluster sampling methodology was used in selecting the study population. After administering face to face questioner a total of 10 ml of venous blood sample was obtained from each participant, Complete blood count was achieved within four hours with Beckman-Coulter, USA. Iron, folate and B12 vitamin was studied among anemic women after storing sera at - 20°C for six months. Radio immunassay method was used to determine folic acid and vitamin B12 levels (Immulite 2000, Diagnostic Product Corporation, Los Angeles, CA, USA). Serum iron concentration and unsaturated iron binding capacity (UIBC) was measured using Olympus System (Au 2700, Germany).the limitation of the study was Hemoglobin determination coasty and was not standard method (17).

NH Nik Rosmawat *etal* for Anemia among Pregnant Mothers in Jerneh Terengganu, Malaysia This cross-sectional study shows on their research that Of 47 respondents, 57.4% was anemic. A Systematic random sampling was applied and the data collection was carried out by using a structured study questionnaire and reviewing patients' medical records. The proportion of anemia was 58.3% and 57.1% for mothers with last child birth spacing of two



years or less and more than two years accordingly. The limitation of the study was hemoglobin was determined using medical record review this doesn't identify the current status of women and difficult to associate risk factors. A systematic random sampling is probability sampling but the sample size was too small and this makes the result difficult to generalize (27).

Alyson M. et al, predictor of anemia among pregnant woman in west Moreland, Jamaica indicates that of 204 pregnant women 34.8% were anemic. Body Mass Index (BMI), Mid-Upper Arm circumference (MUAC) and number of ANC visit showed statistical significance. Multi center cross sectional design was used to assess hemoglobin level medical record review the result of prior visit may not represent the current status. Convenience sampling and cross-sectional design was the limitation of this study (22).

According to Mahasen et al, maternal anemia in rural Jordan 34.7% of woman was anemic. Gestational age, body mass index(BMI) ,history of previous surgery and multivitamin intake during pregnancy were significantly associated .This cross sectional study was conducted among 700 women who came for antenatal care in National Health Service hospital and ten health centers during the study period, by using convenient sampling method. Venous blood samples were obtained and analyzed for complete blood count using a standardized hematological screen at the hospital's laboratory (24).

The prevalence was the highest for women in the 3rd trimester (42.5%) compared to those in 2nd trimester (32.7%) and 1st trimester (18.9%).Underweight women had higher odds of anemia. History of previous surgery and multivitamin intake during pregnancy were associated with higher odds of anemia it is costly to use complete blood count and reliability of the test also difficult to measure, this measurement is only descriptive in nature doesn't associate other factors (24).

TU Agan et al(2010), Prevalence of anemia in woman with asymptomatic malaria parasitemia at first visit antenatal care visit at university of Calbar Teaching Hospital ,Calabar, Nigeria show that prevalence of anemia among 545 pregnant woman was 59.6%,there were statistically significant association between severity of parasitemia and degree of anemia.

The majority (66.7%) who had severe parasitemia were severely anemic (33.3%) had mild to moderate anemia while none had normal hemoglobin. Prospective observational study was conducted over 3-month period but convenient sampling and other predictors is not well addressed (23).

S. E. Msuya *etal*(2007)A study conducted on 2654 pregnant women in Moshi Municipality in northern Tanzania showed that Anemia, (Hgb<11.0g/dl) was found to be present in 47.4% of the pregnant women in this study, Of these, 35.3%, 9.9% and 2.1% had mild, moderate and severe anemia .Anaemia was significantly more prevalent in HIV-positive (56.4%) than in HIV-negative women (46.7%), .Pregnant women with anaemia were more likely to have low birth weight (LBW) infants. Compared with non-anemic women, the risk of LBW was 1.6 times and 4.8 times higher for children born to women with moderate and severe anaemia, respectively (28).

The prevalence of HIV seropositivity in the study population was 3.5% while the prevalence rate among anemic pregnant women was 8.5%, thus this study observed a statistically significant higher prevalence of HIV seropositivity in the sample of anemic women than the prevalence of the entire pregnant women but comparison between two different population makes difficult due to different sample size and nutritional factors is not well addressed (15).

The result of, Tadege which was conducted in Southern Ethiopia shows that the prevalence of anemia in pregnant women was 51.9%, The prevalence of anemia was 39.2%, 54.5% and 57.5% for primigravida, multigravida and grandgravida respectively. Wearing shoe also showed lower prevalence of anemia comparing to non shoe wearing pregnant women (35% and 66%), respectively all intestinal parasitic infections showed a statistical significance difference with anemia Pregnant women walking barefoot were two times likely to be anemic (18).

Umeta *etal*(2005) a study conducted on Iron Deficiency Anemia among Women of Reproductive Age in Nine Administrative Regions of Ethiopia indicate that Oromiya region is one of the three mostly affected region anemia is highly prevalent .The highest prevalence

of anemia rate was seen in Afar with 79.4% followed by Dire-Dawa with 55.7 %, Oromiya (32.3%)(19).

The overall prevalence rate of iron deficiency determined by serum ferritin was 49.7%. The highest prevalence rate was observed in Afar with 65.1% followed by Dire-Dawa (63.9%), Harari (61.8%), Oromiya (55.0%), the overall prevalence rate of IDA was 17.0% with marked regional variations. Using multi-stage cluster-sampling approach assessed for hemoglobin (n=1135) and serum ferritin (n=935) status. Clinical anemia or pallor was considered in this study when there was any degree of paleness of conjunctiva, palm or nail beds and normal otherwise. Hemoglobin concentration was measured from capillary blood using a portable hemoglobin meter (HemoCue AB, Ängelholm, Sweden). The calibration of the HemoCues was checked daily using control microcuvettes provided by the manufacturer. Serum ferritin, which reflects body iron stores, was analyzed using an enzyme-linked immunosorbent assay (ELISA) with a fully automated Elecsys 1020 using commercial kits purchased from Boehringer Mannheim, Germany at EHNRI. But Dietary habit is not included in this study, the association between parasite and malaria with anemia is not well established Studies conducted over the years witnessed the public health significance of anemia in Ethiopia (24).

A study by J.Haidar *et al* (2009) reported that 29.4% prevalence of anemia in reproductive age group women of this iron deficiency anemia was 18.0%. Prevalence of anemia, iron deficiency, and iron deficiency anemia was highest among those 31-49 years old women. Intake of vegetables less than once a day and meat less than once a week was common and was associated with increased anemia (14).

Given the fact that Ethiopia is among the poorest country in Africa with high rates of food insecurity and malnutrition [19] one may assume problems with iron deficiency anemia. Although Ethiopia has a wide range of agro-climatic conditions and grows a variety of cereals, root crops and vegetables, some of these are not fully utilized. There appears to be dependency on a single food crop by region although the specific crop varies in the different regions. The staple crops consumed in the North and Central part of Ethiopia are teff (*Eragrostis tef*) and cereals; in the South and Southwest staple crops are enset (*Ensete*

ventricosum), cassava (*Manihot esculenta*), maize (*Zea mays*), cereals and root crops; and in the East staple crops are sorghum and maize. The lack of dietary diversity results in a shortage of minerals and vitamins which suggests that the bio-availability of much of the iron in the average Ethiopian diet is restricted and this restriction presumably affects the iron status (29).

The work of Hiadar(2005) a study conducted on Prevalence of Anemia, Deficiencies of iron and folic acid and their determinants in Ethiopian women shows that the overall prevalence of anemia, iron deficiency, iron-deficiency anemia, deficiency of folic acid, and parasitic infestations was 30.4%, 50.1%, 18.1%, 31.3%, and 13.7% respectively. A cross-sectional community based study with analytical component was conducted in nine regions of Ethiopia among 970 apparently healthy looking women of child bearing age (15-49). The major determinant for anemia was chronic illness, deficiency of iron and deficiency of folic acid (29).

Socio cultural the perceptions of the society of the problem of anaemia during pregnancy, cultural food taboos, socio economic status and literacy level One study in Nigeria showed that many foods that are avoided during pregnancy provide all the key nutrients (calcium, iron, vitamin A, folic acid, vitamin C) needed by pregnant women(37).

Many pregnant women in India and Thailand believed that taking iron and vitamin tablets will cause them to have big babies, resulting in difficult deliveries (36).

Study conducted in Malawi indicates most of people believe the following food item should not be eaten by a pregnant woman. *E.g*:

Pepper-It is prohibited because babies are born with sores all over the body and red eyes.

Eggs-The head of the child is born without hair.

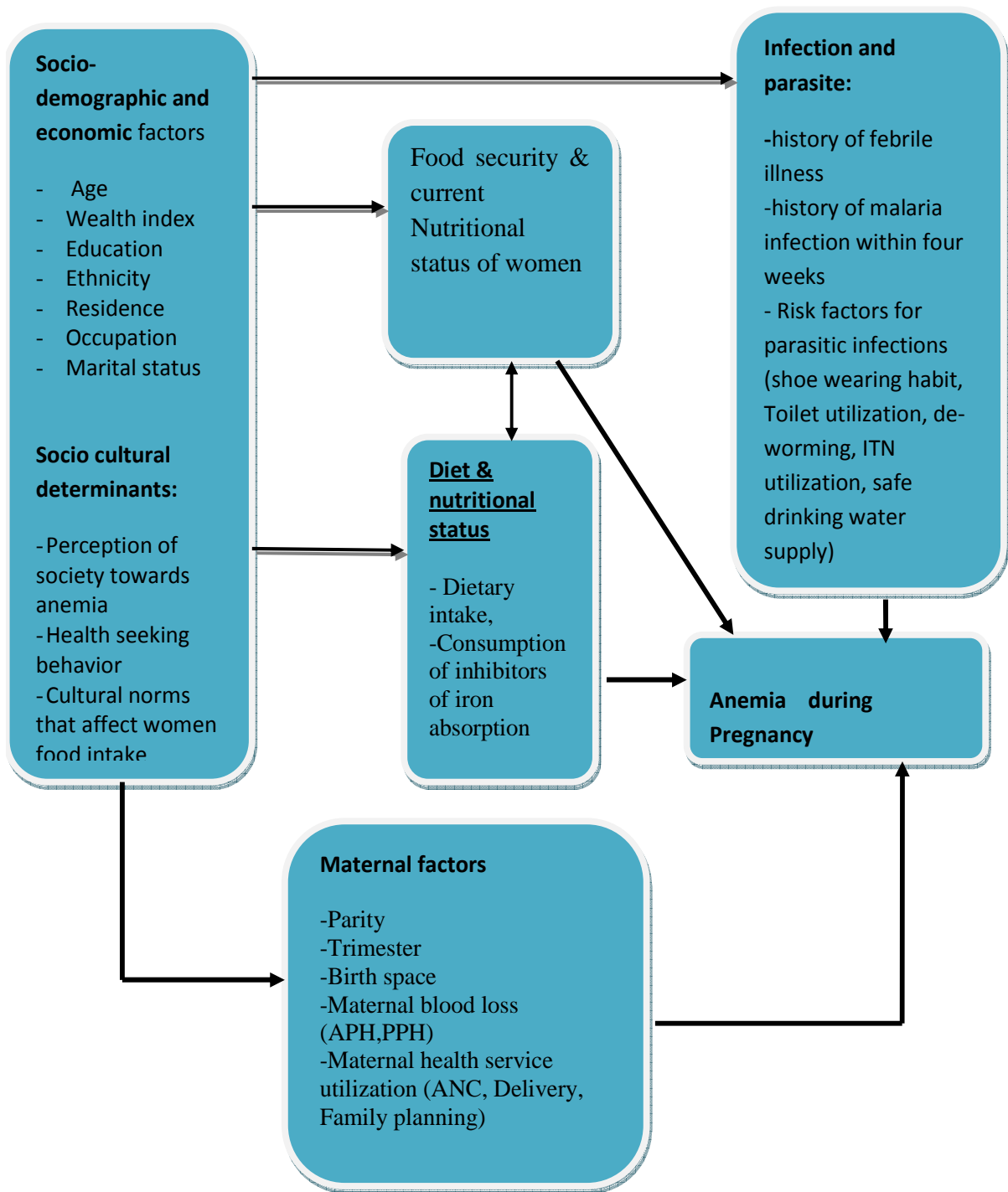
Sweet potato leaves- It causes delay during birth of the child. Causes delay in labor progress and post maturity.

Pig meat- The baby is born with skin rashes.

Mudfish-The mudfish because of its slippery body, you know it has no scales causes abortions.

Sugar cane it causes the baby to be born with grey skin (4).

A handful of previous studies tried to identify potential socio-cultural, economic, demographic, nutritional, reproductive and other potential risk factors of anemia in pregnancy and women of reproductive age. However, in addition to being small scale, these studies reported conflicting and divergent conclusions. The purpose this study will be done to identify prevalence and determinants of anemia among pregnant women.



**Figure 1; Conceptual frame work on factors associated with anemia in pregnancy**

Developed by referring different literatures (3,5)

## **2.2 SIGNIFICANCE OF THE STUDY**

Anemia is ignored in most developing countries even though it is one of the most prevalent public health problems and has serious consequences for national development. The etiology of anemia in Ethiopia is not well established and the information available is limited in representativeness of the whole country. Various researchers came up with different conclusions despite the problem being among the ten top morbidities reported by most health institutions in the country.

In addition to this, the studies done on determinants of anemia were conducted mainly in institution this might not represent general population. The magnitude and predictors of anemia are not explored in this area. Socio-cultural related factors which may contribute for anemia were not assessed in most of the study. The rationale of this study is aimed filling this gap information.

In addition, this study will have great importance in developing information for planners and programmers that can be used in tackling nutritional anemia during pregnancy and associated factors through key nutrition messages targeting the prevailing problems in Doba District West Hararge Zone.

## **CHAPTER THREE**

### **OBJECTIVE OF THE STUDY**

#### **3.1 GENERAL OBJECTIVE**

To assess prevalence of anemia and associated factors among pregnant women in Doba Woreda West Hararge Zone of Oromiya Regional state, East Ethiopia 2013.

#### **3.2 SPECIFIC OBJECTIVES**

1. To determine the magnitude of anemia among pregnant women in Doba district.
2. To assess maternal health service utilization among pregnant women live in this district.
3. To assess nutritional status of pregnant women.
4. To assess socio cultural factors related with anemia .
5. To identify predictors of anemia among pregnant women.



## CHAPTER FOUR

### METHODS AND MAERIALS

#### 4.1 STUDY AREA AND PERIODS

The Study was conducted from Feb-Mar 2013 in Doba Woreda, West Hararge zone of Oromiya region which is located on 380km from Addis Ababa, East Ethiopia. This woreda is one of the largest woreda which covers about 730 Square kilometers. It has 41 kebeles and is also found in the altitude of 1400-2500m above sea level. Based on 2007 census and using population projection Doba woreda has an estimated total population of 157,287, of which 49% (77071) were males and 51% (80216) were females .There are 34808 women of reproductive age group among this pregnant women account about 5301.

According to Doba Woreda health office there are five functional health centers, 40 health posts and 7private clinic offer health services for the total population .Based on 2012/2013 year report about 74% of pregnant women take ANC service.

The people in this woreda are semi -pastoralist, main agricultural products include sorghum, maize, barley, wheat, and haricot been, chat and coffee. According to agriculture bureau food security unit, there were 30 food insecure kebeles and 28,000 people that relay on food aid.



Fig 2: Map of Doba woreda Feb 2013

## **4.2 STUDY DESIGN**

A community based cross-sectional study design with both quantitative and qualitative methods.

## **4.3 SOURCE AND STUDY POPULATION**

### ***4.3.1 SOURCE POPULATION***

All pregnant women residing in Doba woreda

### ***4.3.2 STUDY POPULATION***

A representative sample of pregnant women from the selected urban and rural Kebeles of Doba district who meet the selection criteria

Pregnant women, elders and women in the reproductive age group selected from urban and rural Kebeles were used as study population for the focus group discussion.

## **4.4 SELECTION CRITERIA**

### ***4.4.1 INCLUSION CRITERIA***

Pregnant women who reside in this woreda

### ***4.4.2 EXCLUSION CRITERIA***

Those women who lived in this woreda for less than 6 months.

## **4.5 SAMPLE SIZE AND SAMPLING PROCEDURE**

### ***4.5.1 SAMPLE SIZE DETERMINATION:***

The sample size for this particular study was calculated using formula for a single population proportion considering the following assumptions:

*Where:* n = Minimum sample size

P = Expected prevalence of anemia among pregnant women in Ethiopia 22% (16)

d = an absolute precision (margin of error 5%).

$Z_{\alpha/2}$  = standard normal variable at 95% confidence level.

Substitute in the following single population proportion formula.

$$n = \frac{\left(Z_{\left(\frac{\alpha}{2}\right)}\right)^2 P (1 - P)}{d^2}$$

Since the source population <10,000 finite population correction formula was used.

$$\text{i.e. } n' = n/(1+n/N)$$

Which yields a final total sample size of 251 and by adding 10% for non response and multiplying by design effect of 2, the final sample was determined to be 552 pregnant women.

Four FGDs were conducted separately in four groups each having six to ten members. The four FGDs were considered as adequate after achieving saturation of incoming ideas. A total of 33 women with average of 8 women in each FGD were participated. The participants were selected using convenience sampling technique by the principal investigator based on previous experience of pregnancy.

#### **4.5.2 SAMPLING TECHNIQUE**

Multistage sampling technique was applied to draw a representative sample of all pregnant women in Doba woreda. Primarily a total of thirteen kebeles both from rural and urban were selected using simple random sampling technique. Then the sampling frame was developed by using round 19 nutritional screening reports which was conducted on February 2013 that was prior to one week of data collection. List and number of screened pregnant women for each selected kebele was obtained from woreda health office. The sample was allocated proportional-to-number of screened pregnant women. Then from the list of women the study participants were selected by simple random sampling technique using Computer generated random number open EPI random program.

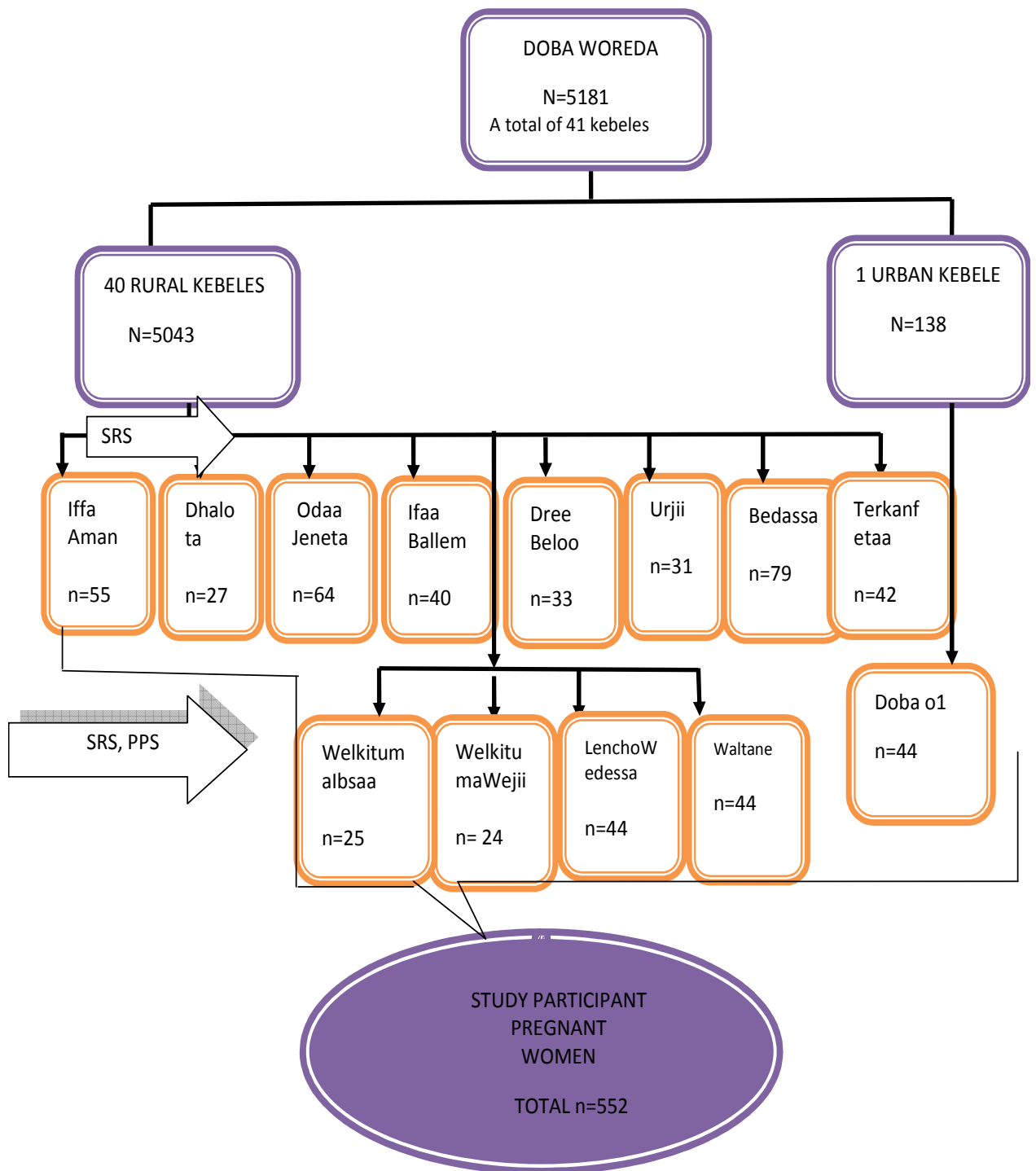


Figure 3; Schematic presentation of sampling technique

## **4.6. DATA COLLECTION PROCEDURE**

### ***4.6.1. DATA COLLECTION TOOLS / MEASUREMENT TOOLS***

The data were collected using Interviewer administered questionnaire adapted from other study and different guidelines by making some modification related with objectives and variables of the study. The format of question consists of six parts .The first section assess the background information, the second part ascertain obstetric, medical and nutritional factors. The third and fourth parts assess Women Dietary diversity score which is adapted from the FANTA Household Dietary Diversity Score Indicator Guide used to assess dietary intake based on 24hr recall (30). Food security at household and individual level was assessed using standard Household Food Insecurity Access Scale (HFIAS) Measurement Tool (31).Diet was also assessed by simplified food frequency questionnaire which is modified Helen Keller International that was used previously in national studies to estimate meat and vegetable consumption.

MUAC was measured in the half way between olecranon process and acromion process using non stretchable tape the value to the nearest 0.5cm and values below 21.0cm was used as an indicator of malnutrition. Mid Upper Arm Muscle Circumference (MUAC) is an indication of the body's muscle which is the main site of protein storage. This calculation would then indicate the current nutritional status of the woman and is used as a proxy for body weight, since it is largely independent of gestational age. Portable hemoglobinometer HemoCue (HemoCueHb301, Sweden) system for point-of care was used for hemoglobin measurement which is cost effective, fast-result in approximately 10 seconds, accurate and precise-no calibration or instrument adjustment needed, user friendly easy to use with little training or supervision, portable-battery operated and hygienic-single use cuvettes and minimal exposure to blood.

For FGD semi-structured discussion guide containing 6 major questions was developed by principal investigator after reviewing literatures. The guide mainly covered social and cultural related factors.

#### ***4.6.2 DATA COLLECTION METHO AND DATA COLLECTORS***

Sixteen nurse students from nearby rift valley nursing college Chiro campus and five BSc nurses and public health officers from woreda health office were recruited as data collector and supervisors respectively. Three day training was given prior to data collection which has four parts brainstorming, discussion, video and demonstration to clarify issues on data collection procedure. Training manual was prepared by principal instigator.

Data were collected from February 2 to March 17, 2013. The actual data were collected by integrating with HEW and community volunteers. The data collectors interviewed the respondents within selected villages of respondents using HEWs information to access their specific address. All pregnant women participating in the study received an explanatory statement about the study and informed that participation was voluntary and anonymous prior to commencing the survey .Anthropometric measurement was taken after each interview and then blood sample for hemoglobin determination was taken from the same finger-prick, a HemoCue-cuvette is filled and the result read within 10 min.

Four FGD was conducted in selected kebeles. Experienced moderator and note taker was assigned for each interview to obtain and verify response from respondent. Each discussion took one to two hours. All discussions were tape recorded & field notes were taken and transcribed to texts immediately.

## 4.7 STUDY VARIABLES

### 4.7.1 DEPENDENT VARIABLES

- Anemia in pregnancy

### 4.7.2 INDEPENDENT VARIABLES

#### 1) Socio demographic characteristics

- Age
- Marital status
- Occupation
- Education
- Ethnicity
- Religion
- Family wealth

#### 2) Maternal and obstetric factors

- Gravidity
- Number of under five children
- Gestational age
- Maternal health service utilization
  - ✓ ANC, Delivery & Family-planning method-use
- Maternal blood loss
  - ✓ APH, PPH

#### 3) Bioavailability of iron

- Dietary intake
- Consumption of tea or coffee after meal

#### 4) Nutritional status

#### 5) Infection and parasite

- Malaria -history of febrile lines within the four week
- History of febrile illness
- Risk factor for parasitic infection
  - ✓ Shoe wearing habit, Toilet utilization, De-worming, ITN utilization and Safe drinking water supply

#### 4.8 OPERATIONAL AND TERM DEFINITIONS

- **Pregnancy:** The state of carrying a developing embryo or fetus which is self reported.
- **First trimester pregnancy** –gestational age of pregnancy below 13 weeks
- **Second trimester pregnancy**-gestational age of pregnancy between 13 to 25 weeks
- **Third trimester pregnancy**-gestational age of pregnancy more than 25 weeks (15).
  - **Anemic:** when hemoglobin level is below 11g/dl
- **Severe anemia:** Women with <7.0 g/dl of blood hemoglobin level.
- **Moderate anemia:** Women with 7.0-9.9 g/dl of blood hemoglobin level.
- **Mild anemia:** Pregnant women with 10.0-10.9 g/dl blood hemoglobin level (4).
  - **Under nutrition:** can be in the form of protein energy malnutrition and micronutrient deficiency. MUAC- values below 21.0cm was an indicator of malnutrition.
- **Moderate malnutrition:** MUAC values between 21.0cm-17.0cm
- **Severe malnutrition** :MUAC value below 17.0cm(35)
  - **Household Food security (HFS):**- refers to the ability of a household to assure all its members' sustained access to sufficient quantity and quality of food to live active health lives (31).
  - **Household food insecurity:** if the family experiences any of the conditions (uncertainty, insufficient quality and quantity of food) within the recall period. - ( if the answer to any of the questions is “rarely,” “sometimes,” or “often”. The only exception was among households in which the respondent’s answer to question 1 was “rarely” but the response to all the other questions was “never”) (31).
  - **Gravidity** –number of pregnancy
- **Grandmultipara:** a woman who has more than 5 children
- **Multipara:** a woman who has 2-5 children(21)
- **Women dietary diversity score:** the number of different food groups consumed by respondents.
  - **Low Dietary Diversity:** DDS less than or equal to three.(35)
  - **Medium Dietary Diversity:** DDS of four or five.(35)
  - **High Dietary Diversity:** DDS greater than or equal to six.(35)



➤ **Wealth Index-** Wealth index, composite indicator of a cumulative living standard, was calculated based on ownership of selected assets such as television, radio mobile ,bed and presence of cow, oxen, goat, sheep, chicken initially.

#### **4.9 DATA PROCESSING AND ANALYSIS**

The data was checked for completeness, consistencies, then cleaned, coded and entered in to a computer using Epi-data3.1 and exported to SPSS windows version 16.0 for analysis. Descriptive statistics was computed for all variables according to type which used to summarize the data. Binary logistic regression was employed to explore association between dependent variable (anemia status) and independent variables. Variables were entered into the model using the “enter” method.

Then, to control the confounding effect of other variables and to determine independent predictors of anemia multivariable logistic regression analysis was carried out. Variable that have  $P < 0.25$  in bivariate analysis were a candidate for entry into multivariate model. The strength of statistical association will be measured by adjusted odds ratios and 95% confidence intervals. Statistical significance will be declared at  $P < 0.05$ . During the analysis, the fitness and statistical assumptions of the logistic model were checked to be satisfied. Hosmer-Lemeshow statistic was used to assess the fitness of the model.

Hemoglobin was used to classify anemia state after an adjustment made for altitude at the field by using CDC Atlanta method based on the recommendations of the International Nutritional Anemia Consultative Group. An elevation over 1000m increase patient Hgb level this can mask the presence of anemia if it is not considered carefully. To adjust hemoglobin values for altitude, correction values suggested by the Centre for Disease Control (CDC) Atlanta method were used and is expressed as follows (25).

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

Wealth index, composite indicator of a cumulative living standard, was calculated based on ownership of selected assets such as television, radio mobile ,bed and presence of cow, oxen, goat, sheep, chicken initially. Reliability test was performed for items included in measuring

the wealth of the households and Chronbach's alpha was calculated to be 0.70 .Wealth index was generated using Principal Components Analysis (PCA). Then the wealth index was categorized in to tertiles.

The Dietary Diversity Score (DDS) was computed from a single 24 hours dietary recall data according to the recommendation of Food and Nutrition Technical Assistance Project Scale Version2 (39). Food items and liquids consumed in the preceding day and night of the survey were categorized into nine groups. Consuming a food item from any of the listed groups earned a score of 1 for that specific category. If not, a score of 0 was given. Accordingly a DDS of 9 points was developed (39). Then the WDDS was categorized into three categories, namely low, medium and high groups. The cutoff points applied in similar previous study at national level (35).

Households were categorized as food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently. The nine food insecurity questions in the HFIAS were used to examine the distribution of the households in different categories of food access (uncertainty, quality and quantity).The questions follow a progressively beginning with anxiety about the food supply, followed by a decrease in the quality of food, a decrease in the quantity of food, and finally going to sleep hungry and going all day and night without eating any food (during the 4 weeks preceding the survey).

The Household Food Insecurity Access Prevalence (HFIAP) Status indicator was used to report household food insecurity. The HFIAP indicator categorizes households into four levels of household food insecurity (access): food secure and mild, moderately and severely food insecure. Households are categorized as increasingly food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently. The HFIAP indicator categorizes households into four levels of household food insecurity (access): food secure and mild, moderately and severely food insecure. Households are categorized as increasingly food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently. A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed

hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure (31).

Analysis of focus group discussion data was done manually by reading through all the responses. First individual, pre-labeled tapes were transcribed verbatim into English language. Next completed transcription was compared with hand written notes to fill inaudible phases or gaps in tapes. Then the data were categorized into thematic areas and a thematic framework analysis was employed manually. The findings presented in narratives and used to support quantitative findings.

#### **4.10 DATA QUALITY CONTROL**

##### **BEFORE DATA**

The following measure was taken to maintain and increase the reliability and validity of the study adequate related literature were reviewed; opinion from the experts and concerned body was obtained. Comments from experts were shared with the research advisors throughout the research process. The questionnaire was translated to Afan Oromo official and most frequently spoken language by native speaker and back translated to English by other competent person to check internal consistency. Before the actual data collection, the questionnaire was pre-tested on 5% of women in Hirna Town for modification in needed obvious difficulties and also facilitators, data collectors and supervisors were trained.

##### **DURING DATA COLLECTION**

Data collectors checked the completeness and consistency of the questionnaire after each interview. The data collection process was closely monitored by supervisors and the principal investigator. Supervisors checked every questionnaire meticulously so that all incomplete forms are identified while they are at the field and more than 10 % of the data was verified by the principal investigator. To check the consistency of the machine; two Hgb measurements were performed for a single subject for every tenth sample using the HemoCue technique.

## **AFTER DATA COLLECTION**

The data were checked and cleaned to ensure accuracy, consistency and completeness of data. In addition, the data were thoroughly cleaned and carefully entered in to computer using Epi-data3.1 and exported to SPSS windows version 16.0 for beginning of analysis. During analysis, the data were cleaned carefully.

### **4.11 ETHICAL CONSIDERATION**

The ethical clearance was obtained from Jimma University College of Public Health and Medical Science Ethical Review Committee.

Official permission was obtained from woreda health office to conduct the study. All respondents were given detailed information about the objective of the study and sampling procedure. Informed verbal consent was obtained from each respondent prior to the data collection.

Concerning blood sample the participant were informed the sample was used for anemia detection only and the result was informed for study participants. For those who are diagnosed anemic iron/folic acid tablet treatment was given and referred to ANC service.

The cuvetts was discarded safely after each hemoglobin determination and was not used for other purpose.

All the information collected from the study subjects was handled confidentially through omitting their personal identification and the data was used for the research purpose only.

### **4.12 PLAN OF DISSEMINATION OF RESEARCH FINDING**

The study findings will be presented to Jimma University community and report will be submitted to Graduate School and Population and Family Health Department of JU, Results will be communicated to Doba Woreda Health Office and other stakeholders.

Further effort will be made for publication on local and international peer reviewed journals

## **CHAPTER FIVE**

### **RESULTS**

#### **5.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS**

Out of the 552 subjects, a total of 532 completed the study giving a response rate of 96.4%. Twenty women could not be traced or were not willing to give blood sample for hemoglobin assessment after completing the interview.

The mean ( $\pm$ SD) age of the respondents was 24.7 ( $\pm$ 5.32) years and ranged from 15 to 45 years. Among the respondents four hundred ninety eight (93.6%) were from Oromo ethnic group and four hundred sixty nine (88.1%) were followers of Muslim religion. Four hundred eighty seven (91.5%) of women were from rural area. Regarding marital status, five hundred twenty six (98.9%) of them were married or living together with partners.

Concerning occupation, 405(76.1%) of women were farmers followed by housewives which accounts for sixty six (12.4%). More than half (65.1%) of women had not attained any level of education. Regarding household wealth, 176(33.1%) of women were poor.

Table 1: Socio-demographic characteristics of study participants in Doba woreda February, 2013(n=532)

Variable		Frequency (%)	
Age	15 -19	75	(14.1)
	20- 24	163	(30.6)
	25- 29	163	(30.6)
	30- 34	91	(17.1)
	35-39	34	(6.4)
	40-44	6	(1.2)
Ethnicity	Oromo	498	(93.6)
	Amhara	33	(6.2)
	Tigrie	1	(0.2)
Religion	Orthodox	58	(10.9)
	Muslim	469	(88.1)
	Protestant	3	(0.6)
	Catholic	2	(0.4)
Occupation	Farmer	405	(76.1)
	Housewife	66	(12.4)
	Merchant	14	(2.7)
	Daily laborer	8	(1.5)
	Student	23	(4.3)
	Gov 't employee	16	(3.0)
	Cannot read write	347	(65.2)
Educational status	Read and write	20	(3.8)
	Grade 1-8	93	(17.5)
	Grade 9-12	56	(10.5)
	More than secondary	16	(3.0)
	Marital status	Married	526
	Single	4	(0.8)
	Divorced/Separated/widowed	2	(0.3)
Residence	Urban	45	(8.5)
	Rural	487	(91.5)

Among the total respondents, two hundred forty eight (46.6%) of the women were multigravida .Three hundred and forty-five (65%) were on their third trimester and overall mean (SD) gestational age was 26.5 (6.3) weeks. The majority (97.6%) of women's had no history of surgical procedure ever.

Among the 383 respondents who have previous history of pregnancy, 148 (39.1%) received ANC service during the pregnancy prior to the current one; whereas 309 (58.1%) started attending ANC service for the current pregnancy during the time of data collection. Three hundred four (78.6%) of them had no history of abortion.

Among respondents of three hundred seventy nine who had one or more children three hundred ten (81.8%) had under five children. The mean ( $\pm$ SD) birth space between last and current pregnancy was 3.4 ( $\pm$ 1.5) and ranged from 1-8 years. Two hundred ninety one (76.8%) has two to four years interval between last and current pregnancy. Sixty three point seven percent of the respondents has history of using modern contraceptives, with the majority using Depo-Provera (86.7%). Three hundred fifty three (93.1%) of women was delivered their last baby at home. Table 2 describes obstetric history and maternal health service utilization of respondents.

Table 2: Obstetric history & maternal health service utilization of study participants Doba woreda, East Ethiopia February 2013 (n=532)

Variables	Frequency (%)	
Gestational age trimester(self reported)		
1 <sup>st</sup> & 2 <sup>nd</sup> trimester	186	(35.0)
3 <sup>rd</sup> trimester	346	(65.0)
Gravidity		
1	149	(28.0)
2-4	248	(46.6)
5 and above	135	(25.4)
History of abortion(number of times) n=383		
No history	301	(78.6)
1	60	(15.7)
2	18	(4.7)
>=3	4	(1.0)
Birth interval between last and current pregnancy n=379		
1	17	(4.5)
2-4	292	(77.0)
5 and above	70	(18.5)
Place of delivery during previous pregnancy n=379		
Health institution	26	(6.9)
Home	353	(93.1)
History of post PPH during previous pregnancy n=379		
Yes	69	(18.2)
No	310	(81.8)
History of ANC for previous pregnancy n=383		
Yes	148	(39.1)
No	231	(60.9)
History of ANC for current pregnancy		
Yes	309	(58.1)
No	223	(41.9)
History of APH during current pregnancy		
Yes	34	(6.4)
No	498	(93.6)
Had ever Surgery		
Yes	13	(2.4)
No	519	(97.6)
History of modern contraceptive use		
No	193	(36.3)
OCP	38	(7.1)
Depo-Provera	294	(55.3)
Implant	7	(1.3)



Among the total studied woman only twenty two (4.1%) had malaria infection within last one month before the survey. The majority (75.8 %) had bed net within their households. Among four hundred fifty eight (86.1%) respondents who had sanitation facility within their households, 437(95.4%) use traditional pit, while 442(96.5%) of toilets had hand washing facility and 513(96.4%) practiced hand washing before handling food. The majority 376(70.7%) of the respondent get water from improved water source which include protected spring, pipe water and rain. Almost all 516(97%) of the respondents had shoe wearing habit. However, only 51(9.6%) of the respondent has taken de-worming pills in the second or third trimester.

Table 3: History of illness & parasitic infection & related factors among the study participants Doba woreda East Ethiopia February 2013 (n=532)

Variables	Frequencies (%)
Malaria infection within last one month	
Yes	22(4.1)
No	510(95.9)
Febrile illness within last one month	
Yes	71(13.3)
No	461(86.7)
Slept under bed net during the previous day	
Yes	310(58.3)
No	93(17.5)
Don't have ITN	129(24.2)
Latrine use	
No latrine	74(13.9)
Hole	80(15.0)
Traditional pit latrine	357(67.1)
VIP	21(4.0)
Hand washing practice (after latrine & before meals)	
Yes	513(96.4)
No	19(3.6)
Use of safe drinking water	
Yes	287(53.9)
No	245(46.1)
Shoe wearing habit	
Yes	516(97.0)
No	16(3.0)
Taken de-worming pills during current pregnancy	
Yes	51(9.6)
No	481(90.4)

Five hundred fifty nine (48.7%) and 235(44.2%) of the respondents had food security within household and individual level, respectively. Forty two point three percent of respondents produce their own food. While 119(22.4%) respondents' uses tea and coffee immediately after meal. One hundred eighty seven 35.2% of respondents reported consumption of dark vegetable at list once daily. Frequency of Only 9(1.7%) consumed meat at list once weekly. Maternal food and nutritional status described in Table 4

Table 4: Dietary factors & food security status of study participants and their corresponding households among the participants Doba woreda February 2013 (n=532)

Variables	Frequencies (%)
Individual food security status	
Food secure	235(44.2)
Food insecure	297(55.8)
Household food security status	
Food secure	259(48.7)
Mild food insecurity	102(19.2)
Moderately food insecure	21(3.9)
Severely food insecure	150(28.2)
Dietary diversity score	
Low dietary diversity score	153(28.8)
Medium dietary diversity score	332(62.4)
High dietary diversity score	47(8.8)
Frequency of meat consumption	
More than once per week	1(0.2)
Once per week	9(1.7)
Less than once per week	522(98.1)
Frequency of dark green leafy vegetable consumption	
≥ 1 once per day	187(35.2)
Less than once per day	345(64.8)
Consumption of tea/coffee after meal	
Yes	119(22.4)
No	413(77.6)
Intake of iron or iron/folic acid tablets during current pregnancy	
Yes	246(46.2)
No	286(53.8)
Primary food source for the household	
Purchase	300(56.3)
Own production	225(42.3)
Others*	7(1.4)

\*Food aid, Borrowed, bartered, exchanged for labor, gift from friends or relatives

Respondents were asked as to whether they had used diet in and outside home within the last 24 hours. The most used food item was cereal (99.8%), oil (88.3%) and legume nut and seed (81.8). Hem iron rich foods such as meat, organ and fish were reported to have been used by very few (4.5%). Non-hem iron source foods like green leafy vegetables were also the second group of foods reported to have been used outside home (28.8%). Fig 4 describes the distribution of scores for different food group.

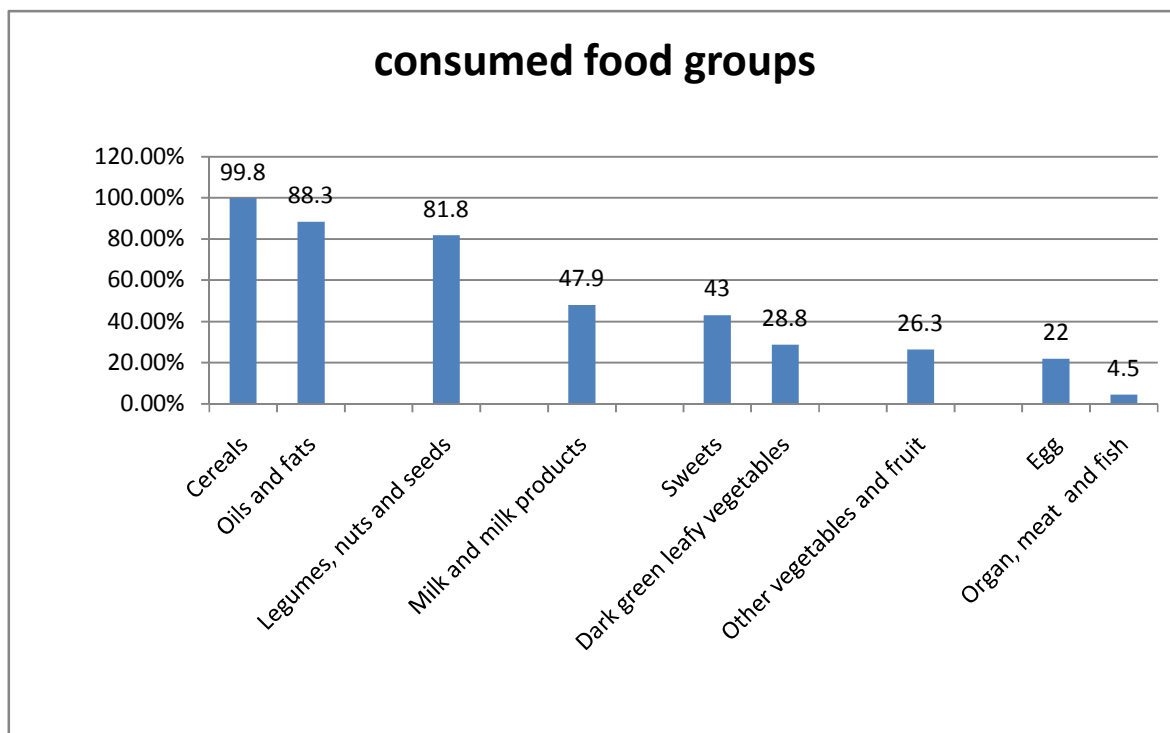


Fig 4: Distribution of consumed food group by respondents within 24 hours

Among the total respondents 332(62.4%), 153(28.8%) and 47(8.8%) of them had medium, low and high dietary diversity score respectively.

The majority 259(48%) of households were food secured. 123(23.1%) had mild to moderate food insecurity and 150 (28.2%) of the respondents had severe house hold food insecurity with in there households.

## 5.2 PREVALENCE OF ANEMIA

Among all respondents, the mean ( $\pm$ SD) blood hemoglobin level (adjusted for altitude) was 10.77g/dl ( $\pm$ 1.37g/dl) . Of total more than a half 275 (51.7%) of women were anemic. Out of these 127(46.2%), 144(52.4%), and 4 (1.4%) had mild, moderate and severe anemia, respectively. Anemia is a significant severe public health problem among women in this woreda.

Mean MUAC was 22.2 cm with SD (1.56cm) range from 15.5-26.00.The majority 439 (82.5%) of respondents have normal nutritional status (MUAC more than 21 cm), 92 (17.3%) had mild to moderate malnutrition (MUAC between 21 to 17cm) and only 1(0.2%) had severe malnutrition (MUAC less than 17cm). Out of moderately malnourished women 67(72.8%) of them were anemic. Table 5 outlines the association between anemia and nutritional stats.

Table 5: The association between current nutritional statuses of pregnant with anemia status

	Normal	Anemic	Total
Normal nutritional status	232*	219*	439
	52.8%	47.2%	100%
Moderate malnutrition	25**	67**	92
	27.2%	72.8%	100%
Severe malnutrition	0***	1***	1
		100%	100%
Total	257	275	532
	48.3%	53.9%	100%

MUAC value above 21cm \* MUAC vale $\geq$ 17 to <21cm \*\*Mode (< 17 cm) \*\*\*

### 5.3 PREDICTORS OF ANAEMIA IN PREGNANCY

The result of the bivariate analysis revealed that anemia was significantly associated with basic socio-demographic variables such as age of mother and educational level, maternal health factors like , ANC service utilization during previous pregnancy, ITN utilization, dietary factors such as primary source of food ,WDDS nutritional status of pregnant women, and food security status factors HHFIAS. Those significant variables and those with p-value less than 0.25 in the crude analysis (number of pregnancy, child number, number of abortion, type of latrine and hand washing facility) were again entered in to multivariate logistic model to control for confounding.

Pregnant women who had no ANC follow up for their last pregnancy (AOR 2.507 95%CI: 1.533, 4.099),whose primary source of obtaining food is purchasing, borrow and food aid (AOR=2.262 95%CI: 1.402, 3.648), had severe household food insecurity (AOR=2.001 95%CI: (1.127, 3.553) were more likely to be anemic as compared to those who had follow ANC for last pregnancy , produce their own food and food secure households. The likelihood of being anemic was lower among women with highest DDS (AOR = 0.819 95%CI :( 0.705, 0.951) and normal nutritional status (MUAC above 21 cm) (AOR=0.636 95%CI (0.544, 0.744) compared to those with the lowest DDS and moderate to severe malnutrition (MUAC less than 21cms), respectively. Assessment also made to assess independent predictors of being anemic.

Table 6: multivariable logistic regression model predicting the likelihood of anemia among pregnant women in Doba woreda west Hararge, Eastern Ethiopia, Feb, 2013

Variable	Normal No (%)	Anemic No (%)	COR[95.0% C.I]	AOR[95.0% C.I]
Educational status				
Illiterate	162(46.7)	185(53.3)	1.427[0.857,2.378]	0.579[.083, 2.344]
Elementary	43(38.1)	70(61.9)	2.035*[1.116,3.709]	1.758[.294,4.576]
Secondary and above	40(55.6)	32(44.4)	1	1
ANC In Previous Pregnancy	97(48.1)	51(34.5)	1	1
Yes	111(65.5)	120(51.9)	2.056**[1.343,3.149]	2.507***[1.533,4.099]
No				
Has bed net				
Yes	174(43.2)	58(45.0)	1	1
No	71(55.0)	229(56.8)	1.611*[1.081, 2.401]	1.382[0.761,2.507]
Contraceptive	146(43.1)	94(48.7)	1	1
Yes	99(51.3)	193(56.9)	1.392[0.976, 1.985]	1.279[.679, 2.410]
No				
Shoe wearing habit	240(46.5)	276(53.5)	1	1
Yes	5(31.2)	11(68.8)	1.913[0.655, 5.584]	.582[.090, 3.779]
No				
WDDS				
Low DDS	61(24.9)	92(32.1)	1	1
Medium DDS	111(45.3)	140(48.8)	0.836[0.556,1.258]	0.804[0.476,1.356]
High DDS	73(29.8)	55(19.2)	0.500**[0.310,0.805]	0.819**[0.705,0.951]
Main Source of food				
Production	156(50.8)	151(49.2)	1	1
Purchase and other	89(39.6)	136(60.4)	1.579*[1.114,2.237]	2.262***[1.402,3.648]
HFSI				
Food secured	128(49.4)	131(50.6)	1	1
Mild to moderate insecure	60(48.8)	63(51.2)	1.026(.668,1.576)	1.258[.666, 2.373]
Severe insecurity	57(38.0)	93(62.0)	1.594* (1.058, 2.402)	2.001*[1.127, 3.553]
Nutritional status				
Moderate to severe malnutrition	48(30)	113(70)	1	1
Normal	197(53.1)	174(46.9)	0.375***(.0557,0.253)	0.636***[0.544,0.744]

**Note:**

\*Statistically significant at P< 0.05,

\*\*statistically significant at P< 0.01

\*\*\*statistically significant at P< 0.00

To produce this final table, all of the variables (p value <0 .25) from the bivariate analysis were entered as independent variables in a logistic regression model, with anemia as the dependent variable. The variables that appeared to be confounders in the initial analysis also were included in the regression model. In the final model, pregnant women with MUAC greater than 21cm were 36.4% AOR=0.636 95CI:(0.544,0.744) less likely to be anemic than women who had MUAC less than 21cm. Pregnant women who had no ANC visits for their last pregnancy were 2.5 times (AOR=2.507 95CI:[1.533-4.099]) more likely to be anemic than women who had antenatal visits AOR was not significant in the first model but it was highly significant in the final model p<0.000 this may be due to confounding effect

#### **5.4 SOCIO CULTURAL RELATED FACTORS ASSOCIATED WITH ANEMIA**

Socio cultural includes the perceptions of the community towards the problem of anemia during pregnancy, cultural food taboos and health seeking behavior related with anemia.

##### ***5.4.1 THE PERCEPTIONS OF THE COMMUNITY ON THE PROBLEM OF ANAEMIA DURING PREGNANCY***

Most of the FGD participants had information about anemia; they believe it is widespread and much prevalent within community. Some of the discussants mention anemia by its common symptom rather than its name.

**Regarding Perceived Causes** the participants from four discussion sites; most of the participants assume that it is caused by lack of balanced diet like meat and egg due to inflation of food prices.

In trying to reflect the situation, 30 years old pregnant women said “... *this problem is now prevalent because of lack of meat.... previously we get meat occasionally (yearly during Redman and after birth of our first son) by slaughtering goat at home. But, now days, it is so difficult to get meat even occasionally due to its high price...*”

Some discussants shared the idea anemia is the result of walking during sunny times like afternoon, lack of support from partner, using modern family planning methods and having too many children make the women to be anemic. One of the discussant from Doba kebele 01 said that

*”.....as I told you earlier family planning has impact on women’s blood by making excess loss women may face the problem of anemia.....” (50 years old women)*

**Regarding the major sign and symptom** majority of FGD discussant forwarded that headache, felling dizziness, blurred vision, incapability of walking during sunny an anemic person could manifest with.

**Regarding the treatment for anemia**, the majority of discussants perceived that tablet like iron folic does not improve the problem. Instead, home treatment is considered as much useful management. The common suggestions forwarded by most of FGD participant were drinking milk, traditional drink “Hojja” which is made from milk and coffee leaf, traditional treatment made from herbs called “Digelo” and “Bekanissa” and soft drink “Vimto”.

Some of discussants mentioned eating red colored vegetables, honey and taking rest as commonly used as a treatment within their communities.

**About perceived seriousness of the problem** The majority of women reported “weakness” to be common/major problem they faced due to anemia. They consider it quite “normal “to feel week particularly during pregnancy. Some of women express falling injury due to dizziness makes anemic women to suffer more problems while they are pregnant.

#### ***5.4.2 HEALTH SEEKING BEHAVIOR RELATED WITH ANEMIA***

Cultural idioms play an important role in a pregnant woman’s decision to seek health care and to comply with a prescribed treatment regime. The finding from all FGD shows health seeking behavior during pregnancy is low because the importance of anemia was list considered. The majority of women reported “weakness” to be common/major problem they faced due to anemia and it was considered quite “normal to fell week particularly during pregnancy.

**Regarding major reason for not seeking assist from health institutions** majority of the participant said home treatment has better outcome than iron supplement which is given in health institutions



45 years old women said“.....felt anemia was not serious enough to seek outside care, instead of cultural treatment of which is made from traditional herbs so called “...Digello” is used as a treatment.....”

Women in four discussion site have varying degree of knowledge regarding iron folic supplements. Some of women took iron folate from health institutions free of charge but they do not utilize it properly as it prescribed. Most women who reported taking iron supplements expected to feel better, but were disappointed.

*"I don't know...about these tablets...but my problems have not changed since I started taking them...."; "...I has taken [red tablets] for three nights but am not feeling better “a 25 years pregnant women said.*

Some of women do not take the tablet as prescribed due to fear of side effect

*"My sister...experienced tiredness and had been given similar tablets. She told me she had a bad stomachache after taking the tablets. After hearing this, I did not even open my packet. ... "*

Others reported a preference for tonics *"....so, now I take the red tablets given at the HEW. It leaves a bad taste in my mouth but what can I do?"*

### **5.4.3 CULTURAL NORMS WHICH AFFECT FOOD INTAKE OF WOMEN DURING PREGNANCY**

**Regarding cultural food taboos** majority of discussants across all FGD said a pregnant woman should not eat fruits like Papaya, Mango, Banana, and Orange and vegetables including cabbage, potato, carrot, sweet potato. Some of them said all balanced diets should not be eaten by pregnant women 37 years old pregnant women from Doba 01 said“...except from dry food like bread and “kolo” all ordinary food should be prohibited...”

This is due to fear of obstructed labor and it is culturally accepted.

*“...Fruit like papaya, mango, banana, vegetable ,potato, cabbage and all balanced diet should not be eaten by pregnant women because the fetus get large and will make the labor difficult and*

*also during delivery increment in feces make the women ashamed so after five month pregnant should eat dry food only even the ordinary foods will be prohibited....” (A 48 years old woman said).*

**Concerning food allocation within the household** majority of the discussants from all discussion sites believe that priority should be given to husband because he is head of household and respected serving him food priority was culturally acceptable. Some of FGD participants believe a man needs more energy to carry out hard works. Even while she is pregnant women’s were considered has list energy need.30 years women non pregnant women said

*“.....Priority food should be given to husband then children and women because the husband is head of household its respect to give food priority and it is culturally acceptable. It is also believed that he is the one doing hard work that needs more energy. Even while she is pregnant it is considered she has list need of energy....”*

**About husband advise their pregnant wives to eat additional food** majority of women said women was not supported by their husbands because husbands consider pregnancy as a women affair it is culturally unacceptable to be involved in women affair unless emergency condition. Some of participants said it is not common to get support from husband while they are healthy. One discussant mention husbands might give attention and support during first child pregnancy.

## CHAPTER SIX

### DISCUSSION

This study revealed the high prevalence 51.7% of anemia among pregnant in the Doba woreda west Hararge zone of Oromia .This result is similar to that of anemia prevalence in Bushulo health centers ,southern Ethiopia 51.9%(18),and Gilgel Gibe dam area southwest ,Ethiopia 53.9%(32), Jerteh Terengganu, Malaysia 57.4%(27) but slightly higher than the anemia prevalence previously reported in EDHS(16) document 22%the reason may be due to the variation of the method prevalence reported in the DHS document is the weighted prevalence where as in this analysis no weight was applied to the data set.

From the total 532 women, 46.2%, 52.4% and 1.4% had mild, moderate and severe anemia, respectively. This differ with the study conducted on pregnant women in Malaysia, which reported 45%, 9.8%, and 1.85% with mild, moderate and severe anemia, respectively (27) and Moshi Municipality in northern Tanzania which indicate 35.3%, 9.9% and 2.1% pregnant women had mild, moderate and severe anemia (28) The difference could be due to studies are conducted urban setting only and also in different study period and subject characteristics.

In the current study, Mean MUAC value was 22.2 cm with SD (1.56cm).Which was lower than reported value in northern Nigeria 25.9cm (3.8cm) (40) .For pregnant women's who had Mid-Upper Arm circumference (MUAC) was greater than 21 cm were 36% less likely to be anemic MUAC than less than 21cm.This finding is in consistent with finding of Westmoreland, Jamaica which reports Women with an MUAC between 25 and 30 cm were 0.3 times less likely to be anemic than women who had MUAC value less than 25 cm .This suggests that women current nutritional status directly indicate their risk to be anemic and anemia is an indicator of both poor nutrition and poor health (33).

The average (SD) dietary diversity score among respondents was 4.42(1.56) .Which is higher than national findings which was 3.84 but significantly lower than the study in Tehi women which was 6.01 (41) this might be due to the presence of food taboos and inaccessibility of food items. Pregnancy is the most nutritionally demanding period in a woman's life. Consequently, pregnant women are advised to eat more diversified diet than usual. However,

in our finding this wasn't the case. The lack of dietary diversity results in a shortage of minerals and vitamins which suggests that the bio-availability of much of the iron in the average women diet is restricted and this restriction presumably affects the iron status. Our results showed that Women with high DDS have 18% times lesser risk of anemia than with low DDS. Similar findings revealed, compared to those with medium or high DDS level; the risk of anemia was 1.3 times higher among those with low DDS level (35).

The level of dietary diversity among pregnant women was significantly low besides, intake of vegetables less than once a day and meat less than once a week was common and was associated with increased anemia the possible explanation for this was inaccessibility and cultural food taboos. The qualitative finding also supports this result

*The majority of participants across all discussion sites agreed there is financial and service inaccessibility to get hem iron from meat from market.*

*“Previously we got meat only during holyday (yearly at Ramadan) and post partum period of the first child by slaughtering goat at home, but now a time there is shortage of access to get meat even occasionally due to its high expenses of animals” (A 30 years old woman said).*

For vegetables and fruit it is not only access but the utilization is low due to believes and cultural food taboos

*The majority of discussants from all FGD said it was culturally forbidden to use vegetables and fruits during their second and third trimester due to fear of obstructed labor.*

*Fruit like papaya, mango, banana, vegetable, potato, cabbage and all balanced diet should not be eaten by pregnant women because the fetus get large and will make the labor difficult and also during delivery increment in feces make the women ashamed so after five month pregnant should eat dry food only even the ordinary foods will be prohibited” (A 48 years old woman said).*

Hem iron from meat is not the only better absorbed non hem iron which is obtained from plant source, whose absorption may range 1-10% needs enhancing factor for absorption. The finding shows that more than half of respondents had vegetable consumption less than once per day this finding is slightly higher than J. A. Hider finding which shows about one-third of the women with anemia had vegetables less than once a day(14).

This suggests low consumption of vitamin C could be another underlying factor for the existence of iron deficiency anemia. Evidence shows that dietary iron was not adequate plus bioavailability was restricted because the type of iron was non-hem and there was inadequate vitamin C, additionally, absorption was further reduced due to the presence of inhibitory factors such as coffee and tea (14).

Despite the various types of nutrition interventions that have been implemented in Ethiopia, cultural food taboos and religious factors are still prevalent among different ethnic, religious, age and gender groups. Taboos have limited the development and utilization of certain plant and animal food resources, with detrimental effect particularly on mothers and children (34). A study conducted in Nigeria showed that many foods that are avoided during pregnancy provide all the key nutrients (calcium, iron, vitamin A, folic acid, vitamin C) needed by pregnant women(37).

Compared to those who produce their own food, the risk of being anemic was 2.3 times higher among those who purchase, borrow and food aid as a primary source of obtaining food this might be accessibility of food within their household make a women to obtain adequate food .There were no other literatures to be used for comparison.

Taking the overall pictures of HFIAS, the prevalence of household food insecurity was 51.3%. This figure is lower than the prevalence in Nepal Kalali district which is 69.2% (42).559(48.7%) and 235(44.2%) of the respondents had food security within household and individual level respectively. Those women who had severe household food insecurity has 2times high risk of being anemic than food secure households.

As pregnancy and delivery increase the risk of anemia, various components of maternity care are expected to alleviate this vulnerability. Only ANC visit showed statistical significance for those women who had ANC during their last pregnancy were less likely to be anemic. Because anemia screening, routine nutrition education, iron and folic acid supplementation, and referrals to higher institution if there are any abnormal findings has protective effect. However, having ANC in the current pregnancy, delivering at health institutions or having PNC did not contribute to the reduction of risk of anemia in the present study (35). According to the results Westmoreland, Jamaica, women who visited antenatal clinics four or more times during their pregnancy were less likely to become anemic. Since the number of ANC

visits showed a strong association with anemia in this population, it would be beneficial to stress the importance of seeking care earlier in pregnancy (33).

## **6.1. IMPLICATION**

Based on WHO most recent estimates if the prevalence is 40.0% or more, it is considered as severe public health problem or the entire population suffer from some degree of iron deficiency (9, 1). This is directly related with development of one country because of the productivity of populations might be affected by anemia. The implications for work capacity and educational achievements are very serious, because men, women, and children are affected. It is estimated that for every 10% increase in hemoglobin, there is a 15% increase in physical work capacity. The effect of anemia on productivity can be reversed with improvements in iron nutrition. Preventing anemia, therefore, contributes to improving human capacity and productivity throughout the life cycle and across generations (38).

Many Studies well indicated the association of anemia with maternal morbidity and mortality. Worldwide, anemia contributes to 20% of all maternal deaths (9) reducing maternal mortality is one of the eight health related Millennium Development Goals (MDG5) adopted at the Millennium Summit in 2000. Within this framework, the international community is committed to reduce Maternal Mortality by three quarters between 1990 and 2015 (6).The government of Ethiopia had many efforts to achieve these goals by promoting ANC, Institutional delivery. More emphasis should be given to maternal nutrition by improving iron status and preventing anemia in pregnancy helps to reduce maternal mortality. Because much of the iron that the infant needs comes from the mother during pregnancy, maternal anemia leads to infant anemia, with serious consequences for infant health and survival, including stillbirth, infant death, and brain damage. Improving iron status and preventing anemia during pregnancy thus helps reduce child mortality which helps to achieve (MDG4).

## **6.2 STRENGTH AND LIMITATION OF THE STUDY**

The study was conducted on community setting by triangulating qualitative with quantitative methods. The study used validated standard tools and measurements. The hemoglobin was measured using standard HemoCue method which is mostly recommended by community based survey.

Since pregnancy status and gestational age was self reported information is subject to bias as well. Bio chemical test like serum ferritin level was not identified to associate nutrition with anemia. Infection and parasite was assessed using risk factors rather than clinical investigation.

## **CHAPTOR SEVEN**

### **CONCLUSION**

This study has showed that anemia in pregnancy is still a severe public health problem in Doba woreda. The major factors which are associated with anemia were nutritional status of women, household food insecurity, primary source of obtaining food and dietary intake of women.

Most of the factors were directly related with women's food intake which has been influenced by cultural and social believes of local community. The women of this community consider if they eat balanced diet during pregnancy they will face difficulty of labor so after five month of their pregnancy the women do not allowed to eat fruit and vegetables and she also avoid frequent meal. Other important factor was maternal health service which is taking ANC. The adherence of taking iron supplement and husbands support during pregnancy was low due to cultural belief.

### **7.1RECOMMENDATION**

#### **➤ For policy makers**

- The common perception that anemia is (is not a severe) a moderate public health problem due to dietary iron intake should be questioned specially in the rural community with high food insecurity like Doba woreda & dietary iron low.
- Focus of strategies on behavior change communications targeting enhancement of food based approaches to improve iron rich food consumption is recommended in addition to targeted iron supplementation to pregnant women.

#### **➤ For zone and woreda health office**

- Good quality antenatal care should be made accessible all pregnant
- Improving maternal nutrition and reducing iron deficiency anemia through iron-folic acid supplement should be maintained but more attention should be given to adherence counseling on the supplement.



- Increased consumption of vegetables and fruits like papaya, orange, mango sweet potato is recommendation to partly address the problem.
- Preventive measures like awareness on the need of balanced diet for pregnant women, reproductive age women should be created among local community.
- Husbands must encourage their pregnant wives to eat additional food.
- In line with this production of fruit and vegetables should be improved by promoting the advantage and with collaboration of agriculture bureau.
- Instead of emergency food aid food security should be maintain by collaborating different stakeholders.

➤ **For researchers**

- Future studies, should be conducted using serum ferritin level to determine the prevalence of iron-deficiency anemia and associated factors this area. This would aid in planning appropriate health care services.

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## **ANNEXES**

### **ANNEX I: QUESTIONNAIRE (ENGLISH VERSION)**

**Jimma University**  
**College of Public Health and Medical Sciences (CPHMS)**  
**School of Graduate Studies**  
**Department of Population and Family Health**

Good morning/afternoon! Dear respondent my name is \_\_\_\_\_. I am working as data collector in a study conducted by the College of Public Health and Medical Sciences of Jimma University. We are interviewing mothers here about anemia and associated factors among pregnant mothers in order to generate information necessary for the planning of appropriate strategies (interventions) to reduce maternal and child mortality and morbidity in this woreda and the country. To attain this purpose, your honest and genuine participation by responding to the question prepared is very important and highly appreciated.

#### **Confidentiality and consent**

I would like you to ask some questions that you may find it difficult to answer. Your answers are completely confidential. Your name will not be written on this form. Anybody will not be told what you said in connection to your name. You do not have to answer any question if you don't want to and you can stop the interview at any time. However your honest answer to these questions will help us to better understand the prevalence of anaemia and its contributing factors within pregnant mothers. We would greatly appreciate your help in responding to this study. The interview will take about 20 – 30 minutes and small blood sample will be taken to measure of your hemoglobin only. Would you be willing to participate?

Yes \_\_\_\_\_

No-----

**QUESTIONNAIRE IDENTIFICATION**

- 01. Questionnaire ID No \_\_\_\_\_
- 02. Code of data collector \_\_\_\_\_
- 03. Date of data collection \_\_\_\_\_
- 04. Keble: \_\_\_\_\_
- 05. Name of interviewer \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_
- 06. Check the questionnaire to make sure that all responses have been provided)  
Checked by supervisor  
Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

**Section 1: Background information of the women**

First, I want to ask you a few questions about yourself

S. No	Questions and filters	Code categories
Q101	How old are you?	Age in completed years _____
Q102	What is your ethnicity?	1, Oromo 2, Amhara 3, Tigrie 4, Guragie 5, Other(specify)
Q103	What is your religion?	1, orthodox 2. Muslim 3, protestant 4, Catholic 5, Other(specify): _____
Q104	What is your occupation?	1. Farmer 2. Housewife 3. Merchant 4, Daily laborer 5, student 6, other(specify)
Q105	What is your educational status?	1. Illiterate 2. Read and write without any formal education 3. Formal education 3.1 maximum grade archived: _____
Q106	What is your marital status?	1. Married 2. Single 3, divorced 4, widowed 5. Separated
Household characteristics		



Q107	Does this household currently have any of the following items?	1, Yes	0 ,No	
	Functioning radio?			
	Functioning television?			
	Functioning tape recorder/CD player?			
	A watch/clock?			
	Mobile phone/landline?			
	Clock?			
	Table?			
	Sofa?			
	A bed with cotton/sponge/spring mattress?			
	Spring mattress?			
	Foam/sponge mattress?			
	Grass mattress?			
Q108	Does this household currently have any of the following animals?	1 Yes	0, No	How Many
	Milk cows, oxen or bulls?			
	Camels?			
	Horses, donkeys, or mules?			
	Sheep?			
	Goats?			
	Chickens?			
	Beehives?			
Q109	Does any member of this household own any agricultural land?			Local unti_____ (specify)
Q110	How many people live in this house?			Number of people including children:_____
Q111	How many rooms in this household are used for sleeping?			No of Room _____
Q113	Does any member of this household have a bank or microfinance saving account?			

<b>Section 2: Questions to asses obstetrics and medical factors</b>			
S. No	Questions and filters	Code categories	skip
Q201	How many pregnancy you have including the current one	_____	
Q202	What is your gestational age?(in month)	_____	
	What is your LMP	Date _____	For those

			who has first pregnancy go to Q211
<b><i>For mothers Who have more than one pregnancy.</i></b>			
Q203	How many children do you have	No. Children born-----	
Q204	How many of them are under five?	-----	
Q205	What is the time from the last pregnancy to the current one/how old is your youngest child	Number of years _____	
Q206	Was there any abortion in your pregnancies?	1. Yes 2. No	
Q207	If you say yes for question 206 how many times?	-----	If says no for Q206 skip this Q
Q208	Where did you deliver your last babies	1. Health institute 2. home 3. other(specify) _____	
Q209	Was there sever blood loss in your previous delivery?	1. Yes 2. No	
Q210	Do you follow antenatal care for the last pregnancy?	1. Yes 2. No	
Q211	Do you follow antenatal care for the current pregnancy?	1. Yes 2. No	
Q212	Was there any blood loss in your current pregnancy?	1. Yes 2. No	
Q213	Have you been taken surgical intervention from any illness?	1, yes 2, No	
Q214	Did you become infected with malaria for the last one month?	1. Yes 2. No	
Q215	Have you become febrile ill in the last one month?	1. Yes 2. No	
Q216	Do you have anti- malaria bed net?	1. Yes 2. No	
Q217	If you say yes for question 216 did you slept under ITN yesterday night?	1. Yes 2. No	If says no for Q216 skip this Q
Q218	Have you ever use modern contraceptive?	1, Yes 2. No	
Q219	If says yes for Q218 which type	1,OCP 3,IUCD 2,Depo 4,Implant 5,other(specify): _____	If says no for Q219 skip this Q
Q220	Do you have latrine?	1. Yes 2. No	
Q221	If you have a latrine which type	1, Hole 2, Traditional pit 3, Ventilated improved pit latrine	If no for Q219 go to Q221

		4,Water flush 5,Others (specify_____)	
Q222	Did you wash your hand after latrine?	1. Yes 2. No	
Q223	Do you wash your hand before meal?	1. Yes 2. No	
Q224	What is the main source of water used by your household for other purposes, such as cooking and hand washing?	1. Protected spring 2. Unprotected spring 3. Surface water (river, dam, lake, pond, stream, canal, irrigation channels) 4. Pipe water 5. Rainwater collection 6. well 7. Other(specify-----)	
Q225	Do you treat your water in any way to make it safer to drink?	1. yes 2. No	
Q226	What do you usually do to the water to make it safer to drink? Anything else?	1,boil 2,add bleach/chlorine 3, strain through cloth 4,other (specify):_____	
Q227	Do you wear shoe?	1. Yes 2. No	
Q228	Do you have taken de-worming pills in the second or third trimester of your pregnancy?	1. Yes 2. No	
Q229	Have you taken iron/folic acid tablets in this pregnancy?	1. Yes 2. No	
Q230	If you take how do you take it?	1 once per day 2,twice per day 3,some times when I remember 4,I don't take	
Q231	Do you have a history of illness	1. Yes 2. No	
Q232	If you have what type of illness?	1,pneumonia 2,malaria 3,GIT 4 ,other chronic illness specify_____	

### Section 3: Nutrition and Food security

Household Food Insecurity Access Scale (HFIAS) Measurement Tool			
S. No	QUESTION	RESPONSE OPTIONS	If yes How often did this happen?

Q301	In the past four weeks, did you worry that your household would not have enough food?	0 = No 1=Yes	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (More than four times in the past four weeks)
Q302	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?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q303	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?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q304	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	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q305	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?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q306	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?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q307	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?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q308	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often
Q309	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?	0 = No 1=Yes	1 = Rarely 2 = Sometimes 3 = Often

Now I would like to ask you some questions about problems you may have encountered with food. These questions are about you personally and not your household overall.

Q310	In the last three months, how many days did you worry that you would run out of food or not have enough money to buy food?	1, Never 2, 1-7 days 3, 8-21 days 4, More than 21 days
Q311	In the last three months, how many days have you had to reduce the number of meals eaten in a day, because of shortages of food or money?	1, Never 2, 1-7 days 3, 8-21 days 4, More than 21 days
Q312	In the last three months, how many days have you had to spend the whole day without eating, because of shortages of food or money?	1, Never 2, 1-7 days 3, 8-21 days 4 More than 21 days
Q313	In the last three months, how many days have you had to ask for food or money to buy food?	1 Never 2 1-7 days 3 8-21 days 4 More than 21 days
Q314	Could you please detail the primary source for obtaining food .	1, Own production, gathering, hunting, fishing 2, Purchased 3, Borrowed, bartered, exchanged for labour, gift from friends or relatives 4, Food aid 5, Other

#### Section 4: Food intake and women dietary diversity

Q401, Please describe the foods (meals and snacks) that you ate or drank in the last tree days during the day and night, whether at home or outside the home. Start with the first food or drink of the morning.

Breakfast	Lunch	Snack	Dinner

Q402, Could you tell me if a food item from this group was consumed or not			
	Food group	Example	yes=1 No
1	CEREALS	corn/maize, rice, wheat, sorghum, teff, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products),	

2	SWEETS	sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes	
3	DARK GREEN LEAFY VEGETABLES	dark green leafy vegetables, including wild forms + locally available vitamin A rich leaves such as cabbage, cassava leaves, kale, spinach	
4	OTHER VEGETABLES and fruit	Ripe mango, ripe papaya, banana ,carrot, Dried papaya	
5	ORGAN, MEAT and fish	Liver, kidney, heart. Beef, goat, chicken, fish.	
6	OILS AND FATS	oil, fats or butter added to food or used for cooking	
7	EGG		
8	LEGUMES, NUTS AND SEEDS	Bean, pea ,lentis, nuts or food made from these	
9	MILK AND MILK PRODUCTS	Milk, cheese	
Q403	Do you take usually tea or coffee immediately after meal?		
Q404	Do you smoke?		
Q405	If you smoke which one		1, sigaret 2, shisha 3, Other specify____ —
Q406	Which material will be used for cooking?		1, metal 2, ceramic 3, Other specify____ —

***food frequency questions; FFQ***

Common foods	consumption
Plant source	0,not at all 1, once per day 2, more
Banana	
Beans	
Bread	
potato	
rice	
orange	
peanut	
cabbage	
Animal source	0,not at all 1, once per week 2, more
Beef meat	
Egg	
Fish	
milk	
poultry	

**MEASUREMENT**

**Anthropometric and Hemoglobin Measurement**

S .no	Activity	Measurement
1	Middle Upper Arm Circumference	MUAC (cm) .....
	Ask consent for anemia test	<p>As part of this study, we are asking pregnant women to take an anemia test.</p> <p>Anemia is a serious health problem that usually results from poor nutrition, infection, or chronic disease.</p> <p>This survey will assist the government to develop programs to prevent and treat anemia. For the anemia testing, we will need a few drops of blood from a finger. The equipment used in taking the blood is clean and completely safe.</p> <p>It has never been used before and will be thrown away after each test.</p> <p>The blood will be tested for anemia immediately, and the result told to you right away. The result will be kept strictly confidential and will not be shared with anyone.</p> <p>Do you have any questions?</p> <p>.</p>
3	Record hemoglobin here	LEVEL G/DL .....

## **ANNEX II: AFAAN OROMO VERSION OF THE QUESTIONNAIRE.**

Unkaa hyyyamaa hirmaatummaa

Akkam oolte/ bulte? Maqaan koo \_\_\_\_\_ jedhama. Qorannoo ,kolleejji fayyaa hawaasa fi sayinsii medikaala unveristiin Jimmaa gaggeesu irratti odeeffanno sassabaa/bduu dha. Hir'ina dhiiqaa haadhoollee ulfaa fi sababii isaa beekuuf hadhoolee ulfaa gaafachaa jirra.kunis terkaanffii du'a daa'immaniif haadhoollee Aanaa Doobbaa fi biyyaa irraa hir'isuuf fudhatamuf odeeffanno gahaa argachuu dha fi tarsiismoo sirri ta'ee karoofachuu dhaaf bay'ee murteessa dha Kaayyoo kan hojii irra oolchuudhaaf hirmaannaan kee deebii sirrii ta'e deebisuudhaan gootu kun baay'ee murteessaa dha.

### **Iciitii qorannichaafi feedhii hirmaattummaa**

Gaaffii deebisuudhaaf ulfaataa tahe si gaaffachuu barbaada. Iciteen deebii keetii gutumaan gutuutti ni eeggama.Maqaan kee unka kana irratti hin barreeffamu.Deebii ati deebistu maqaa kee wajjiin walqabsiisuudhaan nama kamiifiyyuuf hin himamu. Gaaffilee ati deebisuudhaaf fedhii hin qabaanne ykn hin barbaanne akka deebiftuuf dirqama hin qabdu.Yeroo barbaaddettis gaaffii ykn qorannoo kana addaan murtee ba'uu ni dandeessa. .Garuu deebiin sirrii ati nuuf kennittu kuni hir'ina dhiigaa haadhoollee ulfaa fi sababilee isaa sirritti hubachuudhaaf murteessaa dha.Gumaacha qorannoo kanaaf gootuuf dursa si galatoomffanna.Gaaffilee kana xumuruudhaa daqiiqaa 20-30 fudhata.( dhiiga bicuu qarannoo dhaaf qubaa kee irraa ni fudhanna).Qorannoo kanarattii hirmaachuudhaaf fedhii ni qabdaa?

Eeyyan-----

Miti-----

### **Adda Baasii Gaaffilee**

001.lakkoofsa gaaffichaa\_\_\_\_\_

002. koodii nama odeeffanno fuunanu\_\_\_\_\_

003.guyyaa odeeffannoon fudhatame\_\_\_\_\_

004.Aredaa \_\_\_\_\_

005. Maqaa Mallattoo odeeffannoo sassaabe \_\_\_\_\_ Guyyaa\_\_\_\_\_

006. haala gaffin guttame:gutumaan gututi guttamee jira\_\_\_\_\_gutumaan gututi hin guu ttamee jira\_\_\_\_\_

Maqaa\_\_\_\_\_malltoo----- guyyaa\_\_\_\_\_

Duraan dursee gaaffii muraasa si gaafachuu barbaada.



<b>Kutaa :-1 Odeeffanoo Hawaasummaa Haadholee</b>			
<b>Lakk</b>	<b>Gaaffii</b>	<b>Deebii</b>	
101	Umuriin kee meeqa?	Umurii waggaa dhumaatiin_____	
102	Sabnii kee maali?	1.Oromoo 2.Amhaara 3.Tigree 4.Guraagee 5.Kan biro(ibsi)_____	
103	Amantiin kee maali?	1.Ortodoksii 2.Muslima 3.Protestaantii 4.Kaatolikii 5.Kan biro(ibsi)_____	
104	Hojiin kee maali?	1.Qotee bulaa 2.Haadha manaa 3.Deldelaa/ltuu 4.Hojjataa guyyaa 5.Barataa/ttuu 6.hojii mootumaa 6.Kan biro(ibsi)_____	
105	Sadarkaa barumsaa?	1.Hin baranne 2.dubbisuu fi barreessuu 3.Barrattee 3.1Kutaaa:_____	
106	Haala fuudhaa fi heerumaa	1. Heerumeera 2.Hin heerumne 3.Adda bahaniiru 4.Jalaa du'ee jira. 5. Addaan bahuu	
Haala maatii fi Gaaffii qabeenya			
107	Yeroo ammaatti Wantoota armaan gadii ni qabda?	1, Eeyye 0 miti	Yoo qabaattee Meeqa?
	Radiyoo hojjatu		
	Televizinii hojjatu		
	Teeppi yookan CD meeshaa taphahiisu		
	Moobayila		
	Sa'atii gidgda		
	Xarapeeza		
	Soofaa		
	Boraatii spiringii		
	Boraatii sponjii		
	Boraatii margaa		
	Barcumma		
108	Maatiin keen yeroo ammatti beylada ni qabaa?		
	Sangaa/loon		
	Sa'a		
	Farda/gaangee /harree		
	Hoolota		
	Re'ee		
	lukkuu		
109	Lafa qonnaa ni qabdaa?		(s Qindii/Qarxi ykn heektaara_____
110	Baay'ina waliigala maatii mana keessa jiraatan		Baayina namota da'iman

			dabalate:_____
111	Mana cisichaan olu kuta meqa qabdan		Baayina kutalee:_____
112	maatii kee keessaa leeqii fi qusannaatti fayyadamu ni jiraa?		

Kutaa 2:-gaaffiilee haala ulfaa fi raakoolee meedikaalaa adda bassuuf qophaa'e

Lakk	Gaaffii	Deebii	Darbi
201	Ulfi kun kan meeqaffaa dha?	_____	
202	Umuriin ulfaa meeqa(batii meeqa)	_____	
	guyyaan dhumaa xurii kee argite yoom?	Guyyaa _____	Haadholee ulfa jalqabaa isaanii taheef gara # 211
<b><i>Hadholee yeroo tokko oli ulfaa'anif</i></b>			
203	Daa'imman/ijoolle meeqa qabdaa?	Laakkofsaan _____	
204	Meeqa isaanitu waggaa shanii gadi?		
205	Garaagarummaan turtii ulfa dhumaa isa darbee kan ammaa jidduu jiru meeqa/daa'imni isaa dhumaa kee umuriin isaa meeqa?	Waggaa _____	
206	ulfii addaan kutame/sii irraa bahee jira?	1.Eeyyeen 2.Miti	
207	Deebiin gaaffii 206 kee eeyyen yoo ta'e yeroo meeqa?_____	_____	Gafi 206 f miti yoojate gaafi biradabri
208	Daa'imakee isa dhumaa eessatti deesse?	1.Mana yaalaa 2. Mana 3kanbiroibsii (specify)_____	
209	Dau'msa kee isa dhumaa irratti dhiignii hedduun dhangala'ee turee?	1.Eeyyeen 2.Miti	
210	ulfaa darbe irratti tajaajila hordoffi ulfaa taasiftee turte?	1.Eeyyan 2. Miti	
211	Amma hordoffi ulfaa taasisa jirtaa?	1.Eeyyen 2.Miti	
212	Osoo ulfa kana garaa qabduu Dhiigni yaa'ee jiraa?	1.Eeyyeen 2.Miti	
213	yaalii kamiyyuutiif baqaaqsaan qaamaa siif godhamee ture?	1.Eeyyen 2.Miti	
214	Ji'a darban keessatti dhukkuba busaatiin qabamtee turte?	1.Eeyyan 2.Miti	
215	Ji'aa tokkoo darban keessatti ho'inni qaama keetii dabalee turee?	1.Eeyyan 2.Miti	

216	Saaphana siree busaa ni qabdaa?	1.Eeyyan 2.Miti	
217	Gaafi 216f yoo eye jate ,galgalaa dabree kana saphanaa siree jala ciste bulte	1.Eeyyan 2.Miti	Gafi 216f miti yoojate biradabrii
218	Qusannaa maatii fayyadamtee beektaa?	1.Eeyyan 2.Miti	
219	Deeebiin gaaffii Q218 eeyyen yoo tahe gosa akkami	1,Kiniinii liqimfamu 2, lilme 3.gadamessa kan ka'amu 4,Hire kessa kan ka'amu 5,kan bira ibisi_____	Gafi 219f miti yoojate gafi kana bira dabri
220	Mana fincaanii ni qabdaa	1.Eeyyan 2.Miti	
221	Mana fincanini qabdayoo ta'ee kan akkamitii?	1, Hole(boolla) 2,Traditional pit(bola aada) 3,mana finchane hamay ya'wn 4,flush-kanbihan faydamu 5, kan bira ibisi_____	Yoo deebii gaaffi 220 mitti gaffi 221,222 darbi.
222	Mana fincaanii yoo qabaatte harka kee mana fincaannitti erga fayyadamteen booda ni dhiqattaa?	1.Eeyyeen 2.Miti	
223	Harka kee nyaataan dura ni dhiqattaa?	1.Eeyyeen 2.Miti	
224	Bishaan eessaa argatta?/bake bishaan jirru	1.Mada dangeffa/egame 2.mada hindagegn 3.Bishan lafa guba (laga, kuri, bollaa, galaana, bishaan jaliisi) 4. Bishaan bombaa 5.Bishan roobaa 6.Bishaan bollaa 7.Kanbiro ibsi_____	
225	Bishaan dhugaatiif itti fayadamten toftaa kamiin qulqullesitaa/yaalaa?	1.Eeyyen 2.Miti	
226	Bishaan dhugaatif qulqulu akka ta'u yeroo mar'aa/baaye malli fayadamtan mali?	1 ,danfisu 2 ,chlorine iti dabaluu 3 , hucun calalu 4,kanbiroo ibsi:_____	Yoo miti ta'ee gaaffi 226 bira darbi

227	Kophee ni kawataa (ni ufata)	1.Eeyyen 2.Miti	
228	Yommuu ulfaa kee batii 3fa tii kaase hanga batii 6fa kessattii dawa raamoo fudhate?	1.Eeyyen 2.Miti	
229	Dawaa hirinaa dhiiga yeroo garaa qabdu fudhate turte?	1.Eeyyen 2.Miti	
230	Yoo fudhateeta ta'e guyyaati yeroo meeqa fudhatte?	1,guyyatti yeroo tokko 2,guyyatti yeroo lama 3,takka take yeroo yaadadhee 4,hin fudhanhuu	Yoo mitii ta'ee gaaffii 230 bira darbaa
231	Dhukkuba cimaan qabamte bektaa?	1.Eeyyen 2.Miti	
232	Yoo qabamte dhukuba kamii	1,michi sombaa 2,bussaa 3,kanbiroo ibsii: _____	Yoo mitii ta'ee gaaffii 232 bira darbaa

Kutaa 3:-gaaffii haalaa rakkoo nyaataa adda baasuuf Amma waa'ee nyaata keetii fi maatii kee ilaalchisee			
301	In Torban afran darban kessatti midhan gahaa mana kessaa hin qabu jettee ciqamtee turtee?	0 = Miti 1= Eeyyen	1 = darbee darbee (torbee afran darbee kessa altokoo ykn al lama 2 =yeroo tokko tokko(yeeroo sadi hange kudhanii torbee afran darban kessa) 3 = yeeroo baayee (yeroo kudhan olii torbee afran darban kessa)
302	Torbee afran darban kessatti ati ykn maatiin kee gosa nyaata nyaachuu barbaadani dhabdani beektuu sababa qabeenya dhabuu irraa kan ka'een?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee
303	Torbee afran darban keessatti ati ykn maatiin kee sababa rakkoo qabeenya dhabuu irraa kan ka'een nyaata murtaa'ee qofa nyaattee jirtaa?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee

304	Sababa hanqina qabeenyaa irraa kan ka'een torbee afran darbee keessa ati ykn maatiin keessan nyaata hinbarbaannee nyaattani turtanii?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee
305	Torbee afran darbee kessa sababa hanqina qabeenyaa irraa kan ka'e ati ykn maatii keessa hanga nyaachuu barbaaddanii gadi nyaattani turtani?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee
306	Torbee afran darbee kessa ati ykn maatii keessan <b>sababa</b> nyaata gaha argachuu dhabu iirraa kanka'ee nyaata haalaan xiqqoo nyaatae beektuu?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee
307	Torbee afran darbee keessa sababa hanqina qabeenyaa irraa kan ka'een yeeroo nyaanii gosa tokkolen mana kessa hin jirree ni jiraa?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee
308	Torbee afran darbee kessa ati ykn maatin kessan sababa nyaanni dhabameen otoo hin nyatiin beelaan raftani jirtuu?	0 = Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee
309	Torbee afran darbee kessa sababa waan nyaattan dhabu irraa kan ka'een ati ykn maatin kessan guyyaa gutufi halkan osoo waatakkalee hin nyaatin bobba'aan nijira?	0 =Miti 1= Eeyyen	1 = darbee darbee 2 = yeroo tokko tokko 3 = yeeroo baayee

Kutaa 4: haala nyaata itti nyaattu fi nyaata madaalamaa			
401 Waa'ee nyaata guyyaa fi halkan kaleessa nyaatee naaf ibsiiNyaanni sunis maddi isaa keessaa ykn alaa tahu dandaha.Nyaata jalqabaa ganama nyaatte irraa jalqabi.			
Ciree	Laaqana	Maksasi(kasha/subaaxa	irbaata

402 Gosa nyaataa asii gadii eeraman keessaa yoo nyaatte fi hin nyaanne natti himuu dandeessaa?			
Lakkofsa gaaffii	Gosa nyaataa	Fakkeenya	1=eeyye 0=miti
1	Midhaan nyaata	boqqolo/,ruuzii ,bishingaa,ajjaa,qamadii,garbuu xaafii, nyaata kanneen irraa qaphaa'e (fkn daabboo,marqa fi biddeena fi shuumoo).	
2	Mi'aawaa	sukkaara,damma,/?juusii mi'aawa,nyaata sukkaarakan akka chakoleettii,karameellaa,kukusii	

		fi keekii	
3	Muduraa	Raafiu,raafu marama,salaxaa	
4	Kuduraa	Mango,muuzaa,dubbaa,karoti,mixaaxish,dinichaa	
5	Foon	Foon:re'ee,horii,lukkuu,qurxumi,tiru	
6	Zeeyta	Dhadhaa ykn zeeyta	
7	Killee	killee	
8	Midhaa,dheedhii	Baqilaa,atara, shumburaa, ashongooree,misira, laawzii yknnyaata kan irraa hojjeetamee	
9	Gosa Aanannii	Aannaan/ baadu/ hojjaa	
403	Yeroo baayee ati akka nyaatten shaayii/ buna nidhugdaa?		
404	Tomboo ni xuxxaan?		
405	Yoo eyyeen jette isaa kamin?		1,sigara 2,shishaa 3,kanbiroo ibsi_____
406	Yeroo nyaata qophesituu meeshaa kamittii fayyadamta?		1,distii sibilaa 2,distii biyyee 3,kanbiroo ibsi_____

407 can you use the following food items	
Common foods/iron rich	consumption
Plant source	1, once per day /guyyati yeroo tokko2, more/caalaa
Banana/muza	
Beans/ateraafi baaqela	
Bread/daboo	
broccoli	
Spinach	
Cabbage/raafu	
animal source/beldaa irraa	1, once per week/torbetti al tokko 2, more/ykn caalaa
Beef meat/foon hori	
Egg/killee	
Fish/qurxumii	
Milk/annan	
poultry	

Kutaa5:Naataafi gaa'eessi nyaataaAmma rakkoolee nyaata wajjiin walqabate si gaafadha.Gaaffilee kun kallattidhaan si ilaalatta maati keeti miti.

Lakk	Nyaata fi ga'eessumaa nyaataa	
501	Baatilee sadan darban keessati yeroo meeqa nyaataf ykn qarshii nyaata ittiin bittuuf cinqante?	1.humaa cinqamee hin beeku 2.yeroo 1-7 3. yeroo 8-21 4. guyya 21 ol

502	Ji'oota darben sadeen keessatti yeroo meeqa guyyota meeqa yeroo nyaata hir;ifte haqina maallaqaa irraan kan kahe.	1.humaa cinqamee hin beeku 2.yeroo 1-7 3. yeroo 8-21 4. guyya 21 ol
503	Ji'oota darban sadeen keessatti yeroo meeqa hanqina maallaqaa irraan kan kan'en guyyaa guutu nyaata osoo hin nyaatin dabarsite?	1.humaa cinqamee hin beeku 2.yeroo 1-7 3. yeroo 8-21 4. guyya 21 ol
504	Ji'oota darban sadeen keessatti guyyota meeqa nyaata ykn mallaqa kadhatte?	1.humaa cinqamee hin beeku 2.yeroo 1-7 3. yeroo 8-21 4. guyya 21 ol
505	Madda nyaata maal irraa akka argate naaf ibsuu ni dandeessaa?	1=ofii kootiin sassabuudhaan bosonaa adamsuudhaan fi qurxummi qabuu dhaan 2=bitachuudhaan 3=ergisuudhaan nyaata hojiidhaaf,hiriyyaa irra bilisan naaf kenname 4.gargaarsa nyaataa 5=kan biro ibsii
Kutaa 6: Safara		
601	MUAC	cm
	Hayyama hirina dhigaa qurachuuf	Yeeroo qo'ano kana gaggeesinuu dubertoota ulfaa hirina dhigaatif akka qurataman nigafanna,Hirini dhigaa rakkoo fayyaa cimaa sababa hanqina nyaata fii dhibee adda addaa dhufu ni danda'aa Ragaan funaanamu motummaa gargaaruu nidandaa, hirina dhigaa yaaluf yeroo hirina dhigaa qorannoo dhiga xabii takka qofa quba irraa fudhanna meshaan itti fayyadamnuu guttumagututti qulqullufii kan eeggamedha.Firiin qorannoo kessanii yeroo san isinittii himama,lccitin firii kessanii Ni'eegama ykn nama biro tif hin himamuu Gafii qabdan? Q
602	hemoglobin	g/dl

***Yeroo kee waan nuu keenniteef baayee galatoomii !!***

### **ANNEX III: FGD DISCUSSION GUIDE**

Name of Moderator \_\_\_\_\_

Discussion Begin at \_\_\_\_\_ (Local time) End at \_\_\_\_\_ duration \_\_\_\_\_ (hour/s)

Participants: pregnant women, selected reproductive age women, elders

Code of interviewee \_\_\_\_\_

Keble \_\_\_\_\_

1, what is your perception toward anemia?

- What do you think the cause for it?

-What are the major sign/symptom?

-Do you think you can prevent it?

-How it can be cure?

2, what are the major food item a pregnant women should not take please list?

3, what is your reason to restrict these foods?

4, how do you allocate food in the household?

5, for whom you believe food should be given priority and why?

6. In your community, do husbands advise their pregnant wives to eat additional food? Why? How can we help pregnant women to eat what they need?



## **ANNEX IV: FGD DISCUSSION GUIDE AFAN OROMO VERSION**

Maqaa haala mijjeysa-----

Yeroo mariin itti eegale-----

Yeroo itti xumuramee-----

Baayina hirmaattoota

1,waa'ee hirrina dhiigaa wanti beeytan ni jiraa?

-sababni hirrina dhiigaa namatti fidu maal isinitti fakkata?

-mallattoon hirrina dhiigaa gurguddan maalii?

-ofirraa ittisuun ni danda'ama jettani yaadduu?

2,nama hirrini dhigaa naanoo kessanitti qabe wallansii aadaa nijira?

3,dubartiin ulfaa takka akka aadaatti nyaachu hinqabdu jettani yaaddu maal?mee tokkoo tokkon nuibsaa?

4,sababni isa kana maal jettani yaaddu?

5,nyaata akkamitti dhiheeyistu?

6 nyaata bareeda dura eenyuuf dhiheeystu? Nyaanni dura eenyuuf kennamu qaba? Maliif?

**ANNEX V: PRINCIPAL COMPONENT ANALYSIS FOR HOUSEHOLD WEALTH INDEX**

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.619	16.367	16.367	2.619	16.367	16.367	2.389	14.928	14.928
2	2.035	12.716	29.082	2.035	12.716	29.082	2.062	12.887	27.815
3	1.245	7.784	36.867	1.245	7.784	36.867	1.345	8.407	36.222
4	1.167	7.295	44.162	1.167	7.295	44.162	1.205	7.529	43.750
5	1.126	7.035	51.196	1.126	7.035	51.196	1.191	7.446	51.196
6	.971	6.067	57.264						
7	.856	5.353	62.617						
8	.844	5.277	67.893						
9	.810	5.061	72.954						
10	.746	4.660	77.614						
11	.698	4.365	81.979						
12	.679	4.241	86.220						
13	.612	3.827	90.046						
14	.596	3.726	93.773						
15	.578	3.614	97.386						
16	.418	2.614	100.000						

Extraction Method: Principal Component Analysis.