# DETERMINANTS OF NUTRITIONAL STATUS AMONG LACTATING WOMEN IN SUBSISTENCE FARMING HOUSEHOLDS FROM DEDO AND SEQA-CHEKORSA DISTRICTS, JIMMA ZONE, 2014

BY: MIHIRETU ALEMAYEHU (BSc.)

A research thesis submitted to Jimma University College of Public Health and Medical Sciences, Department of Population and Family Health in partial fulfillment of the requirements for Master of Public Health in Reproductive Health specialty (MPH/RH)

June, 2014

Jimma, Ethiopia

# DETERMINANTS OF NUTRITIONAL STATUS AMONG LACTATING WOMEN IN SUBSISTENCE FARMING HOUSEHOLDS FROM DEDO AND SEQA-CHEKORSA DISTRICTS, JIMMA ZONE, 2014

**BY**: MIHIRETU ALEMAYEHU (BSc.)

**ADVISORS**: ABEBE G/MARIAM (prof.)

ALEMAYEHU ARGAW (Msc.)

June, 2014

Jimma, Ethiopia

# Abstract

**Background:** Nutritional status of women is particularly important, because it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations. The extra calories and nutrients required to support breastfeeding makes lactating mothers among groups with special nutritional needs. Nevertheless, many African lactating mothers, including Ethiopians, remained to be undernourished and micronutrient deficient and there is scarcity of studies on the area both in Ethiopia and in the study area..

**Objectives:** This study was aimed at assessing factors associated with nutritional status of lactating mothers living under HFP-CCC (Home-based food production and child centered counseling) project Kebeles in Dedo and Seqa-Chekorsa districts of Jimma zone, south-west Ethiopia from Feb. 3 to March 2, 2014.

**Methods:** A community-based cross-sectional study was conducted in Feb. 3 to March 2, 2014 on 355 lactating mothers who were beneficiaries of the HFP-CCC project. Data on demographic characteristics and nutritional risk factors were gathered through structured interview, whereas anthropometry and hemoglobin concentration measurements were done to assess nutritional status. Data were entered using Epi-data manager and client entry version 1.4.4.0 and analyzed using SPSS for windows version 20. Percentages and means (SD) were used to describe the study population by nutritional status and explanatory variables. Logistic regression was used to identify the predictors of underweight and ane+mia among the explanatory variables.

**Result:** The mean (SD) dietary diversity score of study participants was 4.9(1.9). Majority of study participants ate cereals in the preceding 24 hour of data collection. 92% of study participants didn't eat additional meal other than common family meal. 40.6% of lactating mothers were underweight and 27.8% were anemic. Maternal dietary diversity score (IWDDS) was identified as predictor of undernutrition whereas educational status and dietary diversity were predictors of anemia.

**Conclusion**: Feeding practice of study participants was poor while undernutrition and anemia were high among participants so that HFP-CCC project, woreda health offices, health extension workers and other responsible sectors have to give due attention to improve the situation.

## Acknowledgment

First and most, my gratitude is endless to my heavenly Father, **GOD** for the endless provision and support. I would also like to express my deepest gratitude to my research advisors Prof. Abebe Gebremariam and Mr. Alemayehu Argaw for their unreserved advice and support from the beginning to end of research activities.

My thanks also go to Jimma University for the provision of chance to conduct this research, opportunities to search for literatures, and financial support.

I would also like to extend my whole-hearted gratitude to Home based food production and child-centered nutrition counseling (HHFP-CCC) project for its technical and financial support.

Seqa and Dedo woreda administration, data collectors and study participants deserve my special thank for their facilitation during the data collection.

Last but not least, I would like to thank Mr. Amanuel Tesfay and Mrs. Misra Abdulahi for their advice and suggestion in the research proposal development.

# Table of contents

## Contents

Abstract ..... i

Acknowledgment ..... ii

Table of contents ..... iii

List of tables ..... vi

List of figures ..... vii

Acronyms ..... viii

CHAPTER ONE ..... 1

Background ..... 1

1.1 Introduction ..... 1

1.2 Statement of the problem ..... 3

CHAPTER TWO ..... 6

Literature review ..... 6

2.1 Overview of malnutrition among lactating mothers ..... 6

2.1.1. Magnitude of undernutrition among lactating mothers ..... 6

2.1.2 Magnitude of anemia among lactating mothers ..... 7

2.2 Determinants of malnutrition among lactating mothers ..... 8

2.2.1. Determinants of undernutrition ..... 8

2.2.2. Determinants of anemia ..... 11

2.3 Significance of the study ..... 14

CHAPTER THREE ..... 15

Objectives ..... 15

General objective ..... 15

Specific objectives ..... 15
CHAPTER FOUR ..... 16
Method ..... 16
4.1. Study setting: ..... 16
4.2 Study design ..... 16
4.3 Population ..... 16
4.3.1 Source Population ..... 16
4.3.2 Study population ..... 17
4.4 Inclusion and Exclusion criteria ..... 17
4.4.1 Inclusion Criteria ..... 17
4.4.2 Exclusion criteria ..... 17
4.5 Sample size and sampling technique ..... 17
5.5.1 Sample size ..... 17
4.5.2 Sampling procedure ..... 18
4.6 Data collection and measurement ..... 18
4.7 Variables ..... 20
4.7.1 Dependent Variables ..... 20
4.7.2 Independent Variables ..... 20
4.8 Data management and analysis ..... 21
4.9 Pre-test ..... 21
4.10 Quality control ..... 21
4.11 Ethical consideration ..... 21
4.12 Dissemination of result ..... 22
4.13 Operational definition and Definition of terms ..... 22
CHAPTER FIVE ..... 23
RESULT ..... 23
5.1. Socio-demographic characteristics of the respondents ..... 23
5.2. Maternal health service utilization ..... 25
5.3. Dietary Practice ..... 26

5.4. Magnitude of underweight and anemia ..... 28
5.4.1. Magnitude of underweight ..... 28
5.4.2. Magnitude of Anemia ..... 30
5.5. Determinants of malnutrition and anemia ..... 32
CHAPTER SIX ..... 34
DISCUSSION ..... 34
CHAPTER SEVEN ..... 37
CONCLUSION AND RECOMMENDATION ..... 37
8.1. Conclusion ..... 37
8.2 Recommendation ..... 38
Strength of the study ..... 39
Limitation of the study ..... 39
REFERENCE ..... 40
Questionnaire ..... 43

# List of tables

Figure 1: A conceptual frame work for assessing determinants of nutritional status among lactating mothers in Seqa and Dedo Districts, Jimma Zone, December 2013..... 13
Figure 3: Food groups consumed by respondents in the past 24 hour, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)..... 26
Figure 4: Magnitude of underweight severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014 ..... 29
Figure 5: Magnitude of anemia severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014..... 30

# List of figures

Figure 1: A conceptual frame work for assessing determinants of nutritional status among lactating mothers in Seqa and Dedo Districts, Jimma Zone, December 2013..... 13
Figure 3: Food groups consumed by respondents in the past 24 hour, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)..... 26
Figure 4: Magnitude of underweight severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014 ..... 29
Figure 5: Magnitude of anemia severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014..... 30

## Acronyms

ANC Anti-natal care

AOR Adjusted odds ratio

CED Chronic energy deficiency

COR Crude Odds Ratio

DDS Dietary diversity score

EDHS Ethiopian demographic and health survey

FAO Food aid organization

FP Family planning

Hb Hemoglobin

HFIAS Household Food Insecurity Access Scale

HFP-CCC Home based food production and child-centered nutrition counseling project

IDDS Individual Dietary Diversity Score

IWDDS Individual Women's Dietary Diversity Score

OR Odds ratio

SD Standard Deviation

WHO World health organization

# CHAPTER ONE

# Background

## 1.1 Introduction

Maternal nutrition refers to the nutritional needs during antenatal and postnatal periods and sometimes also to the period prior to conception (i.e. during adolescence). Nutritional status describes an individual's nutritional wellbeing. It is a more comprehensive measure than dietary intake alone as it takes account of body shape and size together with measures of body function [1].

Maternal under nutrition or chronic energy deficit is defined as having a body mass index less than 18.5(1). Body mass index (BMI) is used to measure thinness or obesity. It is defined as weight in kilograms divided by height in meters squared (kg/m2). A BMI below 18.5 indicates thinness or acute undernutrition. A BMI below 16 kg/m2 indicates severe undernutrition and is associated with increased mortality. A BMI of 25.0 or above indicates overweight or obesity [2].

Addressing undernutrition is likely to yield high economic returns and speed up poverty reduction. As a general rule, rates of undernutrition, decline at 50 percent of the rate that gross national product (GNP) per capita increases. Anemia declines at roughly 25 percent of the rate of income growth [3].

Maternal malnutrition remains a persistent problem in developing countries, where women usually fall behind men in having access to food, health care, and education[4]. Evidences showed underlying determinants such as female illiteracy, poverty, and lack of empowerment of women as major barriers to improvement in maternal nutrition in developing countries[5]. Women with low status in societies tend to have weaker control over household resources, tighter time constraints, less access to information and health services, poorer mental health, and lower self-esteem[6].

Poor health has repercussions not only for women but also their families. Women with poor health and nutrition are less likely to be able to provide food and adequate care for their children.

They are also more likely to give birth to low weight infants. Women's health affects the household economic well being, and as women with poor health will be less productive in the labour force[7].

In order to have healthy and well nourished mothers, community and household members should be informed of the importance of making additional food available to women before they become pregnant, during pregnancy and lactation. Efforts to increase the amount of food available to adolescent, pregnant, and lactating women can be the most effective way of improving their health and that of their infants. To support lactation and maintain maternal reserves, most mothers in developing countries will need to eat about 500 additional kilocalories every day (an increase of 20 percent to 25 percent over the usual intake before pregnancy). Consumption of a variety of foods is the best dietary advice[8].

Although maternal malnutrition is not considered an important constraint to breastfeeding for most mothers, giving additional food to malnourished mothers during pregnancy and/or lactation may help increase milk production and will certainly improve their own nutritional status and provide additional energy to care for themselves and their families[8].

This study will reveal factors associated with nutritional status among subsistence farming households in southwest Ethiopia.

## 1.2 Statement of the problem

Malnutrition continues to be a major public health problem throughout the developing world, particularly in southern Asia and sub- Saharan Africa [9]. It is globally the most important risk factor for illness and death, with hundreds of millions of pregnant women, lactating mothers and young children particularly affected.

Evidences show that 450 million women in developing countries are stunted (which indicates chronic malnutrition [10]. Five to twenty percent of women in African countries are underweight. Many African women display low weight for-height as measured by a body mass index of less than 18.5 [11].

Undernutrition impairs a woman's potential to contribute to economic growth since it lowers her productivity and ability to engage in income-generating activities. It also increases the risk of disease. Especially vulnerable populations include female-headed households, widows, female farmers, and female pastoralists [12].

Nutrition is not only a matter of immediate survival; it is also an investment in future generations to avoid some physical or intellectual handicaps. Adequate iron intake is also necessary for brain development. Reducing malnutrition is therefore a humanitarian and developmental issue [13, 14].

Some evidence in developing countries indicate that malnourished individuals, that is, women with a body mass index (BMI) below 18.5, show a progressive increase in mortality rates as well as increased risk of illness (43).

Women of reproductive age, pregnant women, and new mothers along with their babies are disproportionately affected by malnutrition [15].

Women often lack access to sufficient healthy food and eat smaller portion sizes due to cultural practices within the household. Women's heavy workloads and domestic responsibilities also make them vulnerable to malnutrition. When food is in short supply, one coping strategy may be for women and girls to eat less so there is more for men and boys. Not only do women and girls have less access to food, but they also often eat poorer quality, unhealthy, and even unsafe foods.

In addition, inadequate access to safe drinking water and poor sanitation put women and their children at increased risk of illness, malnutrition, and death [16].

Women are more likely to suffer from nutritional deficiency than men for several reasons, including their reproductive biology, low social status, poverty and lack of education. In addition, socio-cultural traditions and disparities in household work patterns can also increase women's chance of being malnourished [17].

The nutritional status of women and children is particularly important, because it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations. A malnourished mother is likely to give birth to a low birth- weight (LBW) baby susceptible to disease and premature death, which further undermines the economic development of the family and society, and continues the cycle of poverty and malnutrition [18].

Women who breastfeed their child require extra calories and protein so that it is important for the mother to eat well to provide the needed nutrition for her and her baby. According to the essential nutrition action (ENA), taking at least two additional meals per day during lactation is recommended for all lactating women. The additional energy needed for lactation is 20-25% of energy needs in the non-pregnant non-lactating state (20-22).

It has also been established that iron deficiency is most likely to occur among malnourished population. Considering this observation that iron deficiency can perpetuate the malnutrition-infection cycle as well as affecting gastric functions, these problems (malnutrition and anemia) should not be considered in isolation when either of them is being addressed [19].

The consequences of morbidity associated with chronic anemia extend to loss of productivity from impaired work capacity, cognitive impairment, and increased susceptibility to infection which also exerts a substantial economic burden [20].

The nutritional status of women and children is a good indicator of the overall well-being of a society. It reflects not only maternal and child care practices, but also household food security, health, and environmental conditions [21].

The health status of mothers before, during and after pregnancy is predictive of the nutritional status of new borns and infants [22].

Maternal diet and nutritional status have been found to influence both the quantity and the quality of milk. The volume of breast milk produced by malnourished women is reported to be lower than that produced by women adequately nourished which in turn affects the nutritional status of infants and children [22].

Research concerning maternal nutritional status and factors which contribute to malnutrition among lactating mothers was not investigated in the study community. Initiating interventions and tackling problems that lactating mothers face must be addressed based on scientific evidences. Thus, this research will provide evidence based information concerning factors associated with malnutrition among lactating mothers in the study community.

# CHAPTER TWO

# Literature review

## 2.1 Overview of malnutrition among lactating mothers

### 2.1.1. Magnitude of undernutrition among lactating mothers

About 870 million people are estimated to have been undernourished (in terms of dietary energy supply) in the period 2010–12. This figure represents 12.5% of the global population, or one in eight people. The vast majority of these, 852 million, live in developing countries, where the prevalence of undernourishment is now estimated at 14.9% of the population[23].

Women are generally vulnerable to undernutrition especially during pregnancy and lactation where the food and nutrient requirements are more during that period (28).

Globally mothers are at higher risk of malnutrition than their counterparts (non-pregnant non-lactating). 40% of women in south and south-east Asia are affected by chronic malnutrition and lack of energy; i.e. stunting and BMI less than 18.5. Mothers from developing countries are at increased risk of undernutrition.

Most Indian mothers are malnourished, anemic and have short pregnancy interval which could have been easily prevented. Women especially in younger age are at high obstetric risk (using the risk criteria of height less than 145 cm and weight less than 38 kg) [24, 25].

In a study done in India, less than half (46.2%) of lactating women in rural India are well nourished. I.e. the remaining 54.8% are malnourished. The prevalence of chronic energy deficiency (CED) was 40% among rural lactating women in India. 23.7 % of lactating mothers are mildly undernourished with BMI of 17.0 – 18.5 $kg/m^2$. 9.5 % and 6.5 % of lactating mothers are moderately and severely undernourished with BMI of 16.0 – 16.9 $kg/m^2$ and below 16 $kg/m^2$ respectively. The prevalence of overweight and obesity (BMI above 25 $kg/m^2$) is very low which accounts only 6 % among lactating women in India [26].

A cross-sectional study done by Yasmeen Majid Khan in 2012 in the three regions of India revealed that 36.6, 19.3 and, 10% of lactating women who live in Ladakhi , Jammu and Kashmiri region are underweight with BMI <18.5 [27].

A cross-sectional study done in Qashqa'i nomad mothers in Fars-Iran showed that 21% of the study mothers were underweight (BMI less than 18.5 kg/m2) [28].

According to the Ethiopian demographic and health survey (EDHS 2011) report, the mean BMI for Ethiopian women age 15-49 is 20 kg/$m^2$. 29.1% of rural women in Ethiopia have BMI less than 18.5kg/$m^2$. Overweight or obesity (BMI 25 kg/m2 or above) is not common among women in Ethiopia. Five percent are overweight (BMI 25-29.9 kg/m2), and just 1 percent are obese (BMI 30 kg/m2 or above)[2].

A cross-sectional study done in northern Ethiopia, Tigray region, revealed that 25% of lactating mothers are chronically energy deficient with BMI less than 18.5 kg/$m^2$. Less than 2% of lactating mothers are overweight and obese with BMI of above 25 kg/$m^2$ [29].

A community based cross-sectional study conducted in Addis Ababa (slum areas) in Teklehaimanot district revealed that 27.1% of lactating mothers have BMI less than 18.5[30].

### 2.1.2 Magnitude of anemia among lactating mothers

According to the World Health Organization (WHO), there are over two billion people around the world suffering from anemia. Iron deficiency, which is the main cause of anemia, is the most common nutrition disorder worldwide (44).

Although the prevalence of anemia is estimated at 9% in countries with high development, in countries with low development the prevalence is 43%.Children and women of reproductive age are most at risk. Africa and Asia accounting for more than 85% of the absolute anemia burden in high-risk groups. 20% of maternal deaths (115,000 deaths per year) are associated with anemia, as a result of iron deficiency[13, 31].

According to the DHS 2011 report, 18.5 % of lactating mothers in Ethiopia are anemic (Hb < 12g/dl). Among the overall lactating mothers 14.8% of them are mildly anemic (Hb 10-11.9g/dl), 3% are moderately anemic (Hb 7-9.9) and 0.6% are severely anemic (Hb< 7g/dl) [2].

But a study done in pregnant and lactating mothers in Dehradun district, India in 2009 showed a high prevalence of anemia among lactating mothers (66%) [32].

According to the Musa S. et al's study in Qashqa'I, Iran, nearly half of their study mothers had hemoglobin level below 12 g/dl, and they could be considered as anemic[28].

But as J. Haidar et al's study in Slum area of Addis Ababa showed, the overall prevalence of anemia among studied lactating mothers was 22.3% with the mean hemoglobin concentration of 11.4 $\pm$ 0.4 gm/dl. Almost all the mothers (99.5%) were mildly anemic except 0.5% severe anemia [30].

Similarly, a cross-sectional survey of 403 pregnant women attending an urban health centre in Hawassa showed 15.1% prevalence of anemia on low hemoglobin (45).

## 2.2 Determinants of malnutrition among lactating mothers

### 2.2.1. Determinants of undernutrition

Studies around different countries show that socio-economic, demographic and maternal health factors are associated with nutritional status of lactating mothers. Income of the family, educational level of mother, residence, family size, religion, marital status, length of marital status, access to safe water, and maternal health factors such as; ANC visits, post natal visits, dietary intake, feeding pattern, number of pregnancies and sickness during lactation determine the nutritional status of lactating mothers [5, 12].

Socio-demographic factors such as age of the lactating mother, residence, educational status and income level are associated with undernutrition. Adolescents (age 15-19) are more likely to be thin (36%) than older women. Rural women also are more likely to be thin than urban women. By education, women who have attended up to primary school have the greatest likelihood of being thin. Those in the lowest wealth quintile also are more likely to be thin than women in other wealth quintiles[2].

Size of farmland is also one of the socio-economic factors which affect the nutritional status of lactating mothers. In a study done by Kiday H in 2013, lactating mothers whose family has smaller farm land are at higher risk of malnutrition than those with larger farm land. Those who

had a land size of 0.26-0.75 hectare were 5.1 times more likely to be malnourished than those who had a land size of greater than 0.75 hectare [AOR=5.1, 95% CI (1.06, 24.46)] [29].

As Woldemariam G and Timotios G study revealed, Household economic status is also significantly associated with women's nutritional status. As compared with women residing in households with medium or higher economic status, women residing in very poor and poor households was about 1.7 and 1.3 times more likely to be undernourished, respectively (46).

Women who are unemployed were 1.5 times more likely to be undernourished as compared with women employed for cash. Women who were employed, but not for cash, were also 1.2 times more likely to be undernourished as compared with women employed for cash (46).

Women's decision making autonomy on expenditure of their cash income is also another important variable explaining their nutritional status. The risk of undernutrition among women who have joint say in how their cash earnings are to be used was 1.5 times more likely as compared with women who have full say (46).

Age is also another important factor which determines women's nutritional status. Women in the youngest age group (15-19) and the oldest age group (35-49) were about 1.6 times more likely to be under nourished as compared with women 20-24 (46).

Marital status is significantly associated with undernutrition. At the national level, never-married women were about 1.9 times more likely to be undernourished than currently married women, and the difference was statistically significant (46).

The length of marital duration is also determining factor to malnutrition in lactating mothers. The longer the marital duration, the less likely the mother will be malnourished. Those whose years of marriage was between 11-20 years were 71% less likely to be malnourished than those whose years of marriage was less than or equal to 10 years [AOR=0.29, 95% CI (0.09, 0.9)] [29].

Frequency of ANC visit had also a significant association with the nutritional status (BMI) of the lactating mothers. Women who had ANC visits of less than or equal to 3 times were 2.9 times more likely to be malnourished (BMI < 18.5 kg/m2) than those who had more than 3 ANC visits [AOR=2.9, (1.2, 7)] [29].

Postnatal care is also important for both the mother and the child not only to treat complications arising from the delivery, but also to provide the mother with important information (including nutrition) on how to care for herself and her child. The level of postnatal care coverage is extremely low in Ethiopia. The great majority of women (92 %) with a live birth in the preceding five years did not receive a postnatal checkup. the proportion of mothers who do not receive postnatal visit is even higher in rural community (95.7%). 93.8 % of mothers in Oromia region do not receive any post natal follow up [2].

Taking additional meal is recommended for lactating mothers in order to support lactation and maintain maternal reserves. The average dietary diversity score among Ethiopian mothers who had at least one delivery in the preceding 3 years of the survey was 4.01 (±1.53). The majority of the respondents 1241 (49.5%) had low DDS. About 902 (36.0%) and 364 (14.5%) had medium and high DDS, respectively[33].

Similarly, In a study done by Kiday H, 71.3% of the study participants do not take any additional meal during their lactation time. The median dietary diversity score of the study participants was 5.0, which was lower than half of the food groups on FAO food grouping i.e. 14 food groups[29]. The dietary intake of rural pregnant women was lower than the recommended level [34].

According to Yasmeen Khan's study in the three regions of India, 45.5% of lactating women who live in Ladakhi region had lower caloric intakes followed by 41.3 and 12.7% women who live in Jammu and of Kashmiri region respectively. The highest percentage of women having deficient caloric intakes were found to be illiterate and belonging to lower socio-economic status while least number of salaried mothers were found to consume deficient diets [27].

Even though iron deficiency anemia is most likely to occur among malnourished population, the study done in Fars-Iran showed that there was no significant association between hemoglobin level and BMI (33).

### 2.2.2. Determinants of anemia

Anemia is patterned by socioeconomic factors, especially by household wealth. As Yarlini B. et al's analysis in low and middle income countries showed, the risk of anemia among women living in the lowest wealth quintiles was 25% higher than among those in the highest wealth quintile. Women with no education were more likely to be anemic than those with greater than secondary education [35].

EDHS 2011 reported that women with no education are twice as likely to be anemic as women with more than secondary education. Similar result was reported from a study done in pregnant and lactating mothers in Dehradun district, India in 2009 that showed significant association between educational status and anemia ($\chi 2 = 19.99$, $p<0.05$) [32] .

According to the Ethiopian demographic and health survey (EDHS, 2011), anemia prevalence decreases as wealth status increases. Study done in Dehradun district also revealed similar result in which 70.7% of lactating mothers were anemic in middle socioeconomic group followed by 66.7% in the lower socioeconomic group, where as only 47.4% of lactating females were anemic in the upper class. However this difference in the prevalence of anemia among lactating women was statistically not significant. ($P > 0.05$) [32].

As the study of A.B. Singh et al revealed, educational status is associated with anemia among lactating mothers while age and occupation of the mother are not significantly associated with anemia(37).

Age of the mother is significantly associated with hemoglobin level as depicted by J. Haidar et al's study in Slum area of Addis Ababa ($p<0.01$at 95% CI) (35). Similar result was depicted from Samson G and Fikre E's study in which age group 30-34 and 35-39 years are at significantly higher risk of anemia compared to the youngest group with adjusted odds ratio (AOR) of 1.31 (95% CI: 1.07-1.60) and 1.56 (95% CI: 1.27-1.90), respectively (11) .

A cross-sectional study done among 978 ultra poor Bangladeshi households showed that age and parity were significantly associated with anemia with AOR-0.08 and -0.11 ($P<0.05$). I.e. older mothers were found more anemic compared to the younger mothers and mothers with large number of children are more anemic than mothers with few children.(48).

But in a study done in Dehradun district, India, the Prevalence of anemia was 71.4% in women of less than 20 years, whereas it was as high as 85.7% among lactating women of 35-49 years age group. However, this difference was statistically not significant ($p>0.05$). (37)

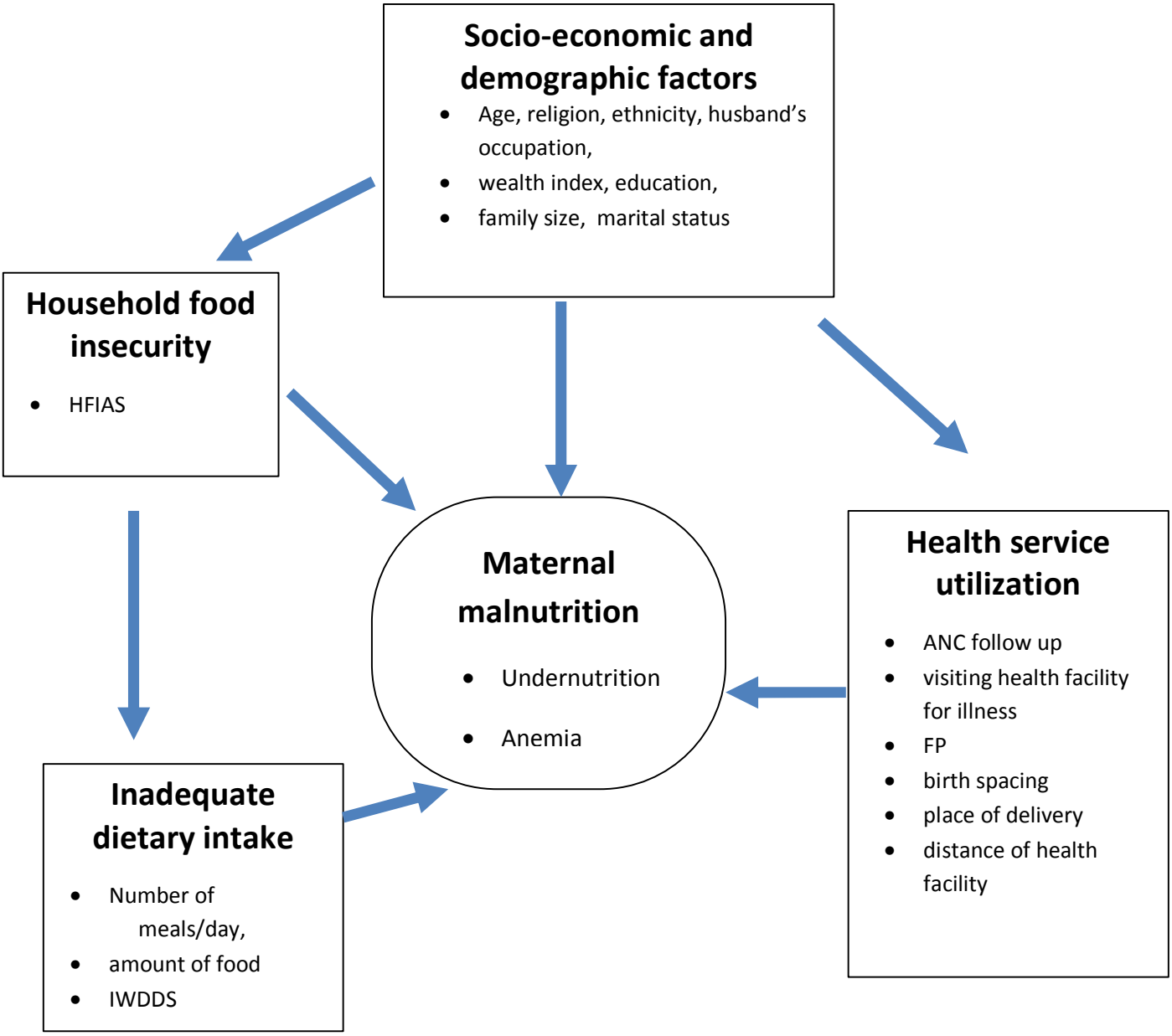


Figure 1: A conceptual frame work for assessing determinants of nutritional status among lactating mothers in Seqa and Dedo Districts, Jimma Zone, December 2013

## 2.3 Significance of the study

Maternal under nutrition remains persistent problem in developing countries including Ethiopia. Lactating mothers are at higher risk of malnutrition due to increased demand of nutrients during breastfeeding period.

Maternal malnutrition has been investigated on other periods of maternity other than Lactational period. But little was investigated both nationally and internationally on nutritional problems during lactational period.

Basically this study aims at providing scientifically sound data on nutritional status, and its determinants among lactating mothers in the study community so that appropriate initiative can be taken by the local government bodies and relevant local stakeholders to respond to identified specific problem to improve health status of the source population in the community.

Seqa and Dedo sub-districts are among the rural districts of Jimma zone. These sub-districts are characterized by subsistence farming and high prevalence of malnutrition. Therefore, the study findings can also be utilized by zonal and regional policy makers and planners who are interested in the study area and other similar settings.

This study will reveal important determinants of nutritional status among farming households in Dedo and Seqa Cheqorsa districts which will be valuable evidence for determinants of nutritional status among lactating mothers in rural Ethiopia.

# CHAPTER THREE

# Objectives

## General objective

To identify the determinants of nutritional status among study participants from Dedo and Seka-Chokorsa Woredas of Jimma Zone, Oromia Region from Feb. 3 to March 2, 2014

## Specific objectives

- To determine nutritional status (underweight and anemia) of study participants
- To identify factors associated with underweight among the study participants
- To identify factors associated with anaemia among the study participants

# CHAPTER FOUR

# Method

## 4.1. Study setting:

This study is part of a baseline survey for the HFP-CCC project (home-based food production and child-centered counseling) which was conducted from Feb. 3- March 2, 2014. The HFP-CCC is a nutrition intervention research to improve dietary adequacy and growth of young children implemented by a collaboration of Jimma University, the Nestle Foundation and the VLIR project. The HFP-CCC project targets lactating mothers and their infants from subsistent farming households in 8 selected Kebeles of Dedo & Seka-Chokorsa Woredas, Jimma Zone.

Jimma Zone is one of the 20 administrative zones in Oromia Regional State with a total population of 2.5 million from which 94% are rural inhabitants. Jimma town, the capital of Jimma zone, is located 346 Km away from Addis Ababa. Subsistence farming is the dominant form of livelihood in Jimma Zone where only 15% of the population is in non-farm related jobs (41). Dedo and Seka-Chokorsa Woredas are among the 18 administrative districts in Jimma Zone where the eight HFP-CCC project Kebeles are located. This setting was selected to represent subsistent farming households in rural southwestern Ethiopia and additional project implementation criteria.

## 4.2 Study design

The study employed community-based cross-sectional design to assess determinants of nutritional status among study participants.

## 4.3 Population

### 4.3.1 Source Population

The source population for this study was all lactating mothers who breastfeed their child age less than one year, in HFP-CCC project area, representing subsistent farming households.

### 4.3.2 Study population

Selected lactating mothers from Seqa Chokorsa and Dedo districts who were included in HFP-CCC project.

## 4.4 Inclusion and Exclusion criteria

### 4.4.1 Inclusion Criteria

The inclusion criteria applied to choose the HFP-CCC project participants were:

- Mother with infant of age less than 12 months
- Permanent residence & no plan to leave the area within the following 2 years
- Mother/primary caretakers is a housewife or farmer
- Main source of household income is agriculture
- Willing to participate & sign the contractual agreement
- Household with enough space in the backyard; $\geq$ 45 $m^2$ (for $\geq$ 3 plots of size 1.5 X 10m)

### 4.4.2 Exclusion criteria

Mothers who were seriously ill so that they are unable to respond

## 4.5 Sample size and sampling technique

### 5.5.1 Sample size

The sample size of this study was 355 lactating mothers that were under the HFP-CCC project. Using 95% level of confidence, this sample size allowed us the estimation of an expected prevalence rate of 25% underweight (34) with precision of 0.045 and 18.5% anaemia (2) with precision of 0.040. Precision for this study was obtained from formula to estimate a single population proportion.

$$n = \frac{z^2 p(1-p)}{d^2}$$

$$d = \sqrt{\frac{z^2 p(1-p)}{n}}$$

Whereas, n= sample size = 355

Z=level of significance at 95% confidence interval

$p_{(BMI)}$=proportion of lactating mothers whose BMI less than 18.5kg/$m^2$=25%(34)

$p_{(Anemia)}$= proportion of lactating mothers who are anemic, i.e. 18.5% (2)

d= margin of error (precision)

**For BMI,**

$$d = \sqrt{\frac{1.96^2 * 0.185(0.815)}{355}}$$

$$d = 0.045$$

**For Anemia,**

$$d = \sqrt{\frac{1.96^2 * 0.25(0.75)}{355}}$$

$$d = 0.040$$

### 4.5.2 Sampling procedure

All HFP-CCC project beneficiary mothers were taken for current study.

This study assessed all the 355 HFP-CCC project beneficiary lactating women from 8 rural Kebeles. These women are assumed to represent lactating women from rural farming households in Jimma area.

## 4.6 Data collection and measurement

Data was collected through face to face interview using pre-tested structured questionnaire prepared in Afaan Oromo by 8 data collectors who were fluent in Afaan Oromo supervised by 2

supervisors. The questionnaire included information on demographic characteristics, household wealth indicators and different nutritional risk factors including maternal health service utilization, recent illnesses, and diet and food security. Household wealth status was assessed by asking about household assets, utilities and housing characteristics used to generate household wealth index in EDHS (2).

**Food security**

Food security was assessed using Household Food Insecurity Access Scale (HFIAS), a tool validated in other developing countries. The HFIAS has nine questions asking household's last month experience about three domains of food insecurity: feeling uncertainty of food supply, insufficient quality of food, and insufficient food intake and its physical consequences. Study households were categorized into different levels of food-security (food-secure and mildly, moderately, or severely food-insecure) according to the recommendation in HFIAS manual (49).

**Dietary assessment**

A 24-hour dietary recall method was used to assess quality of diet. Women's Individual Dietary Diversity Score (IWDDS) of subjects was calculated by adding their responses for food groups consumed. For this study 14 food groups were used as recommended by FAO, namely: 1) Cereals; 2) Vitamin A rich vegetables and tubers; 3) White roots and tubers; 4) Dark green leafy vegetables; 5) Other vegetables; 6) Vitamin A rich fruits; 7) Other fruits; 8) Organ meat; 9) Flesh meat; 10) Eggs; 11) Fish; 12) Legumes, nuts and seeds; 13) Milk and milk products; and 14) Oils and fats

**Anthropometry and hemoglobin measurement**

Weight and height measurements of all subjects were taken using calibrated equipments; UNICEF SECA Electronic weighing scales ($\pm$10 g precision Scale) for weight and a portable stadiometer capable of measuring to 0.1cm for height. All measurements were done according to standardized techniques(42), with the subjects wearing light clothing and no shoes.

Hemoglobin concentration was determined from finger-prick blood sample using HemoCue device (HemoCue Hb 301 UK) by the researcher. Values were adjusted for altitude using the

Centre for Disease Control (CDC) Atlanta method (50). Anemia status was determined using cutoffs used for non-pregnant women in the Ethiopian DHS (2 ). Hemoglobin concentration below 12.0 g/dl was considered the presence of any anemia with mild, moderate and severe anemia determined using cutoffs 10.0-11.9g/dl, 7.0-9.9g/dl and < 7.0 g/dl, respectively.

## 4.7 Variables

### 4.7.1 Dependent Variables

- Under nutrition (BMI)
- Anemia (hemoglobin concentration)

### 4.7.2 Independent Variables

**Socio-demographic characteristics**

- Age of mother
- Marital status of mother
- Household Wealth index
- Ethnicity of mother
- Family size
- Occupation of husband
- Educational status of mother

**Maternal health service utilization**

- ANC
- Place of delivery
- Illness of the mother during lactation
- Visiting health facility for illness
- Distance from nearest health facility
- Number of pregnancies and live births
- Spacing of pregnancy
- Family planning utilization

**Dietary practice**

- IWDDS
- Number of meals/day & increased intake during lactation
- HFIAS

## 4.8 Data management and analysis

Data were coded, entered and cleaned using Epi-data manager and client entry version 1.4.4.0 and all analyses were done with Statistical Package for Social Studies (SPSS windows version 20). Proportions and means (SD) were used to describe the study population by explanatory variables and nutritional status. Bivariate logistic regression was done to identify the differentials of anemia and underweight in the study population. The important predictors of anemia and underweight were determined using multivariable logistic regression model. Stepwise backward procedure was used for modeling by including variables with significant or marginally significant association in the bivariate logistic regression (p-value <0.25). All statistical tests were considered significant at alpha <0.05.

## 4.9 Pre-test

Pretest was done on 20 mothers in the Buyo kechema kebele to ensure appropriateness of the study tools and to acquire common understanding on the assessment tools. Any challenge and problem identified before actual data collection was managed accordingly through discussion with data collectors and principal investigator**.**

## 4.10 Quality control

There was regular supervision of the data collection process by the principal investigator and supervisors. Data was checked for its completeness and confusions were cleared at the end of each data collection day. The interviewers were trained prior to data collection. Anthropometry equipments were calibrated, some of the records were re-checked by the supervisors and extreme values were re-assessed.

## 4.11 Ethical consideration

The actual research activity was conducted after Jimma University College of health and medical science ethical committee approved the clearance. Permission from the local government administration bodies was received and informed written consent was obtained from the participants. Participants were informed that they have full rights to participate or not to participate in the study. Furthermore, the objective of the study, harms and benefits were clearly communicated. The respondents were also informed that their responses will be kept confidential. Mothers whose hemoglobin concentration was below 9.0 g/dl were referred to health facility for further treatment and follow up.

## 4.12 Dissemination of result

The result will be disseminated to Jimma University, HFP-CCC project, Seqa and Dedo Woreda Health offices and Jimma Zone Agriculture office. Furthermore, attempt will be made to publish the result in scientific journal.

## 4.13 Operational definition and Definition of terms

1. **Underweight / undernourished**: is BMI level less than 18.5kg/$m^2$
2. **Mildly underweight/ undernutrition**: is BMI level between 17.0 – 18.5 kg/$m^2$
3. **Moderately underweight/ undernutrition**: is BMI level between 16.0 – 16.9 kg/$m^2$
4. **Severely underweight/ undernutrition**: is BMI level below 16.0 kg/$m^2$
5. **Overweight**: is BMI level between 25.0 – 29.9 kg/$m^2$
6. **Obesity**: is BMI level above 25 kg/$m^2$
7. **Anemia:** is hemoglobin level below 12g/dl
8. **Mild anemia**: is hemoglobin level between 10-11.9g/dl
9. **Moderate anemia**: is hemoglobin level between 7-9.9 g/dl
10. **Severe anemia:** is hemoglobin level below 7g/dl
11. **Food secure:** if mother responded Q1a=1 or Q1a=0, and Q2,3,4…=0
12. **Food insecure:** if mother responded Q1a=2, or Q1a=3, or above
13. **Food security:** When all people at all times have both the physical and economic access to sufficient food to meet their dietary needs in order to lead productive and healthy life
14. **Dietary diversity score:** is the total number of food groups consumed over 24 hours before the data collection
15. **Low IWDDS**: if mother consumed three or less food groups in 24 hour preceding interview.
16. **Medium IWDDS**: if mother consumed 4-5 food groups in the 24 hour preceding interview.
17. **High IWDDS**: if mother consumed six or more food groups in the 24 hour preceding interview.
18. **Food Groups:** A total of 14 food groups adopted from the FAO classifications as outlined: 1) Cereals; 2) Vitamin A rich vegetables and tubers; 3) White roots and tubers; 4) Dark green leafy vegetables; 5) Other vegetables; 6) Vitamin A rich fruits; 7) Other fruits; 8) Organ meat; 9) Flesh meat; 10) Eggs; 11) Fish; 12) Legumes, nuts and seeds; 13) Milk and milk products; and 14) Oils and fats will be used

# CHAPTER FIVE

# RESULT

## 5.1. Socio-demographic characteristics of the respondents

Three hundred and forty-two lactating mothers were assessed making a response rate of 96.3%. The mean (SD) age of study participants was 26.4 (5.6) years. Majority of mothers (n=210) were found in the age category of 25-34 years followed by 92 (27.2%) and 37(10.9%) mothers in the age categories of 15-24 and 35-49 years, respectively. Three hundred and seven (93.8%) of the respondents were from Oromo ethnic group whereas 10 (3.1%) were from Amhara. Regarding religion of participants, 292 (87.1%) were Muslim, 27 (8.1%) were orthodox and the remaining 16 (4.8%) were protestant. Three hundred (96.5%) of the participants were married. As to educational status, only 83 (24.9%) of the participants were able to read and write. The mean (SD) family size and number of under five children were 5.8 (2.94) and 1.66 (1.75), respectively (**Table 1**).

**Table 1: Socio-demographic characteristics of Study Participants, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

| Variables | Frequency (%) |
|---|---|
| Age | |
| 15-24 | 92(27.2) |
| 25-34 | 210(61.9) |
| 35-49 | 37(10.9) |
| Religion | |
| Muslim | 292(87.1) |
| Orthodox | 27(8.1) |
| Protestant | 16(4.8) |
| Ethnicity | |
| Oromo | 307(93.8) |
| Amhara | 10(3.1) |
| Others | 10(3.1) |
| Marital status | |
| Single | 11(3.5) |
| Married | 300(96.5) |
| Education of mother | |
| Illiterate | 251(75.1) |
| Literate | 83(24.9) |
| Husband's occupation | |
| Farmer | 310(94.2) |
| Government | 5 |
| Merchant | 8 |
| Daily laborer | 4 |
| NGO | 2 |

## 5.2. Maternal health service utilization

One hundred and nineteen (35.0%) of the study participants responded that they had illness during their lactational time, where only 84 (71.2%) sought medical service. Regarding family planning utilization, only 136 (37.2%) of the respondents were using family planning to prevent pregnancy. Among study participants, 30 (9.1%) had miscarriage. Regarding birth spacing, 82 (27.8%) of study participants delivered their current child before the older child celebrate his second year. Out of 342 lactating mothers, 190 (55.6%) received at least one ANC service and 78 (22.8%) of study participants received at least four visits for their last pregnancy. Two hundred and seventy three (81.5%) mothers delivered their last child at home.

**Table 2: Health service utilization of Study Participants, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

| Variables | Frequency (%) |
|---|---|
| **Illness in the past 2 weeks** | |
| No | 242(70.6) |
| Yes | 101(29.4) |
| **FP use** | |
| No | 213(62.8) |
| Yes | 126(37.2) |
| **Birth interval** | |
| < 24 month | 82(27.8) |
| 24-48 month | 160(54.2) |
| > 48 month | 53(18.0) |
| **Miscarriage** | |
| No | 299(90.9) |
| Yes | 30(9.1) |
| **ANC** | |
| No | 152(44.4) |
| Once | 14(4.1) |
| Twice | 43(12.6) |
| Three times | 55(16.1) |
| Above three times | 78(22.8) |
| **Place of delivery** | |
| Health facility | 273 (81.5) |
| Home | 62(18.5) |

### 5.3. Dietary Practice

The mean Individual Dietary Diversity Score (SD) of study participants was 4.9 (1.9) with range of 1 to 11. Only 111 (32.8%) participants consumed at least 6 food groups. Cereals and legumes were the most commonly consumed food groups eaten by 323 (95.0%) and 303 (89.4%) participants, respectively whereas foods from fish, organ meat and flesh meat groups were consumed by only 8(2.4%), 15(4.4%) and 26(7.6%) of study participants, respectively.

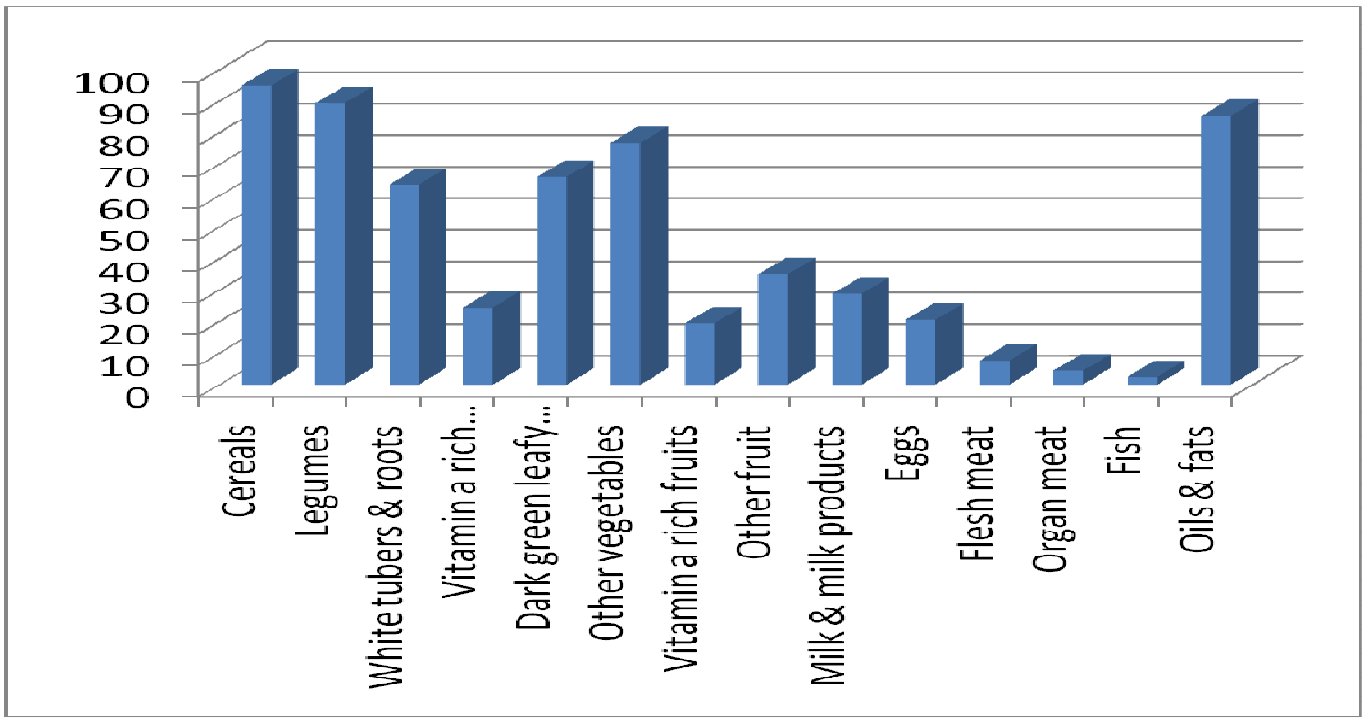


**Figure 2: Food groups consumed by respondents in the past 24 hour, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

Based on the Household Food Insecurity Access Scale (HFIAS) measurement, 22 (6.8%) of study participants were food insecure. Concerning the usual number of meals, the mean (SD) number of meals was 2.96 (0.68) per day with 33 (9.8%), 271 (80.4%) and 33 (9.8%) of participants consumed <3, 3 and >3 meals per day. Only 96 (28.2%) participants reported to consume meals additional to family meals during lactation.

**Table 3: Feeding practice of respondents, lactating mothers from Dedo and Seka-Chekorsa Sub-districts, Feb. 2014 (n=342)**

| Variables | Number (%) |
|---|---|
| **Eat additional foods other than common family food** | |
| No | 246(71.9) |
| Yes | 96(28.1) |
| **Number of meals per day** | |
| Less than or equal to 3 | 305(90.2) |
| 4 meals | 31(9.2) |
| 5 meals | 2 |
| **Amount of food intake** | |
| Increased | 120(35.5) |
| Decreased | 6 |
| No change | 212(62.7) |

## 5.4. Magnitude of underweight and anemia

### 5.4.1. Magnitude of underweight

The mean (SD) BMI of respondents was 19.2 (7.6) kg/m$^2$. Among the 342 respondents, 139(40.6%) were underweight with mild, moderate and severe degrees of underweight occurred in 88 (25.9%), 24(7.1%) and 26 (7.6%) of the respondents, respectively.

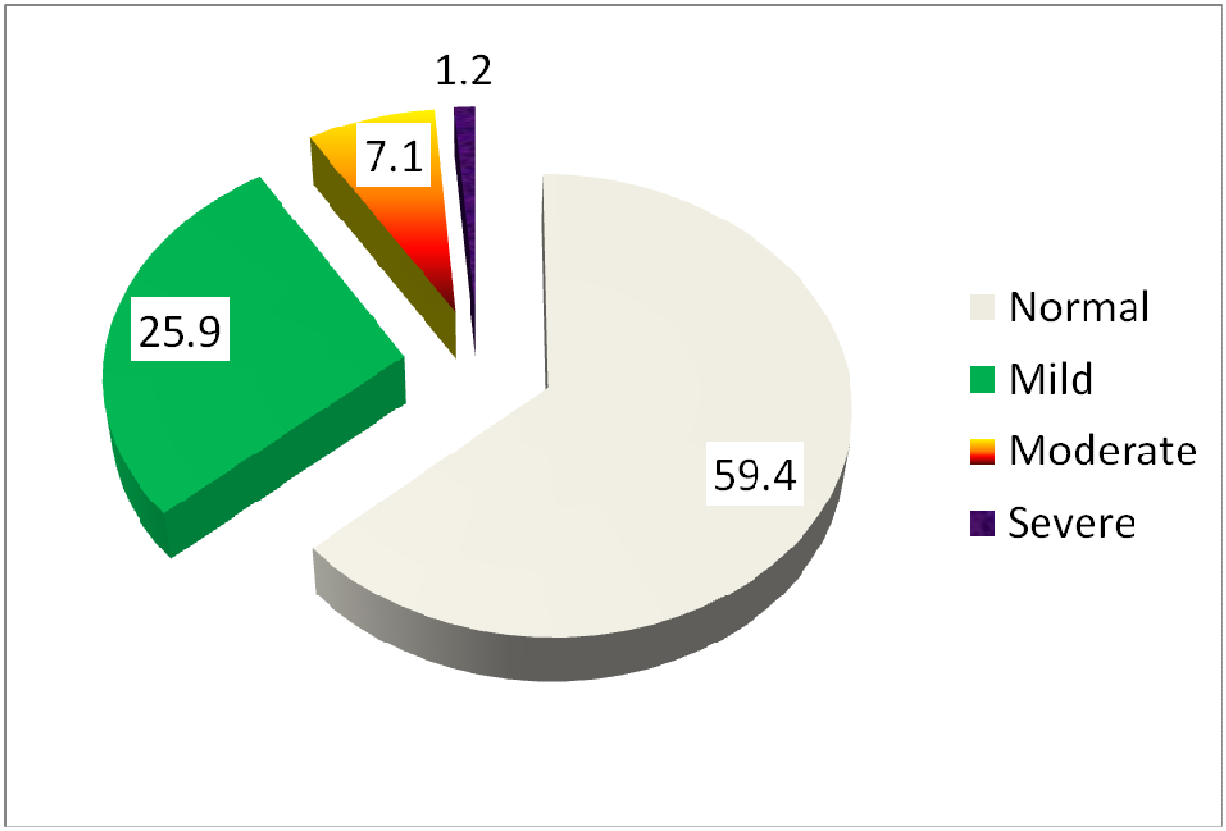

**Figure 3: Magnitude of underweight severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014**

**Table 4: Prevalence of underweight by demographic, maternal and dietary characteristics of study participants (n=532), 2014**

| Variables | | Total | Underweight (%) | Crude OR (95% C.I.) |
|---|---|---|---|---|
| Age | 15-24 | 92 | 37(40.2) | 1 |
| | 25-34 | 210 | 87(41.4) | 1.05 (0.64, 1.73) |
| | 35-49 | 37 | 15(40.5) | 1.01(0.47, 2.20) |
| Religion | Muslim | 292 | 118(40.4) | 1 |
| | Christian | 43 | 21(48.8) | 1.41(0.74, 2.68) |
| Ethnicity | Oromo | 307 | 125(40.7) | 1 |
| | Amhara | 10 | 6(60.0%) | 2.18(0.60, 7.90) |
| | Others | 10 | 3(30.0%) | 0.62(0.16, 2.46) |
| Marital status | Single | 11 | 5(45.5) | 1 |
| | Married | 300 | 121(40.3) | 0.81(0.25, 2.72) |
| Educational status | Read & write | 83 | 31(37.3) | 1 |
| | Cannot read a d write | 251 | 108(43.0) | 1.27(0.76, 2.11) |
| Husband's occupation | Farmer | 310 | 128(41.3) | 1 |
| | Other | 19 | 6(13.6) | 0.66 (0.24, 1.77) |
| Household wealth index | Lowest | 71 | 29(40.8) | 1 |
| | Middle | 69 | 30(43.5) | 1.11(0.57, 2.18) |
| | Highest | 68 | 27(39.7) | 0.95(0.48, 1.88) |
| Illness in the past two weeks | Yes | 100 | 41(41.0) | 1 |
| | No | 241 | 98(40.7) | 0.98(0.61, 1.58) |
| Use FP | Yes | 95 | 52(41.6) | 1 |
| | No | 212 | 87(41.0) | 0.98(0.62, 1.53) |
| Birth interval | < 24 month | 81 | 31(38.3) | 1 |
| | 24-48 month | 159 | 65(40.9) | 1.12(0.65, 1.93) |
| | ≥ 49 month | 53 | 21(39.6) | 1.06(0.52, 2.15) |
| Miscarriage | Yes | 30 | 15(50.0) | 1 |
| | No | 297 | 121(40.7) | 1.46(0.68, 3.08) |
| ANC | < or = 3 | 142 | 65(45.8) | 1 |
| | ≥4 | 120 | 48(40.0) | 0.79(0.48, 1.29) |
| Place of delivery | Home | 272 | 113(41.4) | 1 |
| | Health facility | 62 | 24(38.7) | 0.89(0.51, 1.57) |

| | | | | |
|---|---|---|---|---|
| IWDDS | 0-3 | 82 | 34(41.5) | 1 |
| | 4-5 | 145 | 59(40.7) | 0.97(0.56, 1.1.68) |
| | ≥6 | 110 | 45(40.9) | 0.98(0.55, 1.75) |
| Number of meals/day | < Or = 2 times | 33 | 13(39.4) | 1 |
| | 3 times | 271 | 115(42.4) | 1.13(0.54, 2.37) |
| | 4 and above | 33 | 10(30.3) | 0.67(0.24, 1.85) |
| Visit health facility for illness | No | 34 | 15(44.1) | 1 |
| | Yes | 84 | 35(41.7) | 0.91(0.41,2.02) |
| Food insecurity | Secure | 303 | 128(42.2) | 1 |
| | Insecure | 22 | 8 | 0.78(0.32, 1.92) |
| Anemia | No | 219 | 87(39.7) | 1 |
| | Yes | 88 | 39(44.3) | 0.80(0.52, 1.21) |

### 5.4.2. Magnitude of Anemia

The mean (SD) hemoglobin concentration of participants was 12.8(1.4)g/dl with range of 7.0–16.6g/dl. Hemoglobin concentration was <12.0 g/dl in 88 participants giving an all anemia prevalence of 28.7% (95%CI= 23.6% - 33.8%). The prevalence rates for mild and moderate anemia were 79(25.7%) and 9(2.9%), respectively, whereas no subject was found with severe case of anemia.

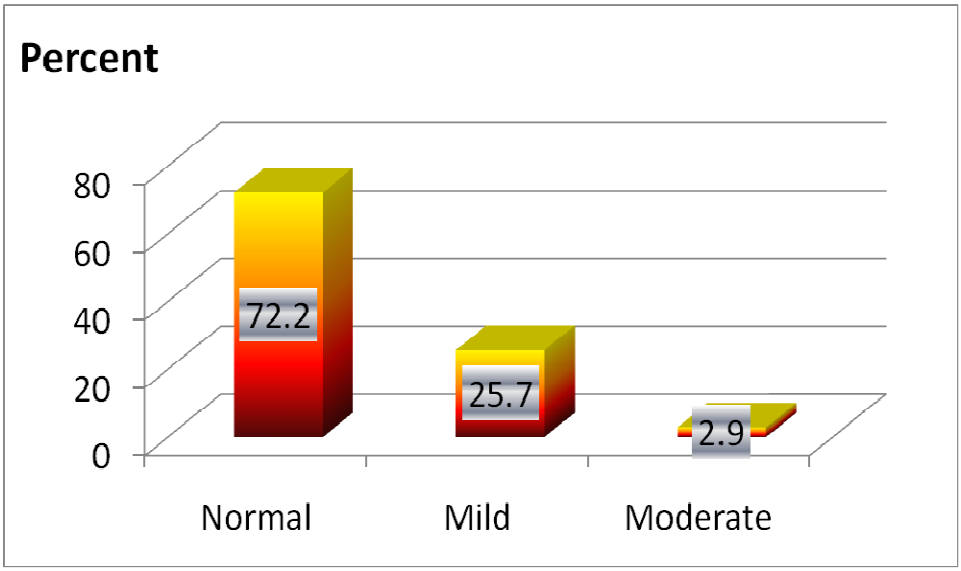


**Figure 4: Magnitude of anemia severity, lactating mothers from Dedo and Seka-Chekorsa Sub-districts (n=342), Feb. 2014**

**Table 5: Prevalence of anemia by demographic, maternal and dietary characteristics of study participants, 2014**

| Variables | | Total | Anemia (%) | Crude OR(95% C.I) |
|---|---|---|---|---|
| Age of mother | 15-24 | 81 | 26(32.1) | 1 |
| | 25-34 | 188 | 51(27.1) | 1.03(0.44, 2.42) |
| | 35-49 | 35 | 11(31.4) | 0.81(0.37, 1.78) |
| Religion of mother | Muslim | 266 | 76(28.6) | 1 |
| | Christian | 36 | 11(30.6) | 0.91(0.43, 1.94) |
| | | 14 | | |
| Ethnicity of mother | Oromo | 276 | 79(28.6) | 1 |
| | Amhara | 9 | 2 | 0.60(0.17, 2.19) |
| | Others | 10 | 4 | 0.43(0.06, 3.22) |
| Educational status | Cannot read and write | 225 | 67(29.8) | 1 |
| | Read & write | 74 | 19()25.7 | 0.82(0.45, 1.48) |
| Husband's occupation | Farmer | 280 | 81(28.9) | 1 |
| | Other | 5 | 2 | 1.90(0.53, 6.79) |
| Household wealth index | Lowest | 64 | 19(29.7) | 1 |
| | Middle | 60 | 14(23.3) | 0.84(0.40, 1.80) |
| | Highest | 60 | 20(33.3) | 0.61(0.27, 1.36) |
| Illness in the past two weeks | Yes | 92 | 29(31.5) | 1 |
| | No | 215 | 59(27.4) | 0.82(0.48, 1.40) |
| Use FP | No | 275 | 58(29.7) | 1 |
| | Yes | 108 | 28(25.9) | 0.83(0.49, 1.40) |
| Birth interval | < 24 month | 77 | 26(33.8) | 1 |
| | 24-48 month | 143 | 34(23.8) | 1.40(0.62, 3.16) |
| | ≥ 49 month | 55 | 12(26.7) | 0.86(0.40, 1.84) |
| Miscarriage | Yes | 27 | 8(29.6) | 1 |
| | No | 268 | 75(28.0) | 0.92(0.39, 2.20) |
| ANC | < or = 3 | 131 | 48(36.6) | 1 |
| | ≥4 | 103 | 25(24.3) | 1.80(1.02, 3.20)* |
| Place of delivery | Home | 248 | 74(29.8) | 1 |
| | Health facility | 53 | 12(22.6) | 0.69(0.34, 1.38) |
| IWDDS | 0-3 | 71 | 22(31.0) | 1 |
| | 4-5 | 134 | 37(27.6) | 0.85(0.45, 1.60) |
| | ≥6 | 98 | 25(25.9) | 0.76(0.39, 1.50) |

| | | | | |
|---|---|---|---|---|
| Visited health facility for illness | No | 109 | 36(33.0) | 1 |
| | Yes | 81 | 25(30.9) | 1.16(0.47, 2.82) |
| Food insecurity | Insecure | 21 | 4(19.0) | 1 |
| | Secure | 274 | 83(30.3) | .0.541(0.18, 1.66) |

***** -significant at p<0.05

## 5.5. Determinants of malnutrition and anemia

### Predictors of undernutrition

After controlling for confounding using backward stepwise multivariable logistic regression, dietary diversity score of mother was found to be independently associated with underweight. (Table 6)

Study participants who ate six or more food groups in the preceding 24 hour of interview were 39.6% less likely to be underweight as compared to those who ate three or less food groups, AOR=0.604 (95% C.I: 0.381, 0.958).

**Table 6: Determinants of underweight among study participants, lactating women (n=342) from selected Kebeles of Dedo and Seqa Chekorsa woredas, Jimma Zone, 2014.**

| Variable | | Total | Underweight (%) | AOR (95% C.I) |
|---|---|---|---|---|
| IWDDS | 0-3 food groups | 82 | 34(41.5) | 1 |
| | 4-5 food groups | 145 | 59(40.7) | 0.56(0.29, 1.08) |
| | ≥6 food groups | 110 | 45(40.9) | 0.60(0.38, 0.96)* |

***** -significant at p<0.05

**Predictors of Anemia**

Backward stepwise multivariable regression revealed educational status of mother and dietary diversity score as independently significant determinants of anemia.

Mothers who can read and write were 55.9% less likely to be anemic as compared to their counterparts, AOR 0.441 (95% C.I: 0.286, 0.680). And mothers who ate 4-5 food groups in 24 hour preceding the interview were 59.6% less likely to be anemic as compared to those who ate three or less food groups, AOR 0.404 (95% C.I: 0.186, 0.879). (Table 7)

**Table 7: Determinants of anemia among study participants, lactating women (n=342) from selected Kebeles of Dedo and Seqa Chekorsa woredas, Jimma Zone, 2014.**

| Variables | | Total | Anemia (%) | AOR |
|---|---|---|---|---|
| Educational status | Cannot read and write | 225 | 67(29.8) | 1 |
| | Read & write | 74 | 19()25.7 | 0.44(0.29, 0.68)** |
| IWDDS | 0-3 food groups | 71 | 22(31.0) | 1 |
| | 4-5 food groups | 134 | 37(27.6) | 0.40(0.19, 0.88)* |
| Food insecurity | Insecure | 21 | 4(19.0) | 1 |
| | Secure | 274 | 83(30.3) | 0.25(0.55, 1.15) |

***** -significant at $p<0.05$

# CHAPTER SIX

# DISCUSSION

Malnutrition is a major public health problem in developing countries. This study tried to use underweight and anemia to measure the nutritional status of study population.

Concerning health service utilization of study participants, 37.2% of study participants were using contraceptive to prevent pregnancy mostly injectable. This finding is higher than EDHS 2011, in which out of the surveyed married rural women 23.4% were using contraceptive. Similarly, this finding is higher than Oromia regional contraceptive prevalence where 26.2% were using contraceptive. This discrepancy might be the results of improved health service coverage compared to the survey time. (2)

ANC follow up is one of the most important factors which can help mothers to be healthy during pregnancy and lactation. 55.4% of study participants received at least one ANC service. This result is far higher than EDHS report in which nationally 34% of mothers visit at least once but lower than a cross sectional study conducted in Northern Ethiopia, Samre woreda where 92% of lactating mothers had at least one visit. This study shows 22.8% of study participants received at least four visits for their last pregnancy. This result is consistent with EDHS 2011 report in which 19% of pregnant mothers received ANC service. Improvement in institutional delivery was seen from current study in which 18.4% of mothers delivered their current child at health facility which is higher than national report in which only 10% gave birth in health facility. (2, 34)

Eating balanced diet is essential for human body to be immune and perform metabolic activities. This study used 24 hour recall method to find out food groups eaten by respondents in the day preceding interview. Respondents were asked to tell all the food types eaten in the preceding day and their response was categorized in to 14 food groups which FAO recommends for individual dietary diversity score.

The mean dietary diversity score of study participants was 4.9 which is consistent with average dietary diversity score of 5 in Northern Ethiopia but slightly higher than national report of 4.0. This might be due to improvement in socio-economy status (both national and regional) which by itself enables individuals to be capable of purchasing goods including variety of food. (34, 38) Nevertheless, the average dietary diversity score of the study participants was lower than half of the recommended food groups.

Giving additional food to malnourished mothers during pregnancy and/or lactation may help increase milk production and will certainly improve their own nutritional status and provide additional energy to care for

themselves and their families. To support lactation and maintain maternal reserves, mothers need to eat about 500 additional kilocalories every day. (9)

However, only 9.8% of lactating mothers in this study eat more than three meals per day. Sadly, the rest eat three or less meals per day. This is lower than study conducted in northern Ethiopia where 28.8% eat additional meal during lactation (34). This might be due to difference in awareness about feeding practice confounded by study area as the current study focused on only rural women but the earlier study focused on both rural and urban areas.

Two women in every five (40.6%) of study participants were underweight with BMI below 18.5kg/$m^2$. this is comparable with a study done in three regions in India, Ladakhi , Jammu and Kashmiri region, in which 36.6% of lactating women were underweight. Similarly, 40% of rural lactating women in another study conducted in India are underweight (31, 32). But the result of this study is higher than Addis Ababa, northern Ethiopia, EDHS 2011 and Fars-Iran where 27.1, 25, 29.1 and 21% of mothers were underweight respectively (2, 33, 34, 35)

The mean BMI of current study was 19.2 kg/$m^2$ which shows lower level compared to national level of women in Ethiopia (i.e. 20 kg/$m^2$) , which is directly related to proportion of underweight population. (2)

Regarding the severity of undernutrition, 25.9%, 7.1% and 7.6% of respondents were mildly, moderately and severely underweight respectively. This result is comparable with study conducted in rural India. (31)

The proportion of overweight and obesity was quite low (1.5%) in this study. This is far lower than national prevalence (6%) of Ethiopian women and lactating women from India (2, 31). this might be due to the difference in life style of individuals which varies with their residence, where as current study exclusively focuses on mothers from subsistent farming households from rural area.

The present study also investigated anemia, which is the most common micro-nutrient deficiency among people in developing country.

Even though the mean hemoglobin concentration of participants (12.8(1.4)g/dl) was higher than a study from Addis Ababa slum areas (11.4 g/dl), The overall prevalence of anemia in current study was 27.8% (hemoglobin level below 12 g/dl) which is slightly higher than national prevalence of anemia among Ethiopian lactating mothers and lactating mothers from Addis Ababa slum areas where 18.5% and 22.3% were found to be anemic (2, 35)

Anemia among current study participants was quite lower than results from Middle East and India where 66% in Dehradun district – India (37) and nearly half of study mothers in Qashqa'I Iran (33). This might be due to consumption of one of Ethiopians' staple food, injera which is reach in dietary iron. In the current study, 95 % of lactating mothers consumed cereals (which contain "teff") which might prevent them from being anemic.

Regarding the severity of anemia, none of the participants were severely anemic (Hemoglobin concentration less than 7g/dl) whereas 25.7% and 2.9% were mildly and moderately anemic respectively.

Coming to predictors of malnutrition and anemia, studies around different countries pointed out that socio-demographic characteristics, health service utilization and feeding practice have some relationship with nutritional status (2, 6, and13). This study also tried to assess their association.

Dietary diversity score of mother was found to be independently associated with underweight. I.e. Study participants who ate six or more food groups in the preceding 24 hour of interview were 39.6% less likely to be underweight as compared to those who ate three or less food groups, AOR=0.604 (95% C.I: 0.381, 0.958) implying that eating diverse food groups as a protective to undernutrition.

In contrary to findings of studies conducted in other areas, wealth index, marital status, Anti-natal follow up, Place of delivery, birth interval and health problem faced during delivery had no statistically significant association with undernutrition on multivariable regression (2, 34, and 46).

Backward stepwise multivariable regression revealed educational status of mother and dietary diversity score as independently significant determinants of anemia. Mothers who can read and write were 55.9% less likely to be anemic as compared to their counterparts, AOR 0.441 (95% C.I: 0.286, 0.680). This finding is consistent with EDHS 2011 report in which women with no education are twice as likely to be anemic as women with more than secondary education (2). this is also comparable with study done in Dehradun district, India where educational status and anemia were significantly associated ($\chi 2 = 19.99$, $p<0.05$) (37)

Mothers who ate 4-5 food groups in 4 hour preceding the interview were 59.6% less likely to be anemic as compared to those who ate three or less food groups, AOR 0.404 (95% C.I: 0.186, 0.879). This might be due to the reason that the more diverse the food eaten, the more a person will be nutritionally healthy as diverse food groups contain different types of macronutrients and micronutrients.

# CHAPTER SEVEN

# CONCLUSION AND RECOMMENDATION

## 8.1. Conclusion

Assessing nutritional status of lactating mothers is crucial as malnourished mothers cannot provide adequate care for their children, more likely to give birth to low weight infants and women with poor health will be less productive in their labour force. From the findings the following conclusions are obtained.

- Feeding practice of the study mothers was poor which by itself contributes to undernutrition where as institutional delivery and ANC service was better than national level in which more than half of study participants had at least one ANC visit.

- Undernutrition and anemia are high among study participants, where two in every five mothers and two in every seven mothers were underweight and anemic respectively.

- Finally, Individual dietary diversity score was independent determinant of undernutrition whereas mother's educational status and dietary diversity score were independent determinants of anemia among the study participants.

## 8.2 Recommendation

Based on the above result and conclusion, the following recommendations are forwarded:

- HFP-CCC project as a follow up project have to give due attention to improve feeding practice of project beneficiaries.
- Dedo and Seqa chekorsa woreda health offices have to strengthen inter-sectoral collaboration with government and non-governmental organizations to improve the nutritional status of mothers
- Researchers have to conduct wider longitudinal studies to assess the usual (every season) feeding practice and relationship with nutritional status.
- Health extension workers, as they are intimate to mothers, have to work hard by providing health and nutrition education to improve maternal malnutrition in the study community.

## Strength of the study

- This study used community based cross-0sectional study design to investigate determinants of malnutrition
- Use of primary data
- The use of laboratory test to identify anemia rather than clinical diagnosis

## Limitation of the study

- Seasonal variation in food consumption might exist so that results regarding dietary issue are only for the specific season of the year in which the study was conducted.
- This study didn’t identify type of anemia as HemoCue HB 301 UK shows only hemoglobin concentration.

**REFERENCE**


1. The Manoff Group: Guidance for Formative Research on Maternal Nutrition. Infant and Young Child Nutrition Project. 2011 [cited 2013 November 01]; Available from: http://www.manoffgroup.com/GuidanceforFormativeResearchonMaternalNutrition.pdf.
2. Central Statistical Agency [Ethiopia] and ICF International. 2012. Ethiopia Demographic and Health Survey 2011. Addis Ababa EaC, Maryland, USA: Central Statistical Agency and ICF International
3. Stimulating Economic Growth through Improved Nutrition. 2008.
5. Khan Y BZPCNA. Nutritional deficiencies in the developing world. current status and opportunities for intervention2010;57:1409 - 41.
6. Bhutta ZA GI, de'Silva H, et al: Maternal and child health: is South Asia ready for change? BMJ 2004; 328: 816-819.
7. Smith LC RU, Ndiaye A, Haddad L, Martorell R: The Importance of Women's Status for Child Nutrition in Developing Countries. Washington, DC, International Food Policy Research Institute, 2003.
8. Chatterjee M 1990. Indian women. Their Health and Economic productivity. *World Bank Discussion Papers,* Washington, D.C: World Bank.
9. www.linkagesproject.org/media/publications/.../FAQMatNutEng.pdf accessed
10. Food and Agriculture Organization of the United Nations. Undernourishment around the world: *The state of food insecurity in the world*2004, Rome.
11. Malnutrition and health in developing countries. www.ncbi.nlm.nih.gov/pubmed/16076825. accessed by Feb, 2014
12. Linkage publication: Academy for Educational Development. Africa: Essential Health Sector Actions to Improve Maternal Nutrition in Africa; 2002:3-7.
13. UNICEF. The State of the World's Children 2012. http://www.unicef.org/sowc/files/SOWC_2012-Main_Report_EN_21Dec2011.pdf. accessesd by Feb, 2014.
14. Nutrition in developing countries, 2011. www.diplomatie.gouv.fr/en/IMG/.../Rapport_**Nutrition**_v_anglaise-2.pdf. Accessed by January 2014.
15. Hunger and malnutrition, 2004.
16. Mayer, J. (1976). The dimensions of human hunger. In: Scientific American (Ed.): Food and Agriculture: A Scientific American Book. San Francisco: W. H. Freeman and Company.
17. 1. UNICEF. The State of the World's Children 2012. http://www.unicef.org/sowc/files/SOWC_2012-Main_Report_EN_21Dec2011.pdf. Accessed by Jan, 2014.

18. Ransom IE, Elder KL: Nutrition of women and Adolescent girls: Why it matters? Population Reference Bureau. 2003.

19.Malnutrition, Quantifying the health impact at national and local levels. Geneva, 2005. whqlibdoc.who.int/.../**2005**/9241591870.pdf. Accessed by Jan, 2014.

20. Good nutrition during lactation, 2007.
21. ENA Counselor's guide: Key behaviors for optimal breast feeding, complementary feeding and maternal nutrition at critical stages in the life cycle of women and children_ draft for discussion_ linkages project. 2008. <http://motherchildnutrition.org/...nutrition/.../mcn-ena-key-messages-bookl>.
22. Institute of Medicine (IOM): Dietary Reference Intakes. Food and Nutrition Board. Washington DC: National Academy Press; 2005.
23. Beaton, G.H. and J.M. Benoga. Nutrition in preventive medicine, ;Geneva, WHO, 1976; Pp.577.
24. Horton S, Ross J. The economics of iron defi ciency. *Food Policy* 2003; **28:** 51-75.
25. United Nations, http://reliefweb.int/sites/reliefweb.int/files/resources/6CD47CD5B0F1801AC12574F9004C5529-UN_Oct2008.pdf.
26. Jelliffe DB, and E. F. P. Jelliffe. 1978. . The volume and composition of human milk in poorly nourished communities. A review. Am. J. Clin. Nutr. 31:492-515.
28. Srinivasan K TK. 1989. Demographic consequences of low Status of women in Indian Society. . In: C Gopalan, Suminder Kaur (Eds.):. w*omen and Nutrition in India.* New Delhi: Nutrition Foundation of India, and Spl. Pub. Series No. 5: 17-62.
29. ACC U. SCN (United Nations Administrative Committee on Coordination-Subcommittee on Nutrition). 1992. Second report on the world nutrition situation. 1994;1.
30. Mathai AT. 1989. Women and the health system. In: C Gopalan, Suminder Kaur (Eds.): *Women and Nutrition in India.* New Delhi: Nutrition Foundation of India, ;and Spl. Pub. Series No. 5: 247- 295.
31. K. Mallikharjuna Rao NB, N. Arlappa , A. Laxmaiah and G.N.V. Brahmam. Diet and Nutritional Status of Women in India, *Indian Council of Medical Research*. *2010*:29(3): 165-70.
32. Yasmeen K AK. Factors influencing the Nutritional Status of Lactating Women in Jammu, Kashmir and Ladakh Regions. International Journal of Advancements in Research & Technology, 2012.1(4).
33. Musa S AY, Atena R. Malnutrition Markers And Nutritional Status In Qashqa'i Nomad Mothers. EJBS 2013,;17(1) ;70-75.
34. Kiday H AM, Meron G Feeding practices, nutritional status and associated factors of lactating women in Samre Woreda, South Eastern Zone of Tigray, Ethiopia. Nutrition Journal2013; 12(28).

35. J. Haidar NMM, A.M. Omwega G. AYANA. Malnutritionand iron deficiency anemia in lactating women in urban slum communities from Addis Ababa, Ethiopia. East African Medical Journal 2003;80(4):191-4.
36. McLean E CM, Egli I, Wojdyla D, de Benoist B. . Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993-2005. Public Health nutr 2009; 12: 444-54
37. A.B. Singh SDK, R. Chandra, V.K. Srivastava, K.S. Negi. Anemia among pregnant and lactating women in district Dehradun. *Indian J Prev Soc Med* 2009;40(1 and 2):19-22.
38. Central Statistical Agency [Ethiopia] and ICF International. 2006. Ethiopia Demographic and Health Survey 2005. Addis Ababa EaC, Maryland, USA: Central Statistical Agency and ICF International
39. Jood S BS, Khelarpaul N. Nutritional status of rural pregnant women of Haryana State, North India. *Nutritional Health* 2002;16:121-31.
40. Yarlini B UR, Emre Ö, Anuraj H S, S V Subramanian. Anaemia in low-income and middle-income countries. 2011; Available from: www.thelancet.com.
41. Milas S, El Aynaoui K. 2004. Four Ethiopias: A regional characterization. World Bank.
42. National Health and Nutrition Examination Survey: Anthropometry procidures manual. 2007. Available from: http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/manual_an.pdf.
43. Rotimi, C., I. Okosun , L. Johnson, E. Owoaje, T. Lawoyin, M. Asuzu, J. Kaufman, A. Adeyemo, and R. Cooper. 1999. The distribution and mortality impact of chronic energy deficiency among adult Nigerian men and women. *European Journal of Clinical Nutrition* 53:734-739
45. Gies S, Brabin BJ, Yassin MA, Cuevas LE: Comparison of screening methods for anemia in pregnant women in Awassa, Ethiopia. *Tropical Medicine and International Health* 2003, 8:301-309
46. Girma, W and Timotiows G. 2002. *Determinants of Nutritional Status of Women and Children in Ethiopia.* Calverton, Maryland, USA: ORC Macro
47. Samson G and Fikre E. Correlates of anemia among women of reproductive age in Ethiopia: Evidence from Ethiopian DHS 2005: *Ethiop J Health Dev* 2011;25(1)
48. Farhana H. Malnutrition among Bangladeshi women in ultra poor households: prevalence and determinants, 2003
49. Food and Nutrition Technical Assistance Project (FANTA) Website: "www.fantaproject.org"
50. Kevin MS, Zuguo M, Laurence GS, Ibrahim P. Tropical Medicine and International Health. Blackwell Publishing Ltd. 2008; 13(10): 1267–1271

# Questionnaire

**Section 1.identification**

| | | | |
|---|---|---|---|
| **I1** | ID mother: \|____\|____\|____\| | **I2** | Interview date: \|__\|__\|/\|__\|__\|/\|__\|__\| (dd/mm/yy) |
| **I4** | Woredas: \|____\| | **I5** | Kebele: \|____\| |
| **I6** | Zone: \|____\| | **I7** | Gote / gere : \|____\| |
| **I11** | Id data collector: \|____\| | **I12** | Supervisor's code: \|____\| |

**Section 2: Demographic and wealth characteristics**

**Household wealth and demographic characteristics**

| | | | |
|---|---|---|---|
| **G2** | Marital status mother: \|___\| _____<br>1. Single 2.married/ 3.divorced 4.widowed 5. Others | | |
| **G3** | Ethnicity mother: \|___\|;<br>_____<br>1.oromo 2.amhara 3.gurage 4.tigre 5.wolaita 6.others(specify)___ | **G4** | Religion mother: \|___\|;<br>_____<br>1. Orthodox 2. Protestant 3. Muslim 4.catholic 5. Traditional 6.others |
| **G7** | Fathers occupation **\|___\|1.** Farmer **2**. Government **3**. Merchant/trade **4**. Daily laborer **5**. Ngo **6**. Other (specify)_____ | | |
| **G11** | How many people live in this house? **G11.1** All people: \|__\|__\| **G11.2** Under-five children\|__\|__\| | | |
| **G12** | Primary source of hh income: \|___\|;<br>_____ | **G13** | Size of agricultural land owned by the hh: \|__\|__\|__\|<br>(_____ unit) |

| | | | |
|---|---|---|---|
| **G14** | Does your household have a functioning ……..: [**write '1' if yes & '0' if no**]<br>**G14.1.** Television: \|___\| **g14.2.** Radio: \|___\| **g14.3.** Satellite dish: \|___\| **g14.4.** Mobile phone: \|___\|<br>**G14.5.** Landline phone: \|___\| **g14.6.** Table: \|___\| **g14.7.** Chair/bench (not stool): \|___\| **g14.8.** Bed with sponge mattress:\|__\|<br>**G14.9.** Bed with straw mattress:\|___\| **g14.10.** Kerosene lamp: \|___\| **g14.11.** Pressure lamp\|___\| **g14.12.** Kerosene stove:\|___\| **g14.13.** Electric 'mitad':\|___\| **g14.14.** Animal-drawn cart:\|___\| **g14.15.** Bicycle:\|___\| **g14.16.** Motorcycle/'bajaj':\|___\| **g14.17.** Refrigerator: \|___\| **g14.18.** Water pump diesel:\|___\|14a1.1.hoe/mattock \|___\| 14a1.2 hammer/iron bar \|___\| 14a1.3 spade/shovel \|___\|<br>14a1.4ox plough \|___\| 14a1.5water pump \|___\| 14a1.6tractor \|___\| | | |
| **G15** | Animals owned by the household:[for each animal, write the number owned by the hh: if the hh doesn't own an animal, write 000]<br>**G15.1.** Plow oxen: \|__\|__\|__\| **G15.2.** Bulls: \|__\|__\|__\| **G15.3.** Cows/heifers: \|__\|__\|__\|**g15.4.** Calves: \|__\|__\|__\|<br>**G15.5.** Sheep & goats: \|__\|__\|__\| **G15.6.** Horse, donkey & mules: \|__\|__\|__\| **G15.7.** Chicken: \|__\|__\|__\| **G15.8.** Bee-hives: \|__\|__\|__\| | | |
| **G16** | How many rooms in this household are used for sleeping? \|___\|___\| | | |
| **G17** | **Housing characteristics** | | |
| | **G17.1. Roof: \|___\|** | **G17.2. Wall: \|___\|** | **G17.3. Floor: \|___\|** |
| | 1. Thatch/leaf 2. Plastic sheets<br>3. Corrugated iron sheet 4. Cement<br>5. Other [specify] _____ | 1.wooden & mud 2.cartoon 3.cement<br>4.stone with lime/cement 5.wood plank/shingles<br>6. Bricks 7. | 1. Earth/ mud 2. Wooden<br>3. Ceramic tiles 4. Cement/bricks<br>5. Other [specify]_____ |

| | | | |
|---|---|---|---|
| | | Other[specify]_____ | |
| **G18** | Type of fuel mainly used for cooking? \|___\|; **1**.electricity **2**.wood **3**.biogas kerosene **4**.straw/shrubs/ grass **5**.other (specify)_____ | | |
| **G19** | Usual place of cooking: \|___\|;<br>**1**.in the living house **2**.in a separate building **3**.outdoors 4.other (specify)_____ | | |
| **G20** | Who owns the house you are currently living in? \|___\|<br>**1**. Personal **2**. Rented from government**3**. Rented from individuals | **G21** | Do you have separate room which is used as kitchen? \|___\|;<br>**0**. No **1**. Yes |
| **G22** | Type of latrine owned by the household: \|___\|;<br>1.flush /pour flush toilet 2. Ventilated improved pit latrine (vipl) 3. Pit latrine with slab 4. Pit latrine without slab/<br>5. No facility/bush/field 6. Other (specify) | | |
| **G23** | Does any member of this household have a bank account or microfinance saving? \|___\| **0**. No **1**. Yes | | |
| | Gender and decision making | | |
| **G24** | Who decides on household income? \|___\|<br>1. I myself 2.mainly husband 3.only husband 4.both jointly 5. Others (specify)_____ | | |
| **G25** | Who decides on the household health expenditure?\|___\|<br>1.i myself 2.my husband 3.i & my husband/partner jointly 4. Someone else 5.others (specify) _____ | | |
| **G26** | Who usually makes decisions about health care for yourself? \|___\|<br>1.i myself 2.my husband 3.i & my husband/partner jointly 4. Someone else 5.others (specify) _____ | | |
| **G27** | Who usually makes decisions about making major household purchases? \|___\|<br>1.i myself 2.my husband 3.i & my husband/partner jointly 4. Someone else 5.others (specify) _____ | | |

**SECTION 2. Maternal health status & health service utilization**

I am going to ask you about your health. Please respond to the following questions about you yourself

| | | | |
|---|---|---|---|
| **H1** | In the past two weeks, have you had any illness? \|___\|***(if n h4)***<br><br>**0**. No **1.** Yes | **H2** | If yes, how many days in the past two weeks were you unable to do your daily work because of illness?\|__\|__\| |
| **H3** | Where do you seek treatment? \|___\|<br><br>**0.** Don't seek treatment **1.** Traditional healer **2**. Community resource persons (vht, drug distributors)<br><br>**3**. Drug shop or private pharmacy **4** private clinic **5.** Not-for-profit health facility **6**. Public health facility | | |
| **H4** | Are you currently using any family planning method? \|___\|**0**. No **1.** Yes ***(if no, skip to h6 )*** | | |
| **H5** | If yes, which methods of family planning are you using currently? (respond to each item) [**write '1' if yes & '0' if no**]<br><br>**H5.1.** Natural/herbs/lactation/counting days: \|__\| **H5.2.** Pills: \|__\| **H5.3.** Injection: \|__\| **h5.4.** Implants: \|__\|<br><br>**H5.5.** Iud: \|__\| **H5.6.** Male condom: \|__\| **H5.7.** Sterilization (tubal ligation): \|__\| **H5.8.** Female condom: \|__\| | | |
| **H6** | How many pregnancies have you ever had? *(include current if pregnant)* \|___\|<br>*[write the number; if she doesn't know, write 98]* | **H7** | How many live born children have you ever had? \|___\|<br><br>*[write the number; if she doesn't know, write 98]* |

| | | | |
|---|---|---|---|
| **H8** | Have you ever lost a child due to death (including stillbirths)? \|___\|<br>**0**. No **1.** Yes **98.** Don't know | **H9** | If yes, how many? \|___\| children<br>*[write the number; if she doesn't know, write 98]* |
| **H10** | Have you ever lost a child due to miscarriage (spontaneous abortion)? \|___\|<br>**0**. No **1.** Yes **98.** Don't know | **H11** | If yes, how many? \|___\| children<br>*[write the number; if she doesn't know, write 98]* |
| **H12** | Month interval between the index child and earlier birth? _____months**98 = don't know** | **H13** | In which order is this index child? \|___\| |
| **H14** | Did you receive any antenatal care during the last pregnancy? \|___\|**[if no, skip to h17]** **0**. No<br>**1.** Yes | | |
| **H15** | How many times did you go for pregnancy checkup? \|___\|<br>**1.** Once **2**. Twice **3**. Three times **4.**>three times **99**. Don't remember | **h16** | Who provided you antenatal care in the last pregnancy?<br>**1.** Tba **2.** Relative **3**. Health professional |
| **H17** | Where did you deliver your last child? \|___\|**1**.home **2**.hospital **3**.health center **4**.health post **5**.other | | |
| **H18** | If your last delivery is in health institution, what was the mode of delivery? \|___\|<br>**1**. Spontaneous vaginal delivery **2**.instrumental delivery **3.** Caesarian section **4**. Other (specify) _____ | | |
| **H19** | Who assisted you in the last delivery?\|___\|<br>**1**.trained tba **2**.untrained tba **3**.neighbor **4**.relative **5**.health professional **6**.other (specify)_____ | | |
| **H20** | Have you encountered any health problems during your last child delivery? \|___\|<br>**0**. No**1**.massive vaginal bleeding **2**. Retained placenta (> 30 min)**3**.birth canal laceration<br>**4**.unconsciousness **5**. Other (specify) ____ | | |

| | | | |
|---|---|---|---|
| **H21** | What is the main transportation that you normally use to go to the nearest health center?<br>1. On foot 2. Minibus/bus 3. Bajaj **4**. Motorcycle/ bicycle 5.animal cart 6.animal 7.other | | |
| **H22** | How long does it take you to reach the nearest health facility using the above transportation method? \|___\|___\| (minutes) | | |
| **K21** | Do you eat additional foods other than common family food \|___\|0. No 1. Yes | | |
| **K22** | How many meals do you take per day?<br>_____meals | **K23** | How is the amount of food intake compared to previous non-lactating time? \|___\|**1**.increased **2**.decreased **3**.no change |
| **K24** | Have you ever been sick during the past breast feeding time? \|___\|**0**. No **1**. Yes | **K25** | If yes for question ____, have you visited health facility? \|___\|**0**. No **1**. Yes |

**Section 3 Mother's dietary diversity score:**

**First:** ask the mother to describe the foods (meals and snacks) that she ate **yesterday during the day and night**, whether at home or outside the home. Start with the first food eaten in the morning & continue probing until she went to sleep

| # | Food group | **0 -No**<br>**1 - Yes** |
|---|---|---|
| **D1** | cereals: any food made from grains such as maize, millet, wheat, barley, sorghum, rice, teff | \|___\| |
| **D2** | legumes, nuts & seeds: any food made from legumes such as lentils, beans, guaya, peas, nuts (lewz), sesame(selyit), chickpea | \|___\| |

| | | |
|---|---|---|
| **D3** | White tubers & roots: any food made from roots or tubers such as white potatoes, white yams, cassava, false banana (kocho), taro (godere) | |___| |
| **D4** | Vitamin a rich vegetables & tubers:such as pumpkin, carrots, orange/red flushed sweet potatoes, sweet pepper (kariaya) | |___| |
| **D5** | Dark green leafy vegetables: such as kale (abeshagommen), spinach (kosta), lettuce(selata) | |___| |
| **D6** | Any other vegetables: such as tomato, onion, cabbage (tikilgomen), eggplant, peppers, beets, zucchini, fosoliya, garlic | |___| |
| **D7** | Vitamin a rich fruits: any fruit with yellow or orange flesh such as mango, papaya, cantaloupe, dried apricot, dried peaches | |___| |
| **D8** | Other fruits: all other fruits including wild ones such as avocado, orange, lemon, banana, gishta, | |___| |
| **D9** | Milk & milk products: such as milk, yoghurt, cheese, arera, aguat, or other milk products | |___| |
| **D10** | Eggs | |___| |
| **D11** | Flesh meats: beef, lamb, goat, chicken, wild game or other birds | |___| |
| **D12** | Organ meat: liver, kidney, heart or other organ meats or blood-based foods | |___| |
| **D13** | Fish: fresh or dried fish including sardines | |___| |
| **D14** | Oils & fats: oil, fats, butter or ghee added to food or used for cooking | |___| |

**SECTION 4 : Household food insecurity access scale (HFIAS)**

| | | | |
|---|---|---|---|
| 10.1 | **IN THE PAST FOUR WEEKS, DID YOU WORRY THAT YOUR HOUSEHOLD WOULD NOT HAVE ENOUGH FOOD?** | (1) yes (2) no → go to q 10.2 | |

| | | | |
|---|---|---|---|
| 10.1.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.2 | **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?** | (1) yes (2) no → go to q 10.3 | |
| 10.2.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.3 | **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?** | (1) yes (2) no → go to q 10.4 | |
| 10.3.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.4 | **IN THE PAST FOUR WEEKS, DID YOU OR ANY HOUSEHOLD MEMBER HAVE TO EAT SOME FOODS THAT YOU REALLY DID NOT WANT TO EAT BECAUSE OF A LACK OF RESOURCES TO OBTAIN OTHER TYPES OF FOOD?** | (1) yes (2) no → go to q 10.5 | |
| 10.4.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.5 | **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?** | (1) yes (2) no → go to q10.6 | |
| 10.5.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.6 | **IN THE PAST FOUR WEEKS, DID YOU OR ANY OTHER** | (1) yes (2) no → go to | |

| | | | |
|---|---|---|---|
| | **HOUSEHOLD MEMBER HAVE TO EAT FEWER MEALS IN A DAY BECAUSE THERE WAS NOT ENOUGH FOOD?** | q 10.7 | |
| 10.6.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.7 | **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?** | (1) yes (2) no → go to q10.8 | |
| 10.7.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.8 | **IN THE PAST FOUR WEEKS, DID YOU OR ANY HOUSEHOLD MEMBER GO TO SLEEP AT NIGHT HUNGRY BECAUSE THERE WAS NOT ENOUGH FOOD?** | (1) yes (2) no → go to q 10.9 | |
| 10.8.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES** | |
| 10.9 | **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?** | (1) yes (2) no → go to **section 11** | |
| 10.9.1 | **HOW MANY TIMES DID THIS HAPPEN IN THE PAST MONTH?** | **____ TIMES.** | |

**Section 5.laboratory tests and anthropometric measurements**

**Anthropometry**

| Measurement date | Height (cm) | Weight (kg) |
|---|---|---|
| \|__\|__\|/\|__\|__\|/\|__\|__\| | \|__\|__\|__\|.\|__\| | \|__\|__\|.\|__\|__\| |

**Hemoglobin**

| | Measurement date | Hemoglobin (g/dl) | Referral? [0. No 1. Yes] | Remark |
|---|---|---|---|---|
| **H1** | \|__\|__\|/\|__\|__\|/\|__\|__\| | \|__\|__\|\|__\| | \|__\| | |