ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
CENTER FOR FOOD SECURITY STUDIES

DETERMINANTS OF UNDERWEIGHT AMONG LACTATING MOTHERS': IN ANLEMO WOREDA, HADIYA ZONE, SOUTHERN ETHIOPIA

BY

AMANUEL ERAMO

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A Thesis Submitted to the College of Development Studies; Center for Food Security Studies, Addis Ababa University, in Partial Fulfilment of the Requirements for the Degree of Master of Science in Food Security and Development Studies

ADVISOR:

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This is to certify that the Thesis entitled: *Determinants of Underweight among Lactating Mothers': in Anlemo woreda, Hadiya Zone, Southern Ethiopia* Prepared by Amanuel Eramo and Submitted to College of Development Studies, Addis Ababa University, in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Food Security and Development Studies.

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DECLARATION

I declare that this thesis is my original work and has not been presented for a degree or certification in any other Universities, institutions and that all sources of material used for the thesis have been duly acknowledged.

Amanuel Eramo Woiloro

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Addis Ababa

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Acronyms and Abbreviations

AWADO	Anlemo Woreda Agricultural Development Office
AWFEDO	Anlemo Woreda Finance and Economic Development Office
BMI	Body Mass Index
CAADP	Comprehensive Africa Agriculture Development Program
CED	Chronic Energy Deficiency
CSA	Central Statistical Agency
DDS	Dietary Diversity Score
EDHS	Ethiopian Demographic and Health Survey
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
FCS	Food Consumption Score
FMH	Federal Ministry of Health
HDDS	Household Dietary Diversity Score
IDDS	Individual Dietary Diversity Score
MUAC	Mid-Upper Arm Circumference
NGO	Non-Governmental Organization
NNP	National Nutrition Program
PEM	Protein Energy Malnutrition
SCN	Standing Committee on Nutrition
SNNP	South Nation Nationalities and Peoples
SPSS	Statistical Package for Social Science
SUN	Scaling Up Nutrition
UN	United Nation
UNDP	United Nation Development Program
UNICEF	United Nation International Children Education Fund
USAID	United State Agency International Development
WFP	World Food Program
WFS	World Food Summit

Abstract

Under-nutrition is a serious problem in developing countries including Ethiopia, particularly the study area. Determinants of nutritional status of lactating mothers widely vary locally, regionally and nationally. However, there was lack of understanding the factors of nutritional status at community level for adequate intervention. Therefore, this study was undertaken to investigate the determinants of underweight among lactating mothers in Anlemo woreda. A community based cross-sectional study was conducted on 266 sample lactating mothers from six kebeles. A household survey was undertaken using structured questionnaire. The data were analyzed using Statistical Package for the Social Science (SPSS.version.22), for descriptive statistics, bivariate and multivariate logistic regression analysis. Binary logistic analysis was used to test association between each independent variable with dependent variable at P < 0.2. Nutritional status of lactating mothers was normal, underweight, overweight and obese was 51.9%, 24.8%, 20.3% and 3% respectively. Findings of this study revealed that the educational status of lactating mothers [AOR = 6.0, 95% CI: 1.09, 35.3], monthly income [AOR = 8.27, 95% CI: 1.2, 56.85], number of meals [AOR = 0.13, 95% CI: 0.19, 0.56] and ANC follow up [AOR = 13, 95% CI: 1.42, 21.3] were found significant determinants with underweight of lactating mothers (P < 0.05). The factors propagate undernutrition which puts substantial burden on lactating mothers in Anlemo woreda. Local government of the Anlemo woreda should give emphasis on lactating mother's education, income source improvement, health practices and feeding pattern is a vital to reduce undernutrition problem of the community.

Keywords: *Nutritional Status, Lactating mothers, Determinants, Underweight, Southern Ethiopia*

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Nutrition is the amount total of processes involved in the intake and utilization of food substance by living organisms: including ingestion, digestion, absorption, transport and absorption of nutrients found in food. It is a fundamental pillar of human life, health and development throughout the entire generational life span. On the other hand, under-nutrition is the result of different immediate, underlying and basic causes which yielded in various sectors such as food security, health, water and sanitation, care and their enabling environment.

Identifying immediate, underlying and basic causes of under-nutrition background has new knowledge and evidence on the causes, consequences and influences of under-nutrition (UNICEF, 2015). Brussels (2013) even though under-nutrition is largely preventable, it is fundamental cause of deaths over 100,000 women and more than millions of children in worldwide every year.

Globally, about 14 million adolescent girls become lactating mothers each year and more than 90% of these very young and reproductive mothers live in developing world. The studies show that Ethiopia is one of the countries with highest level of lactating mothers' malnourishment in sub-Saharan Africa. Among malnutrition types, under-nutrition is a serious problem in Ethiopia. Malnutrition is nothing, but disorder resulting from deficiency or excess of different essential nutrients in developing world. Usually it is described as under-nutrition whereby the existence of varying degrees of deficiencies in essential nutrients (Nigussie and Abebe, 2017). Malnutrition is not unbiased stark of manifestation of poverty; it is also non-income face of poverty and helps to propagate poverty (World Bank, 2012).

Breastfeeding mothers are particularly exposed to under-nutrition due to their increased physiological requirements. Multiple roles played by mothers (bearing, lactating, serving and feeding others) give rise to a severe health and nutritional problems (Ahmed *et al*., 2014). Mothers in age of 15-49 group and children are most exposed to malnutrition due to insufficient dietary diversity, unbalanced distribution of food within households, improper food storage and preparation, dietary taboos, infectious diseases and care (CSA, 2006). Mainly for those women

with high nutritional costs of pregnancy and lactation also contribute expressively to their poor nutritional status (Girma and Timotiows, 2002).

To support lactation and maintain reserves, most mothers in developing nations will need to eat about 500 additional kilocalories every day (an increase of 20% to 25% over the normal intake before pregnancy). Extra food, therefore, must be ready available to the mother to meet the additional demands of pregnancy and lactation (Linkages, 2004; Eshetu, 2016). Lactation also increases the mother's need for water, so it is essential that she drink plenty water to satisfy her thirst (Linkages, 2004).

According to (Joshi *et al*., 2011) nutritional status is determined by complex interaction between internal, external and environmental factors. Internal factors include age, sex, nutrition, behavior, physical activities, diseases and external or environmental factors include food safety, cultural and socio-economic circumstances. Well-being and nutritional status of human being depends on both dietary intake and health status, but there are many various causes or determinants of malnutrition. Diet consumption pattern and nutritional status of mothers have been found to influence both the quality and quantity of breast milk (Mihiretu *et al*., 2014).

Potentially available resources such as natural, financial, organizational or human are not always used by society in the best benefits of those needing them. In practice, their use is determined by providing economic ideological and governmental conditions. Nutritional deficiency should be seen as a problem area that may need solutions at the individual household, local community and broader societal levels (UNICEF, 2015).

1.2. Statement of the Problem

Food and Agricultural Organization and World Food Program (2015) state that several food crises were triggered by extreme climate events due to the El-Nino phenomenon globally. Also food and nutrition security in the horn of Africa are threaten by this strongest weather phenomena, ever seen in the past 20 years (Nkunzimana *et al*., 2016).CARE (2016), also informs that of 10.2 million people affected, an estimated 404,000 pregnant women and lactating mothers are at a particular risk of malnutrition complications during pregnancy due to the overwhelming shortages of food in Ethiopia. Regarding to the statement of Food and Agricultural Organization of United Nation, 41% of Ethiopian lives below the poverty line and more than 31 million populations are undernourished (FAO, 2010). Above 50% of Ethiopian families are food insecure (FMoH, 2005).

According to Ethiopian Demographic and Health Survey (2005), Ethiopia is one of sub-Saharan countries with the highest proportion of malnourished women and it accounts about 27% of women in Ethiopia are undernourished with BMI less than 18.5kg/m2 cut-off points. Under-nutrition remains an over-whelming problem in many developing countries affecting over 815 million people causing more than one-half child death. The estimate of maternal mortality ratio for seven years period preceding EDHS (2009-2016) is 412 deaths per 100,000 live births in Ethiopia (CSA and ICF, 2016). The level of mortality is also aggravated particularly by poverty, inadequate maternal education, lack of drinking water and sanitation, high fertility and inadequate birth spacing (UNICEF, 2009). The problem of malnutrition in Ethiopia is worsening for rural women. It was found that the adolescent age group (15-19) years and mature women in age group (35-49) years in Ethiopia is significantly in higher risk of chronic energy deficiency malnutrition (Girma and Timotiows, 2002).

Lactating mothers from low income settings are considered as nutritionally vulnerable and due to their nursing process, mothers are endangered to nutritional deficiencies and stresses. The study conducted in East Badewachow, Hadiya zone, SNNPR the households' food insecurity is 75.8%, which in turn has association with maternal nutrition. In addition to this, Humanitarian Requirements Document Report in 2015, over one million people are in need of emergency water support in Ethiopia. The poor presentation of the seasonal *keremt* rains have also led to the water shortage in SNNPR, including Anlemo *woreda*, from Hadiya zone (UNICEF, 2015).

According to *woreda* agricultural development office report (2017), Anlemo *woreda* is one of food insecure area and targeted in Productive Safety net Programs (PSNP) and Household Asset Building programs (HABP) since 2005. Almost all (96%) of *kebeles* in the *woreda* are targeted and supportive by the productive safety net programs. There are 3742 male and 3877 female PSNP beneficiaries in Anlemo *woreda* (AWADO, 2017). Diverse studies have been done at national and regionally indicating place of residence on the women's nutritional status in Ethiopia, but the studies more specifically concerned vulnerable groups at lower community, indicating lactation and nutrition are scarce. This study attempts to fill this gap by investigating the effect of socioeconomic, demographic and environmental factors on underweight among lactating mothers' nutrition status at lower level. Thus, the study *woreda* is not free from the above-mentioned problems; therefore this study is designed to investigate the determinants of underweight among lactating mothers in Anlemo *woreda*.

1.3. Objectives of the Study

1.3.1. General objective

The major objective of this study is to investigate the determinants of underweight among lactating mothers'; in Anlemo *woreda*, Hadiya zone, Southern Ethiopia.

1.3.2. Specific objectives

More specifically the study aimed at:

- assessing the prevalence of underweight among lactating mothers in rural *kebeles* of Anlemo *woreda*.
- identifying the determinants associated with malnutrition among lactating mothers in the study area.
- examining dietary diversity and underweight among lactating mothers in the study area.

1.4. Research Questions

- To what extent is underweight prevalent among lactating mothers in the rural *kebeles* of Anlemo *woreda*.
- What are the determinants that associated with underweight of lactating mothers in the study area?
- How to describe the dietary diversity situation of lactating mothers in the study area?

1.5. Significance of the Study

The finding of the study is helpful to encourage local people to improve current nutritional status by handling the risk factors and improving feeding pattern of lactating mothers. It is also serves as helpful guide to plan suitable nutritional and health programs for the community based on the facts and figures generated by this study.

Hence, the result or outcome of this study provides the valuable information for researcher, policy makers, NGOs; governmental and non-governmental organizations as well as local administrations to plan future circumstances.

1.6. Scope and Limitations of the Study

This study is limited on the investigation of determinants of nutritional status among lactating mothers conducted in six rural *kebeles* of Anlemo *woreda*. In this study uncertainty with calibration, instrumental and personal errors arise during anthropometric data measuring and recordings. Irregular floor surfaces, positioning and other circumstances for measuring weight and height might cause some measurement errors.

Another limitation is that the non-response of some household members to respond some of the questions, especially those related to income and other financial issues related to privacy, secrecy, confidentiality fear of withdrawal of food aid. Some local mothers might also have cultural fear that something bad will happen if one counts his/her families. So, correct age may not be obtained in some rural lactating mothers or households. Similarly, structuring and rearranging of offices at *woreda* level believed to result in absence of some crucial data.

1.7. Organization of Thesis

The study is mainly contains five chapters. First chapter deals with introduction, statement of problem, research objectives, significance and limitation of the study. Chapter two reviews the related literatures on determinants of nutritional status among lactating mothers. Chapter three presents study materials, methodology and the description of the study area. The results and discussions of the study are discussed in chapter four. Finally, based on result discussed in chapter three, the conclusion and recommendation are coined in the fifth chapter.

CHAPTER TWO: LITERATURE REIVEW

2.1. Theoretical and Conceptual Reviews

2.1.1. Nutrition

Nutrition includes everything that happens to food from the time it is eaten until it is used for various functions in the body (Srilakshmi, 2002). Nutritional status of women is particularly important, because it is through women and their offspring that the pernicious effects of malnutrition are propagated to future generations (Mihiretu *et al.*, 2015). Carroll *et al*., (2012) also states that nutritional status is an indication of the overall well-being of a population, the state of our body as a result of the foods consumed, their use by the body and also it can be good, fair or poor. Studies by World Bank, inadequate diets are recognized as a cause of deficiencies and under-nutrition, so attention is also given to diet, mainly in the form of nutrition education and personal responsibility for dietary choice (World Bank, 2014).

Since 2008, there has been limited attention for nutrition and is not so readily attractive to politicians as an international development priority due to its complex set of political, social, and economic causes (Horton and Saline, 2013). By the Millennium Development Goals approach, countries and the international community may agree that nutrition was one of the great missed opportunities of the past 15 years. But this neglect can be turned around quickly and sustainable development becomes the dominant idea post-2015. It also emerges as the quintessential for sustainable development objective. If maternal and child nutrition is optimized, the benefits will accrue and extend over several generations (Horton and Saline, 2013).

Recent developments in the political and governance environment are creating opportunities to improve nutrition programming particularly, later 2010. Specially the global nutrition community has been uniting around the scaling up nutrition (SUN) movement to bring together the national governments, donor countries, organizations, civil society and the private sector to support nationally driven processes of scale up nutrition (UNICEF, 2015).

According to FAO (2015) evidence also shows that food consumption patterns in the regions change as income grows. The contribution of cereals, roots and tubers to total per capita dietary energy supply decreases, whereas that of animal sources, sugar, oils, fruits and vegetables

increase significantly. The negative implications of these changes in some circumstance may represent new challenges which can be addressed through balanced dietary diversification as well as adequate care practices, health, hygiene, and sanitation (FAO, 2015).

2.1.2. Nutritional assessment

Nutrition assessment is used to gather information, which is helpful to guide decisions on nutrition care, support and to monitor effectiveness of interventions. It is the interpretation of anthropometric (A), biochemical/laboratory (B), clinical (C) and dietary data (D) to determine whether a person or groups of people are well nourished or malnourished. Elamin (2003) nutritional assessment can be done using the ABCD methods and adequate assessment must take into consideration not only nutritional deficiency but also family income, food readily available and previous reproductive performance measured in terms of the birth weight of earlier babies.

2.1.3. Measuring dietary diversity

Dietary diversity (DD) relates to nutrient adequacy (coverage of basic needs in terms of macro and micro-nutrients) and to diet variety, which are two of the main components of diet quality. This reflects the adequate intake of essential nutrients either at the household level, in which case it can be measured by a household dietary diversity score (HDDS) or by a food consumption score (FCS), and at the individual level, in which case it can be measured by an individual dietary diversity score (IDDS) or women dietary diversity score (WDDS) (FAO, 2008).

The recommended reference time period is the previous 24 hours and food grouping can differ according to objectives, putting emphasis on energy-dense foods or micronutrient-rich foods. In the most cases, the final number of food groups varies from 5 to 14 depending on the main characteristic of the diet that the score intend to reflect energy or micronutrient adequacy. Individual dietary diversity scores aim to reflect nutrient adequacy. Dietary diversity scores have been validated for several age/sex groups as proxy measures for macro and micronutrient adequacy of the diet (FANTA, 2006).

Even though, there is no standard list of foods or food groups, and no cut-off point, upon which the international community agrees. But, tools proposed by FANTA and FAO, both standard food groupings HDDS and IDDS have been used widely (FAO, 2008). For households dietary

diversity score 12 food groups, for individual dietary diversity score 14 food groups. Nine (9) food groups such as starchy staples, legumes and nuts, dairy products, organ meat, eggs, flesh foods, vitamin-A rich dark-green leafy vegetables, other vitamin-A rich fruits/vegetables and other fruits and vegetables are for women dietary diversity score (FAO, 2008).

2.1.4. Nutritional requirements

According to Eggert (2011) recommended daily allowance (RDA) for additional maternal calorie intake for breastfeeding is about 500kcal/day. Between 1997 and 2011 the Institute of Medicine in United States, released the dietary reference intakes and some summaries of the recommended daily allowance (RDAs) for lactating women aged 19–50 years are: carbohydrate 160g/kg/day, protein 1.05g/kg/day, vitamin-A 1200µg retinal equivalents (8571 IU), vitamin-D 15µg, vitamin-E 19α-tocopherol equivalents, vitamin-C 120mg, folic acid 500µg and some essential minerals such as Ca 1000mg, Mg 320mg, Fe 10mg, Zn 12mg (Eggert, 2011). As stated in 2016 EDHS, iodine is an essential micronutrient, and in compliance with food and drug regulations, household salt should be fortified with iodine to at least 15 parts per million (ppm) (CSA, 2016).

2.2. Empirical Literatures

2.2.1. Food and nutrition security situation

Consequently, 27 million Ethiopian became food insecure as a result of 2015 El Niño drought and 18.1 million dependent on relief food assistance in 2016 out of this 7.9 million supported by Ethiopian government productive safety net program (PSNP) (Abduselam, 2017). Another study report by FAO/WFP (2009), about 7.5 million people are still chronically food insecure and remained under the productive safety net program (PSNP); an additional 4.9 million people are facing acute food shortage in Ethiopia.

The agricultural sector in Ethiopia suffers from poor cultivation practices and frequent drought, but recent joint efforts by the government of Ethiopia and donors have strengthened Ethiopia's agricultural resilience, contributing to a reduction in the number of Ethiopians threatened with starvation. Nearly 40% of the rural farm family (about 5 million households) cultivates the land,

less than half a hectare from where they produce only half of their annual food demand, moreover, they do not have enough purchasing power to buy from the market (CAADP, 2013).

Once households replace animal-source foods, fruits, vegetables and other micronutrient-rich foods with cheaper high carbohydrate staples, total energy intake may remain above the minimum requirement, but micronutrient intake is likely to be compromised, increasing risk of malnutrition and associated with poor health outcomes and also families are forced to reduce meal frequency, quantity and quality of food consumption (UNSCN, 2010).

Agriculture plays a significant role in increasing food availability, incomes, supporting livelihoods and contributing to the overall economy. Thus it is central to improving food and nutrition security (UNSCN, 2010). Study in Bangladesh, areas of agriculture as a source of livelihoods, and women's role as intermediaries between agriculture and good nutrition and health within their household (Josef *et al*., 2015). It provides vital macro- and micronutrients, as well as dietary diversity, to smallholder households as a source of food. As a source of income, it may be used to purchase healthy, diverse foods on the other hand it can also be used to purchase processed, nutrient-scarce foods that lead to overweight and poor health.

Ethiopia is heavily dependent on the agricultural sector which accounts for almost half of the gross domestic product (GDP). About three-quarters of the population are engaged in agriculture, mainly in subsistence rain-fed farming and livestock production (FAO, 2008).

2.2.2. Food availability

The food availability indicators capture not only the quantity but also the quality and diversity of food. Also for assessing food availability, several factors are analyzed: adequacy of dietary energy supply, share of calories derived from cereals, roots and tubers, average protein supply, average supply of animal-source proteins and the average value of food production (FAO, 2015).

By examining the dimensions of food security provides a more comprehensive picture, and can also help in targeting and prioritizing food security and nutrition policies and programs. Based on FAO definition food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2010).

Household food security is the application of this concept to the family level with individuals within households as the focus of concern, and also nutrition security exist when food security is combined with a sanitary environment, adequate health services, and proper care and feeding practices to ensure a healthy life for all household members (UNSCN, 2010).

2.3. Levels of Malnutrition in Women

According to 2016 EDHS study, chronic energy deficiency is caused by eating too little or having unbalanced diet that lacks adequate nutrients (CSA, 2016). Women of reproductive age are especially vulnerable to chronic energy deficiency and malnutrition due to low dietary intake, inequitable distribution of food within the household, improper food storage and preparation, dietary taboos, infectious diseases, and inadequate care practices. In addition, chronic under nutrition among women is a major risk factor for adverse birth outcomes (CSA, 2016).

This is also shows under nutrition among women age 15-49, as measured by BMI less than 18.5, has declined over the last 16 years. The percentage of thin women dropped from 30% in 2000 to 22% in 2016 and prevalence of anemia among women age 15-49 declined from 27% in 2005 to 17% in 2011 but then increased to 24% in 2016 (CSA, 2016).

Based on nutrition baseline survey report (2009/10) wasting was also higher among mothers who were classified as thin based on their BMI (17%) and mothers with no education (13%). This report also noted that prevalence of underweight exist more women in rural areas were thin (32%) compared to urban areas (21%) and also women with no education were also more likely to be thin (31%) compared to those with a secondary or more education 17% (EHNRI, 2010).

2.3.1. Measuring malnutrition among adults

According to WFP (2012) malnutrition occurs when the nutrient and energy intake does not meet or exceeds an individual's requirements to maintain growth, immunity and organ function. Malnutrition is a general term and covers both under-nutrition and over-nutrition (overweight/obesity). It can also result from a lack of macronutrients (carbohydrates, protein and fat), micronutrients (vitamins and minerals) or both. Literally it means bad-nutrition and technically it includes both over and under-nutrition (Bealu *et al*, 2017).

The anthropometric indices used with children (stunting, wasting & underweight) and the principles of a standardized growth curve are cannot be applied to adults. There is no internationally accepted anthropometry reference for adults. Consequently, alternative measures, body mass index (BMI) and mid upper arm circumference (MUAC) are used for adults, including women.

2.3.2. Body mass index (BMI)

The most useful measure of malnutrition in adults is the body mass index (BMI) or‘‘Quetelet Index”. It was derived from the name, Lambert Adolphe Jacque Quetelet (1796Y1874) and he was a Flemish astronomer and statistician (Nuttall, 2015).

Body mass index is calculated by dividing the weight (in kilograms) by the height (in meters squared). Even though there is no specific BMI classification for lactating women, widely accepted WHO classification for adult has four categories and one who considered to be underweight, if his/her BMI is in the range of 15 to 19.9, normal weight if the BMI is 20 to 24.9, overweight if the BMI is 25 to 29.9, and obese if it is greater/equal to 30kg/m^2. The common interpretation is that it represents an index of an individual’s fatness and it also widely used as a risk factor for the development of or the prevalence of several health issues (Nuttall, 2015).

2.3.3. Mid upper arm circumference (MUAC)

It is anthropometric measurement, which is a widely used for adults, particularly to measure lactating mothers’ nutritional status of an individual and mothers’ whose mid upper arm circumference is below 18.0 cm are considered as severe acute malnutrition, between 18-21 cm moderate acute malnutrition and greater than 21 cm is normal. It is simple and fast to measure.

2.3.4. Micronutrient malnutrition

Micronutrient malnutrition is commonly known as hidden hunger and more than 2 billion people are thought to be affected by this invisible form of malnutrition. As showed in Ukegbu (2014) continued dependence of the women mainly on starchy staples can place them at risk of micronutrient deficiencies (hidden hunger). Gillespie *et al*., (2016) also severe anemia caused by lack of iron is associated with the deaths of 115,000 women annually during childbirth. And also

Vitamin A, iodine and iron are classified as "the big three," but deficiencies of other micronutrients such as folate, zinc, vitamin B12 and vitamin D are also important. This source also indicated that the main approach to treating micronutrient malnutrition is typically include exclusive breastfeeding, dietary diversification to foods with highly absorbable vitamins and minerals, fortification of staple and complementary foods, control of parasitic infections, and provision of nutritional supplements.

In the most developing countries including Ethiopia, lack of the means to grow or buy micronutrient-rich foods such as animal source foods (meat, fish, poultry, eggs, milk, and dairy products), fruits and vegetables. Instead, they rely on nutrient-poor staples, such as rice and maize. Mother especially, pregnant and lactating with lack of dietary diversity are exacerbated by poor access to healthcare, environment and a high burden of disease (Gillespie *et al*., 2016).

2.4. Overview on Determinants of Maternal Nutrition

Maternal nutrition refers to the nutritional needs of women during the antenatal and postnatal period (when they are pregnant and breastfeeding) and also may refer to the pre-conceptual period (adolescence). There are different determinants on maternal nutrition. Some source of 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 (Bhutta *et al*., 2004).

According to Brussels (2013) causes of under nutrition are usually analyzed at three levels: First, immediate causes that are found at the individual level having two dimensions which are dietary intake and the presence of diseases. This distinction emphasizes the limitation of the term hunger in denoting under nutrition as hunger, but it may or may not be a cause of under nutrition. It can be addressed by providing immediate access to food, in order to improve food intake, and free access to life-saving health care.

Second, underlying causes which operate at the household and community levels and they comprise three categories: household food security, care for women and health environment and services. Household food insecurity can be alleviated through measures aimed at durably increasing household food availability, accessibility (e.g. purchasing power) and utilization (e.g. cooking). Inadequate care practices can be addressed through measures aimed at ensuring

maternal nutrition and appropriate and regular feeding of infants and young children, as well as providing safe feeding spaces. Unhealthy environments can be addressed through water, sanitation and hygiene measures as well as through the provision of accessible health services and disease control measures (e.g. mosquito nets).

Third, basic causes which include a range of factors operating at the sub-national, national and international levels, ranging from the availability of natural resources to social and economic environments and then to political contexts. Basic causes that are linked to political, cultural, religious, economic, educational, demographic, and social systems can only be addressed through long-term development strategies (Brussels, 2013).

2.4.1. Household economic status

The economic status of a household is an indicator of access to adequate food supplies, use of health services, availability of improved water sources, and sanitation facilities, which are prime determinants of child and maternal nutritional status (UNICEF, 1990). A study of most of the DHS surveys conducted in developing countries and a study in the Southern Nations, Nationalities and Peoples Region (SNNPR) of Ethiopia (Teller and Yimar, 2000) showed that women from low economic status households were the most affected by malnutrition.

As stated in Temesgen *et al*., (2015) lactating mothers from low-income countries including Ethiopia are considered as a nutritionally vulnerable group due to different socio demographic factors and lack of nutritional knowledge which impact on the health and well- being of children.

2.4.2. Education status of women

According to Girma and Timotiows (2002) education may enable women to make independent decisions to be accepted by other household members and to have greater access to household resources and women who receive even a minimal education are generally more aware than those who have no education of how to utilize available resources for the improvement of their own nutritional status and that of their families. A comparative study on maternal malnutrition in ten Sub-Saharan African countries and a study in the Southern Nations, Nationalities and Peoples Region of Ethiopia by Teller and Yimar (2000) showed that the higher the level of education, the lower the proportion of undernourished women.

2.4.3. Employment and control over income

Women's employment increases household income, with consequent benefit to household nutrition in general and the woman's nutritional status in particular. It may increase women's status and power, and may sustain a woman's preference to spend her earnings on health and nutrition. Though employed, women without control over their income and decision making authority within the household are deprived of economic and social power and the ability to take actions that will benefit their own well-being (Girma and Timotiows, 2002).

2.4.4. Age of women

Women in developing countries including Ethiopia with high fertility age group are vulnerable to nutrition problems. According to DHS study conducted in some African countries show a greater proportion of mothers age 15-19 and 40-49 that exhibit chronic energy deficiencies. Local studies in Ethiopia also showed that women in the adults/ youngest age group (15-19) and women in the oldest age group (45-49) are the most affected by under nutrition (Teller and Yimar, 2000). Girma and Timotwos (2002) 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 and 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 significant.

The 2016 EDHS results showed that three in 10 women (32 percent) had four or more ANC visits for their most recent live birth. Due to lack of timely medication, a large proportion of maternal and neonatal deaths occur during the first 48 hours after delivery. Thus, prompt postnatal care (PNC) for both the mother and the child is important to treat any complications arising from the delivery, as well as to provide the mother with important information on how to care for herself and her child. Safe motherhood programs recommend that all women receive a check of their health within 2 days after delivery (CSA, 2016).

A number of studies have been conducted in developing countries on the determinants of lactating mothers' nutritional status, yet the studies available in Ethiopia are very limited. As indicated by Girma and Temotiwos (2002), in 2000 Ethiopia DHS is performed to provide the determinants of women's nutrition estimation for the country as a whole and for urban and rural areas separately. The study by Ahmed *et al*., (2016) the Body Mass Index (BMI) shows that

mothers in Alemtidad area in Khartoum are mainly overweight and obese, 45.6% and 18% respectively. And only 35% within normal range and 81.1% of mothers were not able to select the proper food according to age and nutrients and about 71.1% of mothers took two meals per day and 23.3% one meals per day, and only 5.6 take three meals per day.

Another study from East Wollega, Ethiopia by Temesgen *et al*., (2015) family size and family income are significantly associated with the nutritional status of lactating mothers and Nkirigacha *et al*., (2016) however, high diverse diet, dietary intake of vitamin A, iron and zinc were low, indicating unmet nutritional requirements and majority of mothers are underweight. A cross sectional study by Tesfay (2017) states, that women's body mass index increases with increasing dietary diversity score but there is no association between BMI and household food access score which reveals food insecurity triggers under-nutrition than over-nutrition.

2.5. Conceptual Framework

The conceptual framework for maternal nutrition that shows the under nutrition of lactating women are: the immediate causes include inadequate dietary intake and disease. The primary underlying causes are household food insecurity, inadequate care and unhealthy household environment, and lack of health services. Basically the nutritional status of lactating mothers are also affected by basic factors monthly income, family size, land size, age of mother, education, occupation, religion, marital status, head of household, husband's education.

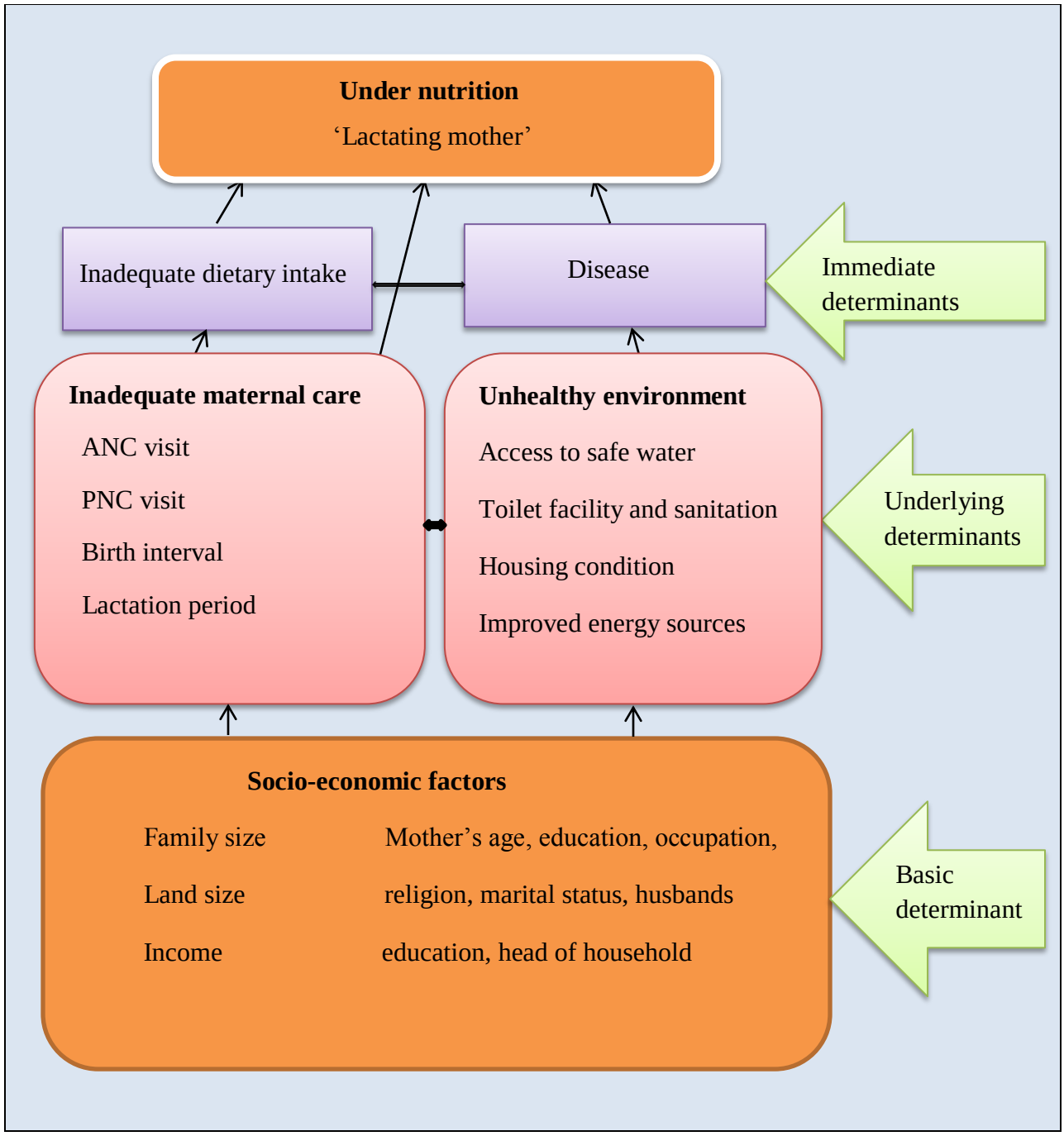

Figure 1. Conceptual framework for determinants of nutritional status

Source: (UNICEF, 1998) modified by researcher

CHAPTER THREE: MATERIAL AND METHODS

3.1. Description of the Study Area

The study was conducted in Anlemo *woreda*, Hadiya Zone, Southern Ethiopia, which is geographically located between 7^0 54′-7^0 73′N latitude and 37^0 89′-38^0 06′E longitudes. According to Anlemo *woreda* agricultural and development office annual report (2017), Anlemo *woreda* is characterized by the topography of hill, valleys, plains and mountains and the altitude ranges from 1500 to 2500 meters above sea level. The total area of the *woreda* is 224 square kilometer (22,414 hectare) of which 14,885 cultivated lands, 427 covered by natural forest, 583 grazing land and the remaining covered by uncultivated land, bush grassland and others.

Based on the traditional agro ecological classification, its weather condition includes *dega* zones (cool and humid with altitude above 2500 meters) and *woina-dega* zones (cool and semi-arid with altitude 1500-2500 meters) the mean annual rainfall ranges from 1000mm to 1200mm, and the mean annual temperature ranges from 15-$20^{o}_{c.}$ Its neighboring is Silte zones in north and northwestern part, Shashogo *woreda* in eastern part, Lemo *woreda* in southern and southwestern part (AWFEDO, 2017). In addition, Anlemo *woreda* is 18 km far from Hosanna town, capital of Hadiya Zone in Southern Nation, Nationalities and Peoples Regional State (SNNPR) and it is about 216 km far from Addis Ababa, the capital city of Ethiopia.

Based on Ethiopian CSA (2007) census, the total population of the *woreda* is 87,265 from this 42,914 (49.2%) is male and 44,351 (50.8%) is female. Most of the total population of the *woreda*, 83,636 (96%) are rural dwellers while only 3629 (4%) are urban dwellers, and about 2975 are lactating mothers from *woreda's* health center report (AWFEDO, 2017).

The dominant religions in the *woreda* are Muslim, Protestant and Orthodox. The most livelihoods economic activity in the study area is agriculture (mixed farming) which consists of crop production and animal rearing. The major agricultural crops include wheat, maize, teff, barley, bean, pea, *enset* and sorghum. The livestock population in the *woreda* includes cows, oxen, goat, sheep, horse, mule, and chickens. Administratively, the *woreda* is divided into 27 rural *kebeles*.

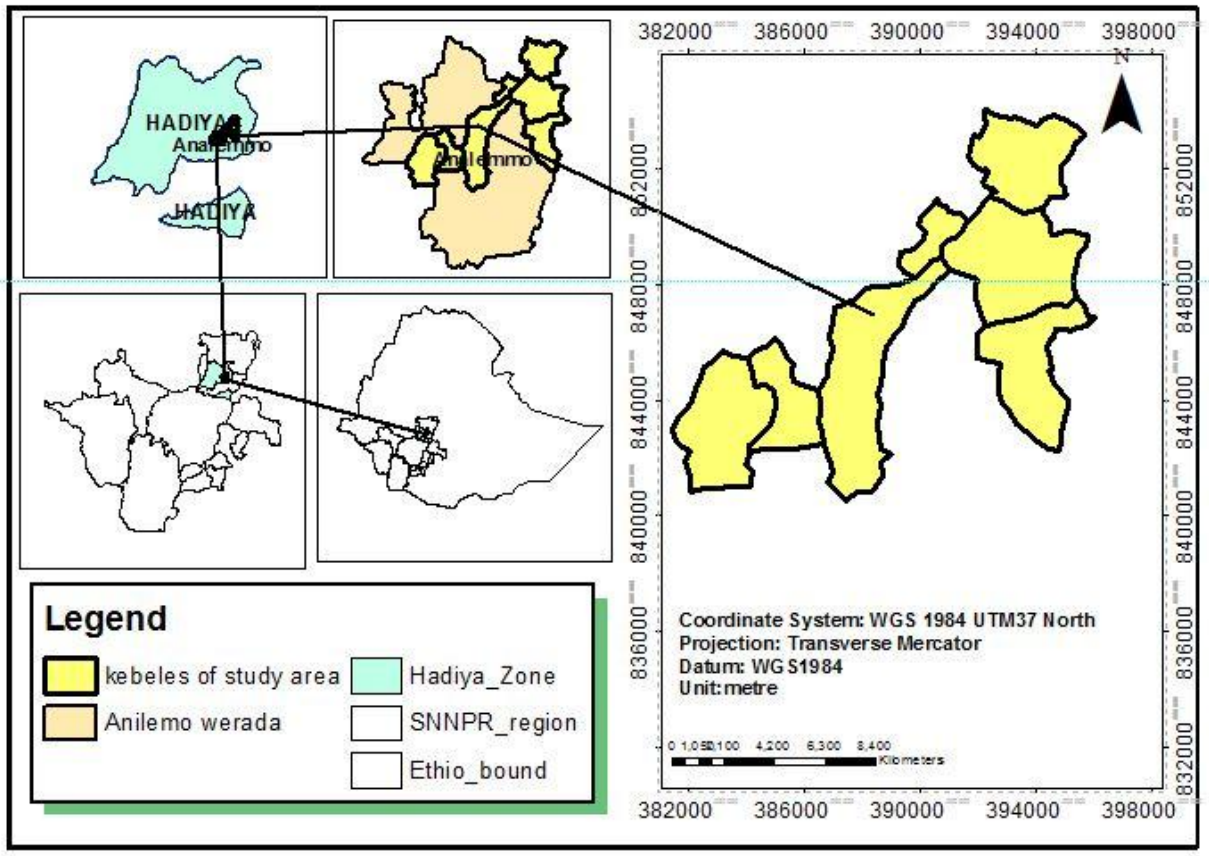

Figure 2. Location map of the study area
Source: Ethio-GIS, 2007

3.2. Research Design

Both qualitative research methods and quantitative research methods were used to address the objectives of the study research. For this study, a community based cross sectional design was conducted to investigate the determinants of nutritional status among lactating women which includes anthropometric measurement at individual and household level. Most of the households' survey was piloted by the application of structured questionnaire to select lactating mothers and to find out the situation at household level by house-to-house visits and it was assisted by focus group discussions.

3.3. Source of Population

Population of the study was all lactating mothers who have been living in Anlemo *woreda*.

3.4. Target Population

The study populations were all lactating mothers in six *kebeles*, having less than or equal to 24 months old child, randomly selected from 27 rural *kebeles* of the *woreda*, by simple random sample selection techniques. All lactating mother who fulfil the eligibility criteria were considered as study populations.

3.5. Inclusion and exclusion criteria

Inclusion criteria: All lactating mothers who have been lived for six months and above in the study area and, having a child of breastfeeding less than or equal to 2 years old were included in the study.

Exclusion criteria: Lactating mothers with pregnancy, mothers having more than two years old child, physical deformities and critically ill during the time of data collection were excluded from the study.

3.6. Sample Size Determination

Published tables were used, which provide the sample size determination for population proportions. Cochran (1963) developed a representative sample size formula for proportions.

For 95% confidence level and assume P is prevalence of underweight are assumed for this equation,

$$n_o = \frac{z^2 pq}{e^2}$$

Where, n_o is the representative sample size,

Z = 1.96 with 95% of confidence level

q = 1-p, e = the level of precision, P = 22% is an estimated level of underweight among mothers with age group 15-49 years in Ethiopia (CSA, 2016). From Anlemo *woreda* finance and economic development office report (2017) about 2,975 are lactating mothers in the *woreda*. For finite population correction proportions of sample size (n_0) can be adjusted by using:

$$n = \frac{no}{1 + \frac{(no - 1)}{N}} = \frac{264}{1 + \frac{(264-1)}{(2975)}} = 242.55 \approx 242$$

Where, N is the total number of population size, n_o is the representative sample size and n is required sample size. Thus, calculated sample size is adjusted for non-response. Considering non-response rate as 10% of the adjusted sample size is 24 and sums to be 266.

Table 1. Sample size proportion computation process

Target district	Sample kebeles	Target population /lactating mothers/	Proportional sample size	
			%	No. of samples
Anlemo woreda	Mento-akebela	123	17	45
	Shasha-gimba	117	16	43
	Dulancho-belela	121	16.5	44
	Hakegale-sanfe	133	18	48
	Laygnaw-fonko	136	18.5	49
	Fonko-tuqa	105	14	37
Total		735	100	266

Source: by the researcher, 2018

3.6.1. Sampling techniques

The study *woreda* was selected purposively, for the reason that, Anlemo *woreda* is one of food insecure *woreda* and targeted on PSNP since 2005. Malnutrition is also one of the problems which affect the vulnerable group of society's especially pregnant, lactating mothers, elders and children. So far there is no more assessment conducted regarding to determinants and nutritional status of lactating women in the study area. Based on agro-ecological conditions, personal observation, accessibilities and familiarity of *woreda* to the researcher, the study was undertaken in this area. Six *kebeles* namely, Mento-akebela, Shasha-gimba, Dulancho-belela, Hakegale-sanfe, Laygnaw-fonko and Fonko-tuqa were selected from the total 27 rural *kebeles* of the *woreda* by simple random selection techniques. Mento-akebela, Shasha-gimba and Dulancho-

belela are from *woina-dega* zones and Hakegale-sanfe, Laygnaw-fonko and Fonko-tuqa are from *dega* zones of agro-ecologies respectively.

3.5.2. Standard definitions of terms

Anthropometry: measuring human body in order to ascertain the average dimensions of human form (weight, height, MUAC) at different ages.

Antenatal Care: health care given to a pregnant woman so as to ensure the birth of healthy baby with minimal health risk to the mother.

Postnatal Care: health care given to the mother during delivery period within (42 days) after delivery.

Lactation period: is the period that stage after pregnancy when the mother breastfed her child by milk secretion (about 2 years in Ethiopia).

Body Mass Index (BMI): a simple measurement ratio of body weight in relation to height.

Underweight: mothers whose body weight was low from cut point, which is BMI < 18.5 kg/m^2.

Individual Dietary Diversity Score: is the sum of food groups eaten by the mother over last 24 hours, serves as a proxy of nutrient adequacy.

3.5.3. Description of variables

Dependent variable: nutritional status of lactating mothers in binary nature (either underweight or not) and it relies on the explanatory variables of demographic, socio-economic and environmental conditions.

Independent variable: socio-economic and demographic variables; sex head of household, family size, land size, income, husband's education, mother's education, occupation, religion, dietary diversity score.

Maternal characteristics: age of mother, current marital status, frequency of ANC visit, PNC visit, birth interval, breastfeeding duration, number of meal, nutrition information and presence of diarrhea. Environmental health condition: access to safe water supply, toilet facility, sanitation and housing condition.

3.5.4. Research instruments

Socio-demographic and economic data were collected by using structured, questionnaire developed by researcher and standard questionnaires table by FAO and FANTA were used to assess 24 hours recall dietary diversity score. Instruments and equipment used for the conduction of the measurements survey are: digital weighing scale (NOVA BS-1112), height measuring scale (vertical woody attached meter), flexible and non-stretchable plastic tape for measuring mid-upper arm circumference. The measurements taken were on weight in kilogram to the (nearest of 0.1kg), height in centimeters to the (nearest of 0.1cm) and MUAC to the (nearest of 0.5cm). The measurement with these instruments was assisted by health expert supervisors.

(a) **(b)** **(c)**

a: Digital weighing scale, b: Plastic MUAC tape and c: Height meter

Figure 3. Anthropometric instruments

3.5.5. Types of data and collection techniques

Both primary and secondary sources of data were used to gather reliable and valid data. Primary sources were health extension workers, experts, personal observations and other concerned bodies. Additionally, secondary sources of data were published and unpublished journals, books, reports of governmental and non-governmental organizations, and other relevant documents.

Data was collected using structured questionnaires and anthropometric measurements starting from March 01/2018 to February 30/2018. The survey was controlled and assisted by the help of health expert enumerators. Two relevant health professional nurses and heath extension workers of the *kebele* were involved in field data collection after giving orientation and training by the researcher about the procedures. The transportation and other related issues that need in the field and house to house visit of selected participants facilitated by the researcher.

The structured questionnaire was developed in English and translated into Amharic language which helps to understand and fill list of the questionnaire merely. Lactating mother's dietary intake pattern was measured by a qualitative recall of all foods consumed by each mother during the previous 24 hours. FAO (2008), dietary diversity would be measured by a household dietary diversity score (HDDS) or by a food consumption score (FCS), or at the individual level, in which case it was measured by an individual dietary diversity score (IDDS).

About nine (9) food groups were proposed by FANTA and FAO, for the women dietary diversity score (WDDS) determination. Based on FAO (2008) classification, the dietary diversity has three main categories. These were low (less than or equal to 3), medium (4 up to 5) and high (more than or equal to 6) in food groups. Questionnaires that translated into Amharic language that used to collect information on demographic and socio-economic characteristics such as age, religion, ethnicity, educational status, occupation, family size, marital status, husband's occupation, husband's educational level, family income, information about nutrition during breastfeeding. The anthropometric outcome measurements (weight, height and MUAC) were seriously measured for the consistency of data.

3.5.6. Focus group discussion

Five focus group discussions were held on having 8-12 members in each group for an hour per group. These meetings were undertaken as the qualitative phase of investigation to determine the general information of the study participants and situation of the area. Discussion was mainly included lactating mothers, *kebele* health extension workers, women's health volunteer representatives and led by the researcher. The issues mainly raised in the discussion were what affect maternal nutrition (socially, economically and environmentally) and food taboos during pregnancy and lactation. Most of the focus group discussion (FGD) participants explain that there were shortages of knowledge to select and differentiate various nutrient-rich food types.

Poor economic status of women in the study *woreda* was another basic factor which inhibits mothers from purchasing different types of food. The discussant clarifies that mothers during pregnancy period, exclude some foods such as honey, fatty meat and some flavoring foods in fear of abortion, fatty baby and fetal abnormality. Even though the food taboos manifested more during the pregnancy period, its impact results on lactating mother and her child as well.

3.5.7. Data quality

Data quality was maintained and assisted by close supervision and training of data collectors. The measurement instruments were calibrated to zero initially for each individual measurements and flattened floor, straight standing position for height measurement, structured and administered questionnaire were used to avoid biases. Data completeness checkups in the field were followed carefully in each day.

3.5.8. Data processing and analysis

The anthropometric measurement results of lactating mothers (height, weight and MUAC) and data from structured questionnaires were checked for completeness, managed, cleared, coded and entered in the computer using Statistical Package for Social Science (SPSS version. 22). Likewise qualitative data were transcribed and coded by assigning and labeling to various categories and then verified test parameters were used to establish the relationships between the independent variables and nutritional status of lactating women.

Descriptive summaries were carried out to determine the proportions, percentages, frequency distribution by using tables, graphs and figures. Both bivariate and multivariate analyses were employed to identify the determinants of nutritional status of lactating mothers. First, bivariate analysis was employed to examine each socio-economic, demographic and environmental factor affecting the nutritional status of the lactating mother at p-value less than 0.2.

Significant variables observed in the bivariate analysis were subsequently included into the multivariate logistic analysis to identify their independent effect. Variables with P-value less than 0.05 on multivariate logistic regression analysis were considered as statistically significant factors. The estimated coefficient indicates that the increase or decrease of a single independent variable while controlling the effects of other variable in the model. The strength of association between dependent variable and independent variables were expressed by odds ratio (OR). Estimates of odds ratio (OR) greater than 1 indicates the risk of malnutrition is greater than that for reference category and estimates less than 1 indicates that the risk of malnutrition is less than that for the reference category of each variable.

3.5.9. Ethical considerations

Ethical clearance was obtained from Ethical Review Board of Addis Ababa University, College of Development Studies, Center for Food Security Studies. Permission was also obtained from all concerned authority ranging from the Regional health bureau, Hadiya zone health office, at the *woreda* authorities and presented to the local government representative bodies of the selected *kebeles* for the study. Before conducting the study, consent was secured from study participants/households by notifying the data to be gathered from them should be kept confidential and important for the study. The respondent participation was based on their willingness, privacy and confidentiality of collected information insurance at all level.

CHAPTER FOUR: RESULT AND DISCUSSIONS

4.1. RESULT

4.1.1. Demographic and socio-economic characteristics

In this study a total of 266 respondents were participated with rate of 100%. About 236(88.7%) of respondents were male-headed households and only 30(11.3%) were female-headed in the households. Table 2, indicate that two-third of total respondents, 177(66.5%) were 25-35 years age group, about 49(18.4%) were engaged to 15- 24 years age group, and 40(15%) were aged above 36 years. Majority of participants 145(54.5%) were Muslim, 92(34.6%) protestant and 29(10.9%) were orthodox religion followers. Most of 248(93.2%) were Hadiya by their ethnicity.

From the total of lactating mothers in the study, 253(95.1%) are married, 5(1.9%) were divorced, 8(3%) were widowed. About 135(50.8%) participants had no formal education, 73(27.4%), had primary education, 43(16.2%) had secondary education, and 15(5.6%) had more than secondary education. Similarly, majority of their husbands 128(48.1%) had no formal education. Nearby one-third 231(86.8%) were housewife in their current occupation. As regards to the number of family size 110(41.4%) had 4-5 members, 117(44.0%) had 6-7 members, 27(10.2%) had above or equal to eight members 12(4.5%) had less than or equal to three members of family, and 184(69.2%) participants had only one child under five (Table 2).

Table 2. Socio-economic and demographic characteristics of lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Variables		Frequency	Percent
Sex of household head	Male	236	88.7
	Female	30	11.3
Age of mother	15-24 years	49	18.4
	25-35 years	177	66.5
	≥ 36 years	40	15.0
Religion of mother	Orthodox	17	6.4
	Muslim	145	54.5
	Protestant	104	39.1
Ethnicity of mother	Hadiya	248	93.2
	Silte	15	5.6
	Kembate	2	0.8
	Other	1	0.4
Marital status of mother	Married	253	95.1
	Divorced	5	1.9
	Widowed	8	3.0
Educational status of mother	No formal education	135	50.8
	Primary education	73	27.4
	Secondary education	43	16.2
	More than secondary education	15	5.6
Educational status of husband	No formal education	128	48.1
	Primary education	83	31.2
	Secondary education	38	14.3
	More than secondary education	17	6.4
Current occupation of mother	Housewife	231	86.8
	Farmer	8	3.0
	Merchant	25	9.4
	Government employee	2	0.8
Family size	≤ 3	12	4.5
	4-5	110	41.4
	6-7	117	44.0
	≥ 8	27	10.2
Number of under-five children	1	184	69.2
	2	78	29.3
	3	4	1.5

Source: field survey, 2018

More of participant's households, 118(44.4%) had average monthly income less than 500 Ethiopian birr, 83(31.2%) had in between 999-500birr, 37(13.9%) had 1000-2000 birr and 28(10.5%) had greater than 2000 birr respectively. Regarding land size about 121(45.5%) owned 0.51-1 hectare, 88(33.1%) had 0-0.5 hectare, 48(9%) had 1.1-2 hectare and small number,

9(3.4%) had land greater than 2 hectare. Only 47(17.7%) respondents got their food from purchasing, most of 122(45.9%) respondents got their food from both own farm production and purchasing from markets. From the interviewed participants, 171(64.3%) had three meals per day and 95(35.7%) had two meals per day (Table 3).

Table 3. Socio-economic characteristics of lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Variables		Frequency	Percent
Monthly income of households	> 2000 Birr	28	10.5
	1000-2000 Birr	37	13.9
	500-999 Birr	83	31.2
	< 500 Birr	118	44.4
Farm land size owned	0-0.5 Hectare	88	33.1
	0.51- 1 Hectare	121	45.5
	1.1-2 Hectare	48	18.0
	> 2 Hectare	9	3.4
Source of food for household	Own farm production	97	36.5
	Purchasing	47	17.7
	Farm production & purchasing	122	45.9
Number of meal per day	2 meals	95	35.7
	3 meals	171	64.3
Distance from nearest market	< 2 kilo meter	115	43.2
	≥2 kilo meter	151	56.8

Source: field survey, 2018

Regarding housing condition of the respondents with wall of wood, mud-floor and thatched roof were, 183(68.8%), with wall of wood, mud-floor and corrugated iron/steel roof, 60(22%) and respondents with wall of wood, cemented floor and corrugated roof, 23(8.6%) respectively (Table 4).

Table 4. Housing condition of lactating mother's household (n= 266) in Anlemo woreda, Southern Ethiopia, 2018

Variables		Frequency	Percent
Housing condition	Wall of wood, mud-floor and thatched roof	183	68.8
	Wall of wood, mud-floor and corrugated iron/steel roof	60	22.6
	Wall of wood, cemented floor and corrugated iron/steel roof	23	8.6
	Total	266	100.0

Source: field survey, 2018

4.1.2. Maternal health service and related factors

Concerning the respondents health attendance of Anti Natal Care (ANC) follow up, 139(52%) had 4 times, 115(43%) had less than 4 times follow up and about 12(4.5%) did not attend ANC follow up during their last pregnancy. Majority of participants, 157(59%) had not attend PNC follow up after their last delivery. Most of 168(63.2%) birth interval period of last delivery belongs to 1-2 years and only 27(10.2%) had first birth (Table 5).

Table 5. Maternal health care practices and condition of lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Variables		Frequency	Percent
ANC follow up	4 times	139	52.3
	1- 4 times	115	43.2
	No attendance	12	4.5
PNC follow up	≥ 3 times	15	5.6
	<3 times	95	35.3
	No attendance	157	59.0
Place of delivery	At home	111	41.7
	At health centers	155	58.3
Birth interval of last delivery	First birth	27	10.2
	1-2 year	168	63.2
	> 2 year	71	26.7
Breastfeeding duration	0-6 month	67	25.2
	7-12 month	115	43.2
	13-18 months	62	23.3
	19-24 months	22	8.3
Vaccination of TT	Yes	76	28.6
	No	190	71.4
Modern use of family planning	Yes	54	20.3
	No	212	79.7
Presence of diarrhea	Yes	43	16.2
	No	223	83.8
Nutrition information	Yes	103	38.7
	No	163	61.3

ANC: Antenatal Care, PNC: Postnatal Care, VTT: Vaccination of tetanus

Source: field survey, 2018

4.1.3. Environmental factors

Regarding to availability of latrine, 226(85%) of respondents had access of toilet facility and only 40(15%) had no their own latrine. Most of respondents, 185(69.5%) had traditional pit

latrine, 40(15%) had traditional pit with slab and about 41(15.4%) were used in bushes or field. From waste disposal report, more of 104(39.1%) were used their garden, 94(35.3%) had dump to dispose house refuses, 33(12.4%) throw everywhere outside and only 12(4.5%) were burnt the refused wastes. According to their source of drinking water majority of 89(33.5%), 75(28.2%) were unprotected hand dug well and unprotected spring user respectively (Table 6).

Table 6. Environmental health, sanitation and hygiene conditions of lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Variables		Frequency	Percent
Availability of latrine	Yes	226	85.0
	No	40	15.0
Source of drinking water	Public tap	55	20.7
	Protected hand dug well	41	15.4
	Unprotected hand dug well	89	33.5
	Unprotected spring	75	28.2
	Other	6	2.3
Responsible to fetch water	Women	233	87.6
	Men	24	9.0
	Hired labor	9	3.4
	Other	6	2.3
Distance of water point	0-15min. and 0-2km	64	24.1
	16-30min. and 2-5km	154	57.9
	31-60min. and 6-8km	48	18.0
Responsible to fetch water	Women	233	87.6
	Men	24	9.0
	Hired labor	9	3.4

Source: (field survey, 2018)

4.1.4. Individual dietary diversity

From the total respondents of dietary assessment in daily consumption, cereals 261 (98.1%), vegetables 213 (80.1%), oils, fats and butter 209 (78.6%), were the most frequently consumed and tubers 14 (5.3%), legumes 6 (2.3%) and animal foods 1 (0.4%) were less frequently consumed foods in seven days frequency pattern respectively (Table 7).

Table 7. Seven (7) days frequency of food consumption by lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Food groups	Daily	2-3days/week	Once/week	Never	Total
Cereals	261(98.1%)	5(1.9%)			266(100%)
Tubers	14(5.3%)	50(18.8%)	48(18.0%)	154(57.9%)	266(100%)
Legumes	6(2.3%)	28(10.5%)	55(20.7%)	177(66.5%)	266(100%)
Animal foods	1(0.4%)	12(4.5%)	42(15.8%)	211(79.3%)	266(100%)
Beverages		4(1.5%)	4(1.5%)	258(97.0%)	266(100%)
Vegetables	213(80.1%)	44(16.5%)	2(0.8%)	7(2.6%)	266(100%)
Fruits			6(2.3%)	260(97.7%)	266(100%)
Oils, fats and butter	209(78.6%)	51(19.2%)	2(0.8%)	4(1.5%)	266(100%)

Source: field survey, 2018

Based on 24 hours recall, 265 (99.6%) of lactating mothers had eaten starchy staples, 220 (82.7%) Vitamin-A rich dark green leafy vegetables, 146 (53.4%) legumes and nuts had consumed in high proportion. On the other hand food groups of organ meat, other vitamin-A rich vegetables and fruits[c] and flesh foods and miscellaneous small animal protein had consumed in low proportion, 7(2.6%), 8(3%) and 7(2.6%), respectively (Table 8).

Table 8. Twenty four (24) hours dietary diversity consumption pattern of lactating mothers in (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Food groups	Categories	Frequency	Percentages
	Yes	265	99.6
All starchy staples	No	1	0.4
	Yes	146	53.4
All legumes and nuts	No	124	46.6
	Yes	79	29.7
All diary	No	187	70.3
	Yes	7	2.6
Any organ meat	No	259	97.4
	Yes	31	11.7
Any eggs	No	235	88.3
Flesh foods and miscellaneous small	Yes	7	2.6
animal protein	No	259	97.4
	Yes	220	82.7
Vitamin-A rich dark green leafy			
vegetables	No	46	17.3
	Yes	8	3.0
Other vitamin-A rich vegetables and fruits[c]	No	258	97.0
	Yes	48	18.0
Other fruits and vegetables	No	218	82.0

Source: field survey, 2018

Mean dietary diversity score (DDS) was 3.34±0.53, which was mostly indicated that lactating mothers in the study area had low dietary diversity food group. The result, based on the dietary diversity group, illustration, 68.8% of lactating mothers had low dietary diversity (less than or equal to 3 food groups), 28.57% had medium dietary diversity (4 – 5 food groups) and only 2.63% had high dietary diversity (greater than or equal to 6 food groups) (Figure 4).

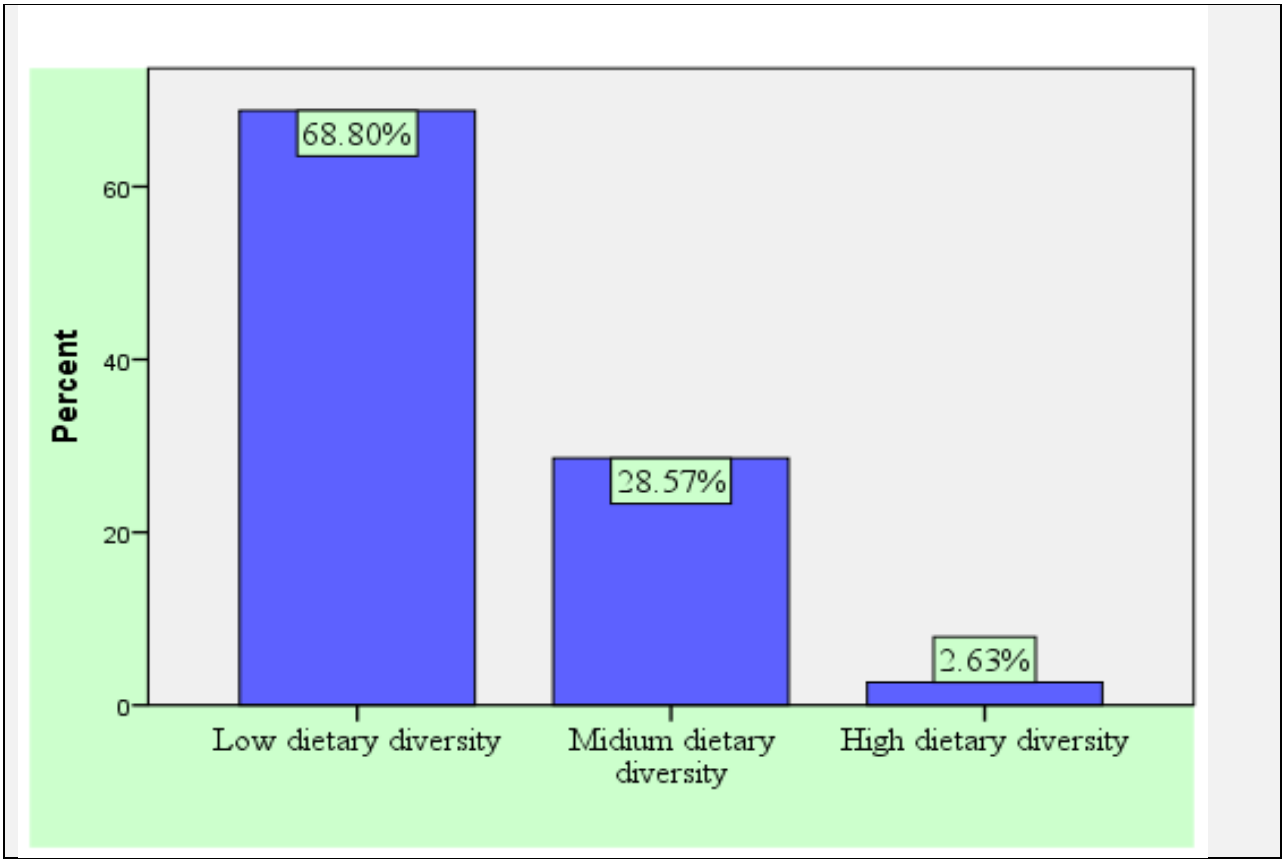

Figure 4. Food groups consumed by lactating mothers' (n=266) dietary diversity score previous 24 hours recall in Anlemo woreda, Southern Ethiopia, 2018

Source: Own field survey, 2018

4.1.5. Nutritional status of lactating mothers

The outcome anthropometric measurements depicts that the overall prevalence of underweight (BMI < 18.5kg/m2) among lactating mothers were 66 (24.8%). And from the total respondents, normal BMI (18.5-24.99kg/m2) were 138(51.9%), overweight BMI (25.0-29.99kg/m2) were 54(20.3%) and obese (BMI >= 30kg/m2) were 8(3%) respectively (Figure 5).

The mean weight, height and BMI of the respondents were 54.05±7.57kg, 1.56±0.08m and 22.18±3.82kg/m2, respectively (Table 9).

Table 9. Anthropometric characteristics of lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

Parameter	Mean(±SD)
Weight(kg)	54.05±7.57
Height(m)	1.56±0.08
BMI(body mass index)(kg/m2)	22.18±3.82

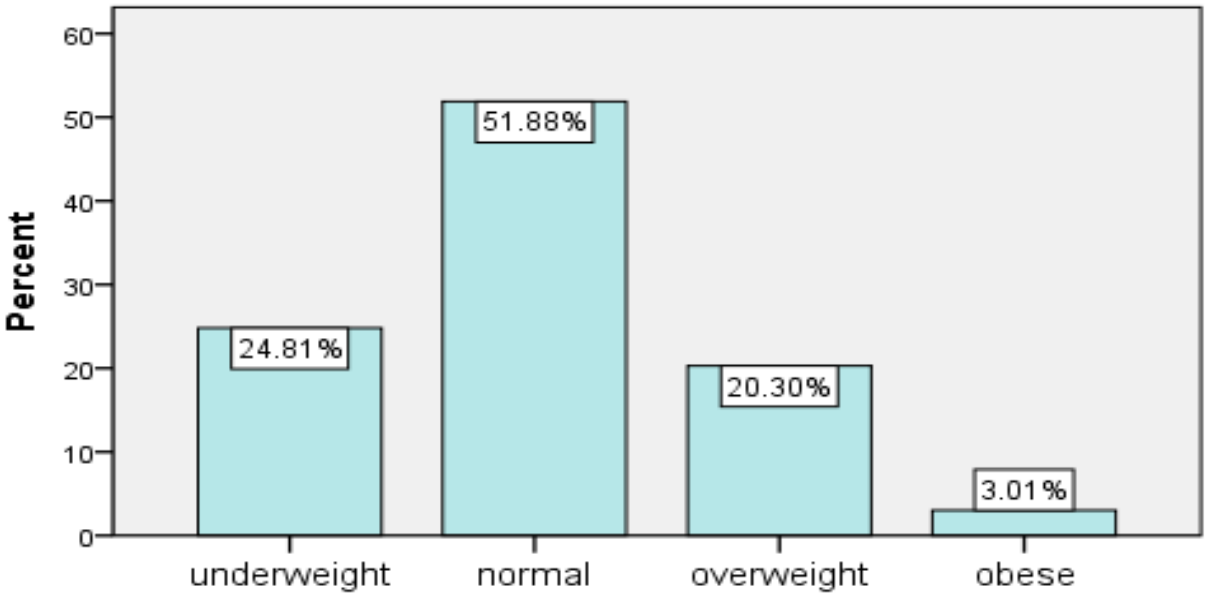

Figure 5. Body mass index categories of lactating mothers in Anlemo woreda

Source: Own field survey, 2018

Using measurement of upper arm circumference of study participants, with (MUAC < 21cm) were 28(10.5%) and most of 238(89.5%) were engaged (MUAC >= 21cm) (Figure 6).

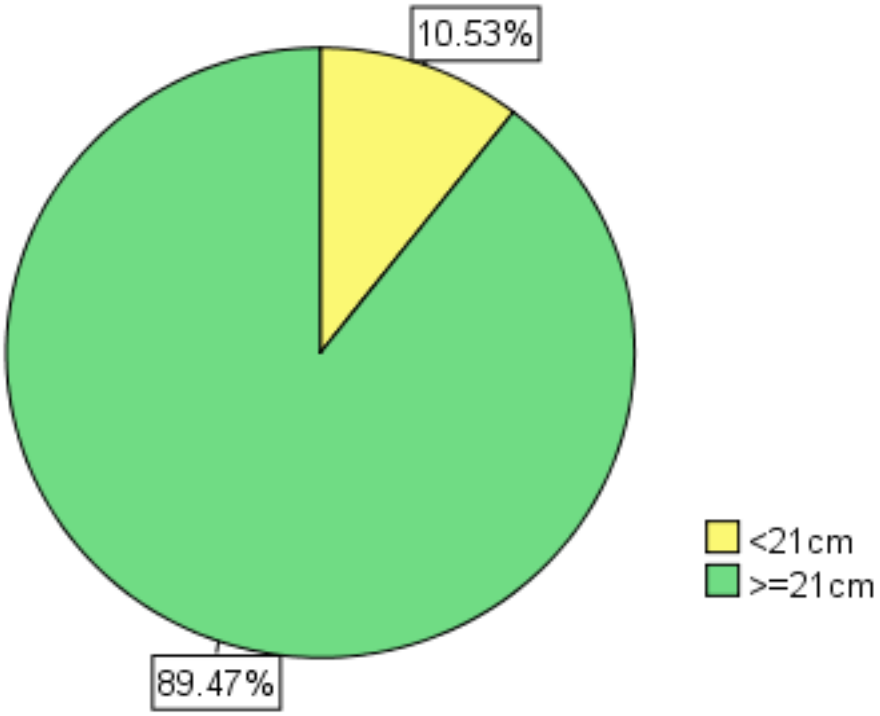

Figure 6. Measurement of upper arm circumference categories of lactating mothers in Anlemo woreda

Source: Own field survey, 2018

4.1.6. Associated factors with lactating mother's nutritional status

Each independent variable was analyzed to identify the association of nutritional status among lactating mothers using bivariate logistic regression analysis model. Some of socio-economic and environmental characteristics monthly income, number of family size, educational status, number of meals, type of latrine, ANC follow up, PNC follow up, having nutrition information and presence of diarrhea were associated with nutritional status of lactating mothers independently at $P < 0.2$ level. However, other expected variables such as age, religion, and ethnicity, education of husband, housing condition, birth interval, marital status, breastfeeding duration, current occupation and complementary feeding had no association with nutritional status of lactating mothers ($P > 0.2$) (Table 10).

Table 10. Factors associated with nutritional status on bivariate logistic regression analysis among lactating mothers (n=266) in Anlemo district, Southern Ethiopia, 2018

		Nutritional status using BMI			
Variables	Categories	Not underweight	Underweight	P-value	COR(95% CI)
Educational status of mother	no education	67(60.9%)	43(39.1%)	0.013	4.92(1.39,17.4)*
	primary education	68(31.5%)	11(68.5%)	0.757	1.24(0.32,4.84)
	secondary education	42(7%)	9(93%)	0.488	1.64(0.4,6.67)
	more than secondary	23(20.0%)	3(80.0%)		1
Family size	≤ 3	3(25%)	9(75%)	0.023	0.26(0.08, 0.83)*
	4 - 5	44(40%)	66(60%)	0.035	0.42(0.19, 0.94)*
	6 - 7	59(50.4%)	58(49.6%)	0.042	0.42(0.19,0.97)*
	≥ 8	22(81.5%)	5(18.5%)	0.003	1
Monthly income of household	> 2000 birr	26(92.9%)	2(7.1%)	0.008	2.13(0.03, 0.53)*
	1000-2000 birr	36(80%)	9(20%)	0.049	1.43(0.19,0.99)*
	999-500 birr	72(80.9%)	17(19.1%)	0.008	1.41(0.21,0.79)
	< 500 birr	66(63.5%)	38(36.5%)	0.007	1
Number of meals	2 meals	62(65.3%)	33(34.7%)	0.000	0.33(0.198,0.56)*
	3 meals	66(38.6%)	105(61.4%)	0.003	1
Type of latrine	traditional pit	87(47%)	98(53%)	0.003	3.07(1.45,6.49)*
	traditional pit with slab	11(27.5%)	29(72.5%)	0.000	7.19(2.7,19.14)*
	no facility/bushes/field	30(73.2%)	11(26.8%)	0.004	1
Attendance of ANC follow up	4 times	49(35.3%)	90(64.7%)	0.013	5.51(1.42,21.3)*
	< 4 times	70(60.9%)	45(39.1%)	0.344	1.93(0.49,7.50)
	None	9(75%)	3(25%)	0.099	1
Attendance of PNC follow up	< 3 times	34(35.5%)	60(64.5%)	0.003	2.045(1.4,3.68)*
	≥ 3 times	7(46.7%)	8(53.3%)	0.517	0.176
	None	87(55.4%)	70(44.6%)		1
Have nutrition information	Yes	33(32%)	70(68%)	0.000	2.96(1.76,4.97)*
	No	95(58.3%)	68(41.7%)	0.035	1
Prevalence of diarrhea in past 2 weeks	Yes	35(81.4%)	8(18.6%)	0.000	0.16(0.073,0.37)*
	No	93(41.7%)	130(51.9%)	0.014	1

*Variables significant at P < 0.02 level, COD = Crude Odd Ratio, CI = Confidence Interval

Source: field survey, 2018

4.1.7. Determinants of lactating mother's nutritional status

To identify the most determinant factors, bivariate analysis were followed by multivariate logistic regression analysis. Among the independent variables significant on bivariate analysis; educational status of lactating mother and monthly income, number of meals eaten by lactating mother and attendance of ANC follow up were statistically significant on multivariate logistic regression analysis at P- value <0.05 level. The education level of mothers and undernutrition had inverse relationship which shows education level increases undernutrition decreases and vice versa. The result revealed that lactating mothers who had primary education was 6 times more likely undernourished outcome than lactating mothers who had nourished outcome (AOR = 6.0, 95%CI: 1.09, 35.3; P=0.047).

Regarding to monthly income, lactating mothers with monthly income greater than 2000 ETB was 8.27 times nourished outcome than lactating mothers who had monthly income less than 500 ETB (AOR= 8.27, 95%CI: 1.2, 56.85; P=0.032). And also lactating mothers had two meals per day were 0.13 times less likely nourished outcomes than mothers who had three meals per day (AOR= 0.13, 95%CI: 0.19, 0.56; P=0.000) and mothers with ANC follow up greater than four times were 13 times more likely protective of undernutrition than lactating mothers who had no ANC follow up regularly (AOR= 13, 95%CI: 1.42, 21.3; P= 0.012) (Table 11).

Table 11. Multivariate logistic regression of nutritional status among lactating mothers (n=266) in Anlemo woreda, Southern Ethiopia, 2018

		Nutritional status by BMI			
Variables	Categories	Not underweight	underweight	P-value	AOR(95% CI)
Educational status of mother	No education	67(60.9%)	43(39.1%)	0.676	1.4(0.29,6.80)
	Primary education	68(31.5%)	11(68.5%)	0.047	6.0(1.09,35.3)**
	Secondary education	42(7%)	9(93%)	0.305	2.6(0.42,15.8)
	More than secondary	23(20.0%)	3(80.0%)		1
Monthly income of household	> 2000 birr	26(92.9%)	2(7.1%)	0.032	8.27(1.2,56.85)**
	1000-2000 birr	36(80%)	9(20%)	0.377	1.69(0.53,5.46)
	999-500 birr	72(80.9%)	17(19.1%)	0.119	2.19(0.82,5.87)
	< 500 birr	66(63.5%)	38(36.5%)		1
Number of meals	2 meals	41(43.2%)	51(56.8%)	0.000	0.13(0.19,0.56)**
	3 meals	159(93%)	12(7%)		1
Attendance of ANC follow up	4 times	133(95.7%)	6(4.3%)	0.012	13.0(1.4,21.3)**
	< 4 times	64(55.7%)	51(44.3%)	0.363	2.29(0.49,7.50)
	None	3(25%)	9(75%)		1

**Variables significant at P<0.05 level, AOR = Adjusted Odd Ratio, CI= Confidence Interval

Source: field survey, 2018

4.2. DISCUSSIONS

In this study, the prevalence of underweight and determinant factors was assessed by outcome measurements of Body Mass Index (BMI) and Mid Upper Arm Circumference (MUAC). The anthropometric measurements indicate that 51.9% of lactating mother had normal nutritional status (BMI=18.5kg/m2-24.99kg/m2), 24.8% was underweight (BMI < 18.5kg/m2), 20.3% was Overweight (25.0-29.99kg/m2) and 3% was Obese (more than or equal to 30.0kg/m2).

The prevalence of underweight was comparatively in line with the finding of the study from Northwest Ethiopia, (25.4% underweight) (Sileshi, 2017) and slightly higher than the 2016 EDHS report of 22% (CSA, 2016), (21.5% underweight) study conducted in Ambo (Eshetu, 2016) and (20 % underweight) study from Nekemte (Temesgen *et al*., 2015). The difference might be less interventions on maternal nutrition, health and care practices by governmental and non-governmental organizations in the study area. In disparately, it was much higher than study conducted in Addis Ababa, (12.7% underweight) (Tesfay, 2017) and much lower than study from Jimma zone, (40.6% underweight) (Mihiretu *et al*., 2014) respectively.

This finding was also confined in between the rates of serious (20% to39%) undernutrition of women in Sub-Saharan Africa (prevalence in Chad, India, Ethiopia, Mali and Nepal), but comparatively lower than higher prevalence of underweight (more than or equal to 40%) in Eritrea and Bangladesh (WHO, 2012). According to mid upper arm circumference measurements of the respondents, had 10.5% (MUAC < 21cm), undernourished lactating mothers which is comparable with findings from Western Ethiopia, in Ambo (12.8%) and Northern Ethiopia, in Tigray (13%) (Eshetu, 2016). It was found that educational status of lactating mothers; monthly income, number of meals eaten by mother and ANC follow up of lactating mother were appeared to be important predictors or determinant factors of nutritional status of lactating mothers in study woreda on further multivariate regression analysis.

This study revealed that lactating mothers who had no formal education were more likely susceptible to undernutrition than mothers who were engaged more than secondary education indicating the inverse association between undernutrition and education level. It shows that lactating mothers who had primary education level were six times vulnerable than the reference group. This finding was consistent with the study in Ethiopia, the higher the level of education,

the lower the proportion of undernourished in women (Teller and Yimar, 2000; Girma and Timotiows, 2002).

The study also designates that lactating mothers' nutritional status was determined by monthly income of lactating mothers. They were positively associated and those who got monthly income greater than 2000 birr was 8.27 times less likely to be undernourished than that had monthly income less than 500 birr. This finding was similar with the study conducted in Ethiopia (Girma and Timotiows, 2002) and the study from East Wollega, Ethiopia (Temesgen *et al*., 2015).

According to ANC follow up, more than half (52.3%) of the total respondents were attended four times and 43.2% of them were attended less than four ANC visits. This was comparatively higher than the 2016 EDHS finding of 32% (three in ten women) have four or more than four ANC visits for the recent live birth (CSA, 2016). Conversely, only 5.6% of the participants had PNC visits in the study area, which was much lower compared to 17% of PNC checkup of health after in the first two days after birth EDHS in 2016 (CSA, 2016). This study also showed that mother's nutritional status was determined by ANC follow up which minimizes the probability of mothers to be undernourished.

More often than not, those lactating mothers who had three meals per day were better than those who had two meals per day. Most of the respondents in this study area consume starchy staples, cereals mainly maize, wheat, teff and enset food items frequently. This is due to their availability and accessibility in the study area. Animal products, organ meat, eggs and other leafy vegetables were less frequently consumed. More than two-third of the total respondents had about three or less food group from the nine food groups involved in women dietary diversity score in the study.

The mean dietary diversity score was 3.34, which indicates that the study participants of the study area had low dietary diversity. It was relatively lower than the study piloted in Jimma Zone, Ethiopia, the mean value of 4.9 and national report value 4.0 (Mihiretu *et al*., 2014). The study indicates that about 35.7% of lactating mothers in the study area had got two meals per day and 64.3% had got three meals. This result was less comparable than the study of Alemtidad area in Khartoum (71.1%) of mothers with two meals, 23.3% of mothers with one meal and only 5.6% of mothers were taken three meals per day) (Ahmed *et al*., 2016)

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The prevalence of underweight at national level was 22% in 2016 EDHS report, which was slightly lower than the present finding of the Anlemo woreda with the prevalence of underweight resulted in 24.8%. The nutritional status of lactating mothers in the study area was poor and basically determined by socio-economic and demographic factors. Particularly educational status of lactating mother, monthly income, number of meals eaten by mothers and ANC follows up were found the most important predictors of nutritional status of lactating mothers in the study area.

The study also revealed that majority of lactating mothers in the study area had poor dietary diversity, from twenty four hours recall about two-third of lactating mothers, (68.8%) were consuming inadequate variety of diets. It was clustered into low dietary diversity score by food and agricultural organization classification. Lactating mothers in Anlemo woreda were more dependent on starchy staple or carbohydrate foods mainly inset foods and cereals foods from maize and wheat which were poor in nutrient-rich varieties.

5.2. Recommendations

Malnutrition in lactating mothers more specifically underweight is one of the major problems in the study area that affect well-being and productive future of mothers. Identifying and understanding the various factors that determine the nutritional status of lactating mothers in different setting provide the valuable information for policy makers and researchers; and community at large; for practitioners who work in the area as well. Therefore, based on the findings of the study, the following recommendations are forwarded:

- ✓ The local government of Anlemo woreda administration supports awareness activities through agricultural and health institutions for the community to reduce the identified

level of undernutrition problems, which is indicated by the prevalence value of 24.8%. It should maintained by involving women targeted agricultural and productive activities.

- ✓ The woreda health extension workers, volunteer groups and other stakeholders should work actively to minimize misunderstanding on food taboos, preferences, preservations, preparations and consumption patterns of lactating mothers in the community.

- ✓ The study revealed that lactating mothers of households having greater than 2000 birr were more protective than those low income levels; therefore, promoting income generating activities such as poultry farm, involving in small trading groups, employment opportunity and in other public works at the community level are vital tasks.

- ✓ The finding of the study indicates that 50.8% have no formal education and 27.4% have primary education level which shows majority of lactating mothers are in low educational level. It also revealed that lactating mothers who had primary education was 6.0 times more undernourished than those who had more than secondary education, so both education and health sectors of the woreda should uphold awareness on ANC follow up, PNC follow up and sanitation practices to mother's education to improve their nutritional status through educational health care practices. It is also advisable to increase the tendency of mothers to eat adequate meals in their households.

- ✓ Majority of lactating mother in the study area, 68.8% of mothers, had dietary intake consumption below three food groups; therefore, diversification of agricultural production, promoting nutrient-rich vegetables and homestead production in the back yard is critical to improve and maximize their diet. Woreda agricultural and rural development sectors have better to introduce improved animal sources, fruits and vegetables varieties for sustaining and enhancing mother's nutritional status in the community.

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Annex-I: Questionnaire

- **To assess the determinants of nutritional status among lactating mothers' in the rural kebeles of Anlemo district; Hadiya Zone, Southern Ethiopia, 2018**

Good morning/afternoon dear participant! My name is Amanuel Eramo. I am a graduate student of Addis Ababa University, College of Development studies, Center for food Security Studies. I am conducting a research studies for my master's degree of Science in food security and development studies at Addis Ababa University. The interview will take about 40 minutes. I kindly request you to lend me your attention to explain you or tell truth about the study, being selected as the study participant.

Name of participant:_____Kebele/village _____

Name of Data Collector:_____Signature_____Date_____

Name of Supervisor: _____Signature _____Date _____

Part-I: Socio-demographic characteristics of respondents

Instruction: Encircle appropriate choice or fill blank spaces clearly and neatly.

1. How old are you? 1) …….years old. 2) I don't know
2. Which religion do you follow? 1) Orthodox 2) Muslim 3) Protestant 4) Others
3. In which ethnicity you belong to? 1) Hadiya 2) Silte 3) Kembate 4) Other (specify)
4. What is your current marital status, 1) Married 2) Divorced 3) Widowed 4) Single
5. If not married currently, whom do you live with? 1) Alone 2) With parent 3) With relatives 4) Other (specify)_____
6. Current educational status of mother 1) no education 2) primary education 3) secondary education 4) more than secondary
7. Current educational status of husband: 1) no education 2) primary education 3) secondary education 4) more than secondary
8. Current occupation of mother: 1) Housewife 2) Farmer 3) Merchant 4) Government employee 5) Private employee
9. Where is your last delivery place? 1) At home 2) At health center/clinic
10. How long birth interval for the last delivery? 1) First birth 2) 1 - 2 3) > 2 4) I don't know

11. How long your breast feeding duration?___1) 0 - 6 months 2) 7 - 12 months 3) 13 - 18 months 4) 19 - 24 months 5) I don't remember
12. When did your child start complementary feeding? 1) 5month 2) 6month 3) 7-9month 4) >10month
13. How many numbers of families do you have? 1) < =3 2) 4-5 3) 6-7 4) 8 and above
14. How many children do you have less than 5 years old? 1) 1 2) 2 3) 3 4) >3 5) No
15. Who is household head of your families? 1) Male 2) Female
16. How much income do you get monthly in ETB 1) > 2000 2) 1000 -2000 3) 999-500 4) < 500
17. How much farm land do you possess? 1) 0 - 0.5ha 2) 0.51 - 1ha 3) 1.1 – 2ha 4) > 2ha
18. What are the main sources of food for your household? 1) Own farm production 2) Purchasing 3) Food aid /Relief 4) Own farm and Purchasing 5) Other _____
19. How many meals are eaten in a day by lactating mother? 1)1 meal 2) 2 meals 3) 3 meals 4) >3 meals

Part II: Water, sanitation, environmental hygiene and facilities

20. What is the main source of drinking water? 1) Private tap 2) Public tap 3) Protected well 4) Unprotected well 5) Unprotected spring 6) other specify _____
21. How long does it take to fetch from source of water point? 1) 0 - 15min. and 0 - 2 km 2) 16-30min. and 2-5km 3) 31-60min. and 6-8km 4) Above 1hrs. and more than 8km
22. Do you know anything to do with drinking water and sanitation? 1) Yes 2) No
23. If yes' what do you do? 1) Boil 2) Boil and filter 3) Sedimentation 4) Other, specify _____
24. Is the water available throughout the year? 1) Yes 2) No
25. If no' what do you do when the water source dries up? 1) Move along distance 2) Buy from urban centers 3) Other, specify _____
26. Who is mainly responsible to fetch water? 1) Women 2) Men 3) Hired labor 5) Others, _____
27. Do you have a latrine for your household? 1) Yes 2) No
28. If 'yes' what type of latrine do you have? 1) Traditional pit 2) Traditional pit with slab 3) Flush 4) VIP 5) Other, specify _____
29. If 'no' where does your household use? 1) Neighbors' 2) Public 3) Bush 4) Others, _____
30. Where do you dispose of your waste (house refuse)? 1) Compost pit 2) Dump 3) Burn 4) Garden 5) Everywhere outside 6) Others, specify _____
31. Do you have any access to use improved alternative energy sources? 1) Yes 2) No
32. If yes' which sources do you have? 1) Solar energy 2) Improved stove/mirt 3) Biogas 4) Other, specify _____
33. What is the main type of fuel that is usually used for cooking in your household? 1) Firewood 2) Charcoal 3) Paraffin 4) Dry leaves 5) Other, specify _____
34. Main source of light in your household? 1) Kerosene lamp 2) Solar 3) Open fire 4) Other, specify _____
35. Distance from your home to the nearest market (km) _____

36. Type of housing/living conditions, _____

Wall	Floor	Roof
1) Wood 2) Mud and cement 3) Cement or stone blocks 4) Other, specify…	1) Mud 2) Cement 3) Others specify……	1) Thatched 2) Mud 3) Corrugated iron/steel 5) Other, specify…..

Part III: Questions to assess maternal health care practices

Q. no	Questions	Response	Remark
37	Have you visited the health facility for the last pregnancy follow up?	1) Yes 2) No	
38	How many times do you have ANC follow up?	1) 4 times 2) <4 times, 3) None	
39	How many times do you have PNC follow up?	1) < 3 times 2) > =3 times 3) None	
40	Have you ever been vaccinated?	1) Yes 2) No	
41	Which type of vaccination do you get?	1) Vitamin A 2) Iron folate 3) Zinc 4) Deworming, Other… 5) TT	
42	Are you currently using any family planning services?	1) Yes 2) No	
43	If your answer is 1(yes), which method did you use?	1. Pills 2. Injectable 3. Norplant 4. IUCD 5. Condom 6. Breast feeding 7. Others (specify)…….	
44	Distance from health facility to home	< 3 km ≥ 3 km	
45	Did you experience diarrhea in the past two weeks?	1) Yes 2) No	
46	Have you get any type of nutrition education?	1) Yes 2) No	
47	If yes, from where did you get the information?	1) Health workers 2) Health volunteers 3) Media 4) Others…….	

Thank you very much for your response!

Part IV: Seven days food consumption frequency

a) What is the frequency of consumption of the following foodstuff in the household? What are their sources, and do you get enough?

Food groups		Daily	1-3 days/week	Once in a week	Never	Food sources	Enough? Yes=1, No=2
Cereals	Millet						
	Maize						
	Wheat						
	Sorghum						
	Barley						
	Rice						
Tubers	Potato						
	Enset foods						
	Sweet potato						
Legumes	Beans						
	Peas						
	Lentils						
	Ground nuts						
Animal foods	Milk						
	Cheese						
	Yogurt						
	Beef/goat						
	Poultry						
	Eggs						
Beverages	Kineto, tela, keribo, borde						
	fruit juice						
Vegetables	Cabbage						
	Spinach						
	Tomatoes						
	Kosta, selada						
Fruits	Avocado						
	Mango						
	Pineapples						
Oils/fats	oil, fat, butter						

Part V: Questions to assess mother's (24 hours recall) dietary consumption pattern

b) **Instruction:** Ask the lactating mother to recalls all the foods and beverages consumed during the previous 24 hours recall, whether at home or outside the home. Underline the corresponding foods in the list under the appropriate food group and write "1" in the column next to the food group if at least one food in this group has been underlined. Once the recall is finished, probe for food groups where no food was underlined.

Q.no	Food groups	Response, Yes = 1 No = 0
1	**All starchy staples:** white potatoes, yams, enset, manioc, cassava or any other foods made from roots or tubers , bread, kita, kocho, porridge, injera, spaghetti, kolo, or any other foods made from maize, millet, wheat, teff, barely, oat, sorghum, rice	
2	**All legumes and nuts:** beans, peas, lentils, nuts, any other foods made from these group	
3	**All diary:** milk or other milk products, cheese, yogurt	
4	**Any organ meat:** Liver, kidney, heart or other organ meats or blood-based foods	
5	**Any eggs**	
6	**Flesh foods** and other miscellaneous small animal protein: any beef, lamb, goat, chicken, or other birds	
7	**Vitamin-A rich dark green leafy vegetables**: cabbage, lettuce, spinach	
8	**Other vitamin A-rich vegetables and fruits[c]:** pumpkin, carrot, or sweet potato, red sweet pepper, lemon, avocado, mango, papaya or banana and 100% fruit juice made from these sources	
9	**Other fruits and vegetables:** wild fruits and 100% fruit juice made from these, tomato, onion and other locally available vegetables	

Thank you very much for your response!

Part VI: Lactating mothers' anthropometric measurement list format

No	Name of respondent	Sex	Age of mother	Weight in (Kg)	Height in (M)	MUAC (cm)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						

Part-VII: Guidelines focus group discussion

Name of village_____ Date _____	Some points to discussion	Remark
Number of discussion members Name: _____ _____ _____ _____ _____	How do you suggest improving maternal nutrition in your community? Especially during pregnancy and lactation. Is there any food which is not eaten during lactation? Do you know what determines nutritional status of lactating mothers? (Demographics, socioeconomic, environmental, feeding practices and other factors are the most to determine maternal nutrition?	

Thank you very much for your response!

Annex-II Questionnaire in Amharic Translation

መጠይቅ

በአንሌሞ ወረዳ፣ሃድያ ዞን፣ ደ/ብ/ብ/ህ/ክ/መ የሚገኙትን የገጠር ቀበሌዎች በ2010 በሚያጠቡ እናቶች ላይ ያሉትን ወሣኝ የሆኑ የኑትርሽን ደረጃ ለመገምገም የተዘጋጀ መጠይቅ ነው።

አማኑኤል ኤራሞ እባላለሁ በአዲስ አበባ ዩኒቨርስቲ የሀገር ልማት ጥናት ኮሌጅ በምግብ ዋስትና ጥናት ማአከል የድህረ-ምረቃ ተማሪ ሲሆን በአሁኑ ጊዜ በአዲስ አበባ ዩኒቨርስቲ በሳይንስ ለሁለተኛ ዲግሪ፣ የሚሆነኝን በምግብ ዋስትናና ሀገር ልማት ላይ የተመሰረተ ጥናት /research/ በማካሄድ ላይ እገኛለሁ። ስለዚህ ይህንን መጠይቅ እንዲመልሱኝ ስለተመረጡ መጠየቁን እንዲሞለኝ በታላቅ ሕትና እየጠየኩ ለሚደረግልኝ ትብብር ሁሉ በቅድሚያ አመሰግናለሁ።

አድራሻ ቀበሌ _____መጠይቁን የሞላ ስም _____ፊርማ_____

መጠይቁን የተሞላበት እለት _____

ክፍል አንድ፡- <u>የተጠያቂዋ ማሕበረ-ሰብአዊ ሁኔታ፡-</u>

መመሪያ፡- <u>አባክዎ ትክክለኛ ምርጫዎ ላይ ያክብቡ ወይም በተሰጠው ባዶ ቦታ ላይ በግልጽ ይሙሉ ፤</u>

1. ዕድሜ ፡- ሀ/_____ ለ/አላውቅም _____
2. ሃይማኖትዎ ምንድ ነው?
   ሀ/ ኦርዶቶዶክስ _____ ለ/ መስሊም _____ ሐ/ ፕሮቴስታንት _____
   መ/ ሌላ ከሆነ ይግለጹ _____
3. ብሄረሰብዎ ምንድነው?
   ሀ/ ሃድያ_____ለ/ ስልጤ _____
   ሐ/ ከምባታ ._____መ/ ሌላ ካለ ይግለጸ _____
4. በአሁኑ ጊዜ ያልዎት የጋብቻ ሁኔታ።
   ሀ/አግብቻለሁ_____ ለ/ ተፋትቻለሁ ._____ ሐ/ ባለቤቴ ሞቶብኛል _____
   መ/ለብቻዬ እኖራለሁ_____
5. ያለገቡ ከሆነ ከማን ጋር ነው የሚኖሩት?
   ሀ/ ለብቻዬ _____ ለ/ከወላጆቼ _____ ሐ/ ከዘመዶቼ _____
   መ/ ሌላ ካለ ይግለጹ_____

6. ያገቡ ከሆነ የባለቤትዎ የትምህርት ደረጃ እንዴ ነው?

ሀ/ አልተማረኩም _____ለ/ 1ኛ ደረጃ ት/ት _____

ሐ/2ኛ ደረጃ ት/ት _____መ/ ከ2ተኛ ደረጃ ት/ት በላይ_____

7. የትምህርት ደረጃ እንዴት ነው ?

ሀ/ አልተማረኩም _____ ለ/ 1ኛ ደረጃ ት/ት _____

ሐ/ 2ኛ ደረጃ ት/ት _____ መ/ ከ2ተኛ ደረጃ ት/ት በላይ_____

8. በአሁኑ ጊዜ ስራዎ ምንድነው?

ሀ/ የቤት እመቤት _____ለ/አርሶአደር _____ሐ/ ነጋዴ _____

መ/የመንግሥት ሰራተኛ_____ ሰ/የግል ሰራተኛ ____

9. የመጨረሻ ልጅዎን የወለዱት የት ነው?

ሀ/ በቤቱ _____ ለ/ በጤና መዕከል_____

10. የመጨረሻ ልጅዎ ከታላቁ ስንት አመት ልዩነት አለው?

ሀ/ የመጀመሪያ ልዴ ነው_____ለ/1-2 ዓመት _____

ሐ/ከሁለት አመት በላይ_____መ/አላውቅም _____

11. ለምን ያህል ጊዜ ነው ልጆዎን ጡት ያጠቡት?

ሀ/ ከ0-6 ወር _____ ለ/ ከ7-12 ወር _____

ሐ/ከ13-18 ወር _____ መ/ ከ19-24 ወር _____

12.ለልጅዎ ከስንት ጊዜ በኋላ ነው ተጨማሪ ምግብ መስጠት የጀመሩት?

ሀ/ 5 ወር _____ ለ/ 6 ወር _____

ሐ/ ከ7-9 ወር _____ መ/ 10 ወር ከሞላው በኋላ _____

13. የቤተሰብዎ ብዛት ስንት ነው? _____

ሀ/1-2_____ ለ/3-5_____ ሐ/6-7_____ መ/8 ወይም ከዚያ በላይ _____

14. ዕድሜያቸው ከ5 አመት በታች የሆኑ ስንት ልጆች አለዎት?

ሀ/1_____ለ/2_____ሐ/3_____ መ/ከ3 በላይ ____ሠ/ የለኝም_____

15. ቤትዎን የሚያስተዳድረው ማነው?

ሀ/ ባል/ወንድ_____ ለ/ ሚስት/ሴት/ _____

16.በቤተሰቦዎ የወር ገቢዎ በወር ስንት ይሆናል?

ሀ/ ከ2000 ብር በላይ _____ ለ/ ከ1000-2000 ብር_____

ሐ/ ከ500-999 ብር_____ መ/ ከ500 ብር በታች _____

17.ለቤ/ተሰዎ ምን ያህል የእርሻ መሬት አለዎት?

ሀ/0-0.5ሄክታ_____ለ/0.51-1 ሄክታር _____

ሐ/1.1-2 ሄክታር_____መ/ከ2ሄክታር በላይ _____

18.ቤተሰብዎ የሚመገበው ምግብ ዋና ምንጩ ከየት ነው?

ሀ/ ራሳችን የምርት ነው _____ ለ/ ከገበያ በምንገዛው _____

ሐ/ በእርዳታ በኩል በምናገኘው እህል _____

መ/ እርሻን ከምናመርተውና ከገበያ በምንሸምተው _____ሰ/ ሌላ ካለ ይግለጹ _____

19. እርዎ በቀን ስንት ጊዜ ይመገባሉ?

ሀ/ 1 ጊዜ _____ ለ/ 2 ጊዜ _____ሐ/ 3 ጊዜ _____መ/ከ3 ጊዜ በላይ ____

ክፍል ሁለት፡- <u>ውሃ፣የጽዳት ሁኔታ እና የአካባቢ ንጽህና አገልግሎት</u>

20. የምትጠጡትን ውኃ በአብዛኛው ከየት ነው የምታገኙት?

1/ ከግል ቧንቧ_____2/ የህዝብ ቦኖ _____3/ ከተጠበቀ ጉድጓድ_____

4/ ካልተጠበቀ ጉድጓድ___5/ ካልተጠበቀ ምንጭ _____6/ ሌላ ካለ ይግለቱ _____

21.ከቤትዎ ውኃ ለመቅዳት ምን ያህል ይጓዛሉ?

1/ ከ0-15 ደቂቃ፣ከ0-2 ኪ..ሜ 2/ ከ16-30 ደቂቃ፣ከ2-5 ኪ..ሜ

3/ከ31-60 ደቂቃ፣6-8 ኪ..ሜ 4/ከ1 ሰዓት በላይ እና ከ8 ኪ..ሜ በላይ

22. ከሚጠጣ ውኃና ንጽህናን በተመለከተ የሚደረግ ነገር ያውቃሉ??

1/ አዎ 2/ አላውቅም

23. ለጥያቄ ቁጥር 22 መልስዎ "አዎ" ከሆነ፣ምን ያደርጋሉ?

1/ ማፍላት 2/ ማፍለትና ማጥለል 3/ መዝቀጥ 4/ ሌላ ካለ ይግለጹ .....

24.የምትጠጡበት ውኃ አመት ሙሉ ይዘልቃል?

1/አዎ 2/ አይዘልቅም

25.የምትጠጡበት ውሃ አመቱን የማይዘልቅ ከሆነ ከየት ያገኛሉ?

1/ ርቀት በመሄድ 2/ ከከተማ በመግዛት 3/ሌላ ካለ ይገለጽ_____

26.በአብዛኛው ውኃ ለመቅዳት ኃላፊነት የሚወስደው ማን ነው?

1/ ሴቶች 2/ ወንዶች 3/ ተቀጣሪ ሰራተኛ 4/ ሌላ ካለ ይግለጹ_____

27.ለቤተሰብዎ የሚሆን መጸዳጃ ቤት አልዎት?

1/ አዎ 2/ የለኝም

28.ለጥያቄ ቁጥር 27 መልስዎ "አዎ" ከሆነ ምን አይነት መጸዳጃ ነው ያልዎት?

1/ ባህላዊ ጉድጓድ 2/ ባህላዊ ጉድጓድ ከነመክደኛው 3/ ውኃ የሚፈስ መጸዳጃ 4/መስተንፈሻ ያለው የተደላደለ ጉድጓድ

29.አሁንም ለጥያቄ ቁጥር "27" መልስዎ የለኝም ከሆነ የት ይጠቀማሉ?

1/ የጐረቤት 2/ የሕዝብ 3/ ጫካ 4/ ሌላ ካለ ይግለጹ _____

30.የቤትዎ ቆሻሻ የሚጥሉት /የሚያፈሱት የት ነው?

1/ በኮምፓስት ጉድጓድ 2/ ቆሻሻ መጣያ ቦታ 3/ በማቀጠል አስወግዳለሁ 4/ በጓሮ አትክልት ቦታ 5/ የትም እጥላለሁ 6/ ሌላ ካለ ይግለጹ_____

31.የተሻሻለ የሃይል አማራጭ የሚያገኙበት ዕድል አለዎት?

1/ አዎ 2/ የለኝም

32.የጥያቄ ቁጥር 31 መልስ "አዎ" ከሆነ ምን አይነት አማራጭ ኃይል ነው?

1/ የፀሐይ ኃይል/ሶላር/ 2/ የተሻሻሉ ምድጃ 3/ ባዮጋዝ 4/ ሌላ ካለ ይግለጹ

33.በቤትዎ ምግብ ለማብሰል የሚጠቀሙበት በዋናነት ከምን ነው?

1/ ከማገዶ እንደጨት 2/ ከሰል 3/ ነዳጅ/ጋዝ/ 4/ የደረቁ ቅጠሎች 5/ ሌላ ካለ ይግለጹ

34.በቤትዎ ዋና የመብራት ምንጭ ምንድ ነው?

1/ ኩራዝ 2/ የፀሐይ መብራት 3/ እሳት 4/ ሌላ ካለ ይግለጹ _____

35. ከቤትዎ በጣም ቅርብ የሆነ የገበያ ቦታ ያለው ርቀት በኪ..ሜ_____

36. **የመኖሪያ ቤት ሁኔታ**

ግድግዳ	ወለል	ጣሪያ
1/ እንጨት	1/ ጥቃ/ፈፋር	1/ በሳር የተከፈነ
2/ ብሎኬት	1. ሲሚንቶ	2. በቆርቆሮ የተሸፈነ
3. ሌላ ካለ	2. ሌላ ካለ	3. ሌላ ካለ

ክፍል ሶስት- የእናቶች ጤና ክትትል ጥያቄዎችን በተመለከተ፤

ተ/ቁ	ጥያቄዎች	ምላሽ
37	የመጨረሻው እርግዝና ወቅት የጤና ክትትል ሄደው ያውቃሉ	1/አዎ 2/ አይደለም
38	የቅድመ ወሊድ/የእርግዝና ወቅት/ክትትል	1/ 4 ጊዜ 2/ ከ4 ጊዜ ምያንስ 3/ የለም
39	ድህረ ወሊድ/ከወለዱ በኋላ/ክትትል	1/ከ3 ጊዜ የሚያንስ 2/ ከ3 ጊዜ የሚበልጥ 3/ የለም
40	የትኛውንም ክትባት ወስደው ያውቃሉ?	1/አዎ 2/ አይደለም
41.	ጥያቄ ቁጥር 40 አዎ አከሆነ የትኛውን ክትባት ወይም ሰኘልመንት ወስደው ያውቃሉ?	1. ቪታሚኒ ኤ 2. አይረን ፎሌት 3. ዚንክ 4. ዲወርሚንግ ታብሌት 5. ቴታነስ መርፌ
42	የቤተሰብ ምጣኔ አገልግሎት ይጠቀማሉ?	1/አዎ 2/ አይደለም
43	ጥያቄ ቁጥር 42/አዎ/ ከሆነ የትኛውን ?	1/ፒሊስ 2/ መርፌ 3/ኖርፕላንት 4/አይዩሲዲ /ሉኘ/ 5/ኮንዶም 6. ጡት ማጥባት
44	ከቤትዎ እስከ ጤናዎ አገልግሎት ያለው ርቀት	1. ከ3 ኪ/ሜትር ያንሳል 2. ከ3 ኪ/ሜትር ይበልጣል
45	ባለፈው ሁለት ሳምንት ውስጥ ተቅማጥ ነበረቦት	1. አዎ 2. የለም
46	ስለኒውትሪሽን /ስነ ምግብ/ ትምህርት ግንዛቤ አለዎት	1. አዎ 2. የለም
47	ጥያቄ ቁጥር 46 አዎ ከሆነ መረጃውን ከየት ያገኛሉ	1.ከጤና ባለሙያ 2. ከጤና በጎ መልክተኛ 3. ከሚዲያ

ክፍል አራት፡ <u>የሰባት ቀናት የምግብ አወሳሰድ ድድግሞሽ ለቤተሰቧ</u>

የምግብጉርፕ/ክፍል/	በየቀኑ	1-3ቀን/በሳምንት/	በሳምንት አንዴ	በፍፁም	የምግብ መጠን 1. አዎ 2. አይዳለም
ጥራጥሬ ፣ ቦቆሎ፣ ስንዴ፣ ማሽላ፣ ገብስ፣ ሩዝ					
ስራ ስር፣ ድንች፣ እንሰት፣ ስኳር ድንች ሌሎች					
ሊጉመስ ጥራጥሬ፣ ባቄላ፣ አተር፣ ምስር፣ ሽንቡራ					
የእንሰሳት ተዋጽኦ ምግቦች፣ ወተት፣ አይብ፣ እርጐ፣ የበሬ ወይም የፍየል ስጋ፣ የዶሮ ስጋ፣ እንቁላል					
ከመጠጦች፣ ጠላ፣ ጠጅ፣ ኬኔቶ፣ ፍራፍሬ ጭማቂ					
አታክልቶች፣ ጐመን፣ የሀበሻ ጐመን፣ ቲማቲም፣ ቆስጣ/ሰላጣ					
ፍራፍሬዎች አቮካዶ፣ ማንጐ፣ አናናስ፣ ሌሎችም					
የቅባት ምግቦች፣ ዘይት፣ ጮማ፣ ቅቤ					

ክፍል አምስት፡ <u>/የ24 ሰዓት ምግብ ትውስታ/</u>

ሀ/መመሪያ፡ በ24ሰዓት ውስጥ የተመገቡትን የምግብ አይነት ክትላንትና ማታ ጀምሮ እንዲያስታውሱና ያስመዘግቡ/ በቤትም ሆነ ከቤት ውጭ/ በዝርዝር ውስጥ ያለውን በመስመር ያሳውቁ፡፡

ተ.ቁ.	የምግብ ክፍል	መልስ አዎ 1 አይደለም 0
1.	ኃይል ሰጪ የምግቦች ክፍል ነጭ ድንች የእንሰት ምግቦት ጎደፌ፣ ስኳር ድንች፣ ሌሎች የስር ተክል፣ ዳቦ፣ ቂጣ፣ ገንፎ፣ እንጀራ፣ ፖስታ፣ ቆሎ፣ በቆሎ ስንዴ፣ ጤፍ ማሽላ ሩዝ	
2	ሊጉመስና ለውዝ ምግቦች ባቄላ፣ አተር ምስር ሌላ ተመሳሳይነት ያለው ጥራጥሬዎች	
3	የእንሰሳት ተዋጽኦ አይብ ወተት፣ እርጐ	
4	ሌሎች የስጋ ክፍል ጉበት ኩላሊት ሌሎች የመሳሰሉት	
5	የእንቁላል አይነቶች	
6	ጥሬ ስጋ አይነት ኘሮቲን በሬ ስጋ፣ የበግ ስጋ፣ የፍየል ስጋ፣ የዶሮ ስጋ	
7	በቫይታሚን ኤ የበለፀጉ አረንጓዴ ቅጠላቅጠል ጐመን፣ ሰላጣ	
8	ሌሎች ቫይታሚን ኤ አታክልቶች እና ፍራፍሬዎች ካሮት ስኳር ድንች፣ ቃሪያ፣ ለሚ አቮካዶ፣ ማንጎ፣ ፖፖያ፣ ሙዝ እና ሌሎች የፍራፍሬዎች ጭማቂ	
9	የተለያዩ ፍራፍሬዎች እና አታክልቶች ሽንኩርት ቲማቲም ሌሎች የእንጆሪ ጭማቂ	

ክፍል- ስድስት፡- የአጥቢ እናት

ተ.ቁ	ሙሉ ስም	ፆታ	ዕድሜ	ክብደት(ኪሎ ግራም)	ቁመት /ሜትር/	ክንድ (MUAC)(ሴ.ሜ)
1						
2						
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4						
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ክፍል ሰባት፡-የአጥቢ እናቶች ስነ ምግብ ሁኔታ ወይም ኒውቴሪሽን የሚወስኑ ወሳኝ ነገሮች ላይ ከሚመለከታቸው አባላት ጋር የሚደረግ ውይይት ቅጽ፣

የአካባቢ _____ ቀን	የመወያያ ርዕሶች	ምርመራ
የአባላት ብዛት _____ _____ _____ _____ _____	የእናቶች ስነ ምግብ ሁኔታ በአካባቢው እንዴት ነው? የአጥቢ እናቶች ስነ ምግብን የሚጎዱ ወሳኝ ነገሮች የትኞቹናቸው? ሶሻልሊ፣ ኢኮኖሚካላይ	

አመሰግናለሁ!

Body Mass Index categories of lactating mothers in Anlemo woreda, 2018

BMI categories	Frequency (%)
Undernourished/underweight (< 18.5kg/m2)	66(24.8)
Normal (18.5-24.99kg/m2)	138(51.9)
Overweight (25.0-29.99kg/m2)	54(20.3)
Obese (>=30.0kg/m2)	8(3.0)
MUAC < 21cm	28(10.5)
MUAC >=21cm	238(89.5)

BMI= Body Mass Index, MUAC= Mid Upper Arm Circumference SD= Standard Deviation

Annex-II: Table of multivariate logistic regression analysis

Parameter Estimates

nutritional status by BMI2[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
not underweight	Intercept	-.991	1.493	.441	1	.507			
	[EDUCSM=1]	.338	.808	.175	1	.676	1.402	.288	6.828
	[EDUCSM=2]	1.795	.902	3.961	1	.047	6.020	1.028	35.266
	[EDUCSM=3]	.950	.925	1.054	1	.305	2.585	.422	15.845
	[EDUCSM=4]	0[b]	.	.	0	.	.	.	.
	[BRTFEEDU=1]	.689	.843	.667	1	.414	1.991	.381	10.396
	[BRTFEEDU=2]	.932	.797	1.369	1	.242	2.540	.533	12.107
	[BRTFEEDU=3]	.246	.823	.089	1	.765	1.279	.255	6.417
	[BRTFEEDU=4]	0[b]	.	.	0	.	.	.	.
	[FAMLYSZ=1]	-.126	.844	.022	1	.882	.882	.169	4.611
	[FAMLYSZ=2]	-.144	.619	.054	1	.816	.866	.258	2.911
	[FAMLYSZ=3]	.090	.623	.021	1	.885	1.094	.323	3.710
	[FAMLYSZ=4]	0[b]	.	.	0	.	.	.	.
	[MOINCOME=1.00]	2.113	.983	4.618	1	.032	8.274	1.204	56.847
	[MOINCOME=2.00]	.527	.597	.782	1	.377	1.695	.526	5.457
	[MOINCOME=3.00]	.785	.503	2.435	1	.119	2.192	.818	5.875
	[MOINCOME=4.00]	0[b]	.	.	0	.	.	.	.
	[SFOODHH=1]	-.039	.499	.006	1	.937	.962	.361	2.559
	[SFOODHH=2]	.960	.586	2.686	1	.101	2.613	.829	8.238
	[SFOODHH=4]	0[b]	.	.	0	.	.	.	.
	[NMEALM=2]	-2.027	.518	15.305	1	.000	.132	.048	.364
	[NMEALM=3]	0[b]	.	.	0	.	.	.	.
	[ATANCFUP=1]	2.568	1.026	6.267	1	.012	13.039	1.746	97.363
	[ATANCFUP=2]	.832	.914	.828	1	.363	2.297	.383	13.788
	[ATANCFUP=3]	0[b]	.	.	0	.	.	.	.
	[DIARRHEA=1]	-1.259	.559	5.070	1	.124	.284	.095	.850
	[DIARRHEA=2]	0[b]	.	.	0	.	.	.	.

a. The reference category is: underweight.

b. This parameter is set to zero because it is redundant.

EDUCSM= Educational status of mother, BRTFEEDU= Breastfeeding duration, FAMLYSZ= Family Size, MOINCOME= Monthly income, SFOODHH= Source of food for households, NMEALM=Number of meal, ATANCFUP= ANC follow up, DIARRHEA=Presence of diarrhea and B=Beta (β)