COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR FOOD SECURITY STUDIES

PREVALENCE OF UNDERNUTRITION AND ASSOCIATED FACTORS AMONG CHILDREN AGED 6-59 MONTHS IN BISHOFTU TOWN, ETHIOPIA

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November, 2019

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A THSIS SUBMITTED TO CENTER FOR FOOD SECURITY STUDIES, COLLEGE OF DEVELOPMENT STUDIES ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN FOOD SECURITY AND DEVELOPMENT STUDIES

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DECLARATION

This Thesis is my original work and has not been presented for a degree of master in any other University and that all sources and materials used for the thesis have been duly acknowledged.

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This is to certify that the thesis prepared by Melaku Abebaw Getahun entitled: "Prevalence of Under nutrition and Associated Factors Among Children of Aged 6-59 Months in Bishoftu *town, Ethiopia"* and submitted in partial fulfilment of the requirements for the Degree of Master of Science in Food Security complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Chairperson of the Centre or Graduate Program Coordinator

Dedication

In loving memory of my beloved mother: W/ro Zewde Mekonen Alemu.

Acknowledgment

First of all, the praise is due to God the lord of the globe, the all-knowing, who thought man with the use of the pen and thought man what he knew not. I would like to express my deepest gratitude to my principal advisor Dr. Abebe Haile (Ph.D.), for all his motivation, suggestions, valuable advice, and cooperation during preparation, data collection and writing of this my thesis.

Secondly, I want to express my deepest appreciate to office colleagues and my dearest friends Assefa Belay, Danieal Kidane, Fikirte Sisay, Yohannes Mewcha and Habtamu Ayele who had given their assistance and support without having to be asking when I needed the most. Thank you for being there for me, for being patient and understanding and for thinking of me. Your friendships had helped me through the most difficult time I had to face here. I understand that I'm very lucky to have friends like you both. I would also like to thank other friends at the graduate school for all the constrictive discussion we have had. Knowing that we were all in the same boat had lifted my spirits when they were down.

There were a number of people and organization who given their assistance and cooperation during my research data collection. To all of them are my gratitude sent. I want to thank all the data collectors and respondents who had spared their valuable time to take part in my research. And I also tank Bishoftu Town Administrative Health Office and their staff to support during data collection

Finally, I would like thank to my everything brothers and sisters Yetatework Mekonen, Rakeb Abebaw, Solomon Dejene, Nega W/gebreal and Zelalem Abebaw for their encouragement and financial assistance during my thesis work. My apologies to other people I have forgotten to acknowledge in here, thanks you for all your contribution in the course of my study life.

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Abbreviation/Acronyms

AAU: Addis Ababa University

ARI: Acute Respiratory Infection

BMI: Body Mass Index

CSA: Ethiopian Central Statistical Authority

DHHS: Department of Health and Human Service

EBF: Exclusive Breast Feeding

EMA: Ethiopian Mapping Agency

EPI: Expanded program on Immunization

FAO: Food and Agricultural Organization

FDRE: Federal Democratic Republic of Ethiopia

FGD/s Focus Group Discussion/s

GTP: Growth and Transformation Plan

HC: Health Centre

HE: Health Education

HEW: Health Extension Worker

HP: Health Post

HH: Household

MUAC: Mid Upper Arm Circumference

ONRS: Oromia National Regional State

OPD: Out Patent Department

PHC: Primary Health Care

UNICEF: United Nations International Children Emergency Fund

USAID: United States Agency for International Development

USD: United States Dollar

WAZ Weight for Age Z-score

WHZ Weight for Height Z-score

WHO: World Health Organization

Abstract

Under nutrition is decreasing during the two-decade but still a major public health problem in the world especially in developing countries including Ethiopia. In Ethiopia child under nutrition is one of the most serious public health problems. Also in Oromia region prevalence of child under nutrition is serious public health problem. As discussed above, Bishoftu town is vulnerable to under nutrition and there is a common case of under-five under nutrition in study area. The study was assess the prevalence of under nutrition and associated factors among children of aged 6-59 months in kebele 01, 03, 05, and 07 Bishoftu Town, Oromia region. Cross-sectional design was employed in the existing randomly selected kebeles. The sample size was determined by using single population proportion formula then adjusted by finite population correction factor to draw the final 410 sample children and then allocated proportionally to each kebeles in the town. Then the households were selected using simple random sampling. If there is more than one child in the selected household only one child was considered randomly. Structured questionnaire was used to gather information on the demographic, socio-economic, and maternal and child caring practice, as well as nutritional practice of family for children's. While anthropometric measurement was used to collect height, weight and mid-upper arm circumference *following the standard measurement tools and procedures. Information was entered into Epi-Data version 3.1 and anthropometric measurements were converted into Z scores by WHO Anthro version 3.2.2., 2011 software. Then exported to STATA version 13 and analysed using descriptive statistics and inferential statistics. The result revealed that the prevalence of overall under nutrition was (34.4%) Specifically, severely stunting was (6.9%), stunting (13.8), underweight (2.2%) and wasting (11.2%). Bivariate and multivariate logistic regression model was employed to analyse prevalence of child under nutrition. The result of multivariate model revealed that family size, birth interval, child age and frequency of breast feeding as significant determinants for wasting. While for stunting, family size, level of mother's education, birth interval, currently breast feeding, exclusive breast feeding and monthly income were found as statistically significant ($p<0.05$) determinants of child under nutrition. Additionally, age of child and household who hadn't got advice and visited by health extension workers were more than five as likely to be underweight compared to those who are not frequently advised or visited were found statistically significant determinants of underweight. Thus, need continues training, awareness creation activities, special attention for family planning, child and maternal healthcare services by Bishoftu town Health Office and other practitioners. Besides, Bishoftu town Finance and Development Office should be made efforts to households engage in different income generating activities to improve child nutrition.*

***Keywords**: Associated, MUAC, Prevalence, Under Nutrition, Under-five, Weight for Age Z-score. Weight-for-age z-score,*

CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Under nutrition is decreasing during the two-decade but still in a major public health problem in the world especially in developing countries including Ethiopia. Stunning and wasting rates are dropping but 159 million children around the world are still affected, respectively (WHO, 2015). Malnutrition remains one of the most common causes of morbidity and mortality among children throughout the world. It has been responsible, directly or indirectly for 60% of the 10.9 million deaths annually among children under-five and two-thirds of these deaths are often associated with inappropriate feeding practices (WHO, 2016).

Globally an estimated 101 million children below five years of age are underweight. These accounted for 16% of children below five years of age. The prevalence of under nutrition was the highest which was 33%, followed by Sub-Saharan Africa, which was 21%. There were 59 million in South Asia, while 30 million were in sub-Saharan Africa (Deonis *et al.,* 2012). Under nutrition is the major public health problem especially in under-five children stills a devastating problem in developing countries, especially in sub-Saharan Africa, including Ethiopia (Joosten *et al.,* 2008).Under-five malnutrition is an indicator of one's countries health status as well as economic conditions (Rayhan, and Hayat, 2006).

Nearly half of under-five death is attributable to malnutrition. Malnutrition puts children at greater risk of dying from common infections and results in increased infection and delayed recovery. Poor nutrition in the first 100 days of a child's life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance (UNICEF, 2016). About one-third of deaths among children below five years of age were attributed to under nutrition and it can lead children to be at greater risk of death and severe illness due to common childhood infections such as pneumonia, diarrhoea, malaria, human immune deficiency virus, or AIDS and measles (UNICEF, 2013).

Child malnutrition affects academic performance and physical and mental development throughout their lives (Mandefro *et al.,* 2015). Malnutrition among children is a critical problem because its effects are long lasting and go beyond childhood. It has both short and long term consequences (Glewwe *et al.,* 2007). Malnutrition is attributed to one third of under-five death, in the first five years of life which is preventable by economic growth (Mandefro *et al.,* 2015). Stunting, wasting, and underweight are among those anthropometric indicators which are commonly used to measure malnutrition of under five children. Underweight, low weight-for-age reflects both low height-for-age

and low weight-for-age and therefore reflects both cumulative and acute exposures of malnutrition. Ethiopia has a high prevalence of Acute and chronic malnutrition with almost half of Ethiopian children chronically malnourished and one-in-ten children wasted. About 47% of children under-five are stunted, 11% are wasted and 38% are underweight (Adeba, 2014).

1.2 Statement of the problem

Under nutrition remains one of the most common causes of morbidity and mortality among children under five children throughout the World (UNICEF, 2005). In Ethiopia, the levels of under nutrition are not decrease significantly. The EDHS (2016), Report showed that stunting was 58% in 2000, 51% in 2005, and 44% in 2011, 51% in 2016. This report also showed that wasting was 12% from 2000 to 2005 and 10% in 2011, 12% in 2016. The third predictor is underweight, which was 41% in 2000, 33% in 2005, and 29% in 2011, 33% in 2016. Even though the government health sector developments plan with targeted supplementary food and transitioning of enhanced outreach strategy into the health extension program, health facility nutrition services, community based nutrition and micronutrient interventions and essential nutrition actions integrated infant and young feeding counselling services continues to improve the nutritional status of mothers and children through different programs but under nutrition among children is still a common problem in Ethiopia (Zewdi and Degenet, 2013).

In Oromia Regional State the number of children under chronic malnutrition were 36.5%, severely stunted accounts to 17%, the percentage of underweight children (wasted) or under state of acute malnutrition were 10.6%; and 3.5% of them were severely wasted (EDHS, 2016). Prevalence of malnutrition in Sebeta, Oromia, Ethiopia was identified. Thus, 46% children were malnourished and 10.9% were severely malnourished. More specifically 22.6%, 16.1% and 7.4% children were stunted underweight and wasted, respectively. Though 6.1%, 3% and 1.7% children were severely stunted, severely underweight and severely wasted, respectively (Abebe and Tigest, 2018). For that matter, under nutrition is at a standstill difficulty level and a major concern in Ethiopia in general and the research area in particular; no study was conducted before about under nutrition status and related factors amongst 6-59 months' children; and various associated factors were not clearly identified in the study area. Therefore, this study is aimed to determine factors associated with the nutritional status of the children 6-59 months in the study area. In Oromia region prevalence of child under nutrition is one of the most serious public health problems. As discussed above, Bishoftu town is vulnerable to under nutrition and there is a common case of under nutrition in Bishoftu Hospital under-five OPD. In *Bishoftu* town, because of under nutrition, many under five children became underweight, wasted and stunted because of socioeconomic, demographic, child caring practice and personal factors.

Despite the fact that under nutrition is one of the major public problems in Bishoftu town, limited information is available on prevalence of under nutrition and associated factors in Bishoftu town. Besides, the high percentage of death under nutrition rate in the town is alarming which needs further study to describe the intervention and to assess the factors contributing to problem. The study therefore, is aimed at describing the prevalence of under nutrition children of age less than five years and identifies factors contributing to under nutrition. It was also intended to forward doable recommendations to local government institutions and policy makers on the way to improve intervention overcome children under nutrition.

1.2. Objectives of the study

1.2.1. General objective

The aim of this study was to assess the prevalence of under nutrition and associated factors among children of aged 6-59 months in Bishoftu, 2018/9.

1.2.2. Specific objectives

The specific objectives of this study were to:

- Assess the status of under nutrition and the prevalence of stunting, wasting and underweight among children of aged 6-59 months in Bishoftu town.
- Identify factors associated with under nutrition n among children of aged 6-59 months in Bishoftu town.

1.3. Research questions

This research intended to answer the following basic questions which are derivatives of the abovementioned research objectives:

1. What is the magnitude of occurrence under nutrition on children of aged 6-59 months in Bishoftu?
2. What are the underlying causes that are associated with under nutrition on the children of aged 6-59 months in *Bishoftu*?
3. What are the major possible solutions to eradicate under nutrition in children of aged 6-59 months in Bishoftu?

1.4. Scope and limitation of the study

The study was conducted focusing on nutritional status among children age 6-59 months indicated by stunting, wasting and underweight, and their determining factors was studied. Those determining

factors considered in this study were demographic only includes sex and age of child, sex of household head, child birth order, number of under-five children in the household and household size; socioeconomic factors take into account only maternal education, monthly household income, mothers main occupation. While child caring practice considers mothers depletion of colostrum's, exclusive breastfeeding, current breastfeeding practice, duration of breastfeeding, introduction to complementary feeding ,vaccination and incidence of diseases in last two weeks before study. And personal factors of mothers or caregiver take in to account only awareness, information or exposure to mass media and number of visit by health extension worker.

Maternal health, parental DNA and other health related issue of the parent are not concern of this study. Also, environmental factors hygiene and sanitation practices, other biophysical like rain fall, vegetation and so on are not concern of this study. Additional under nutrition status of children resulted from nutrient deficiency such as iodine, iron and vitamin A deficiency not included in the study. This study faced time and budget constraints.

1.5. Significance of the study

This study has both methodological, and policy significance as well as significance for the study area. Methodologically, it examines the determining factors of child under nutrition among households in Bishoftu town which can be useful input for other researchers who are interested in the area. Policy wise, in a country, the cause of under nutrition was complex and a lot of children suffering with such problem identifying factors that associated with child under nutrition help out and create valuable input for formulation of relevant policy which target human development policies as well as programs to intervene. For study area, firstly the region health office documents the information and results obtained through this study and make available for who need it inmost. Secondly helps them to give attention for Bishoftu towns regarding provision and accessibility of health care service. Finally helps as preliminary point for nutrition assessment and identify for intervention.

1.6. Operational definitions of terms

Malnutrition: is a broad term commonly used as an alternative to under nutrition, but technically it also refers to overweight and obesity. People are malnourished if their diet does not provide adequate calories and protein for growth and maintenance, or if they are unable to fully utilize the food they eat due to illness (under nutrition). They are also malnourished if they consume too many calories compared to how many they expend. Good nutrition is when the right balances of nutrients enters, leave and are absorbed by the body. In this study the term Malnutrition is used to refer under nutrition (UNICEF, 2006 cited by Save the Children, 2016). Under nutrition refers the outcome of insufficient food intake and repeated infectious diseases. It includes being underweight for one's age,

too short for one's age (stunted), dangerously thin for one's height (wasted), and deficient in vitamins and minerals (micronutrient malnutrition). This study will focus only on the stunting, underweight and wasting (UNICEF, 2006 cited by Save the Children, 2016).

Stunting: refers to a child who is too short for his or her age. Stunting is a result of inadequate growth of the fetus and child and results in a failure to achieve expected height compared to a healthy, well-nourished child of the same age. It is a cumulative indicator of growth failure and a marker of chronic insufficient protein and energy intake, frequent infection, sustained in appropriate feeding practices, and impaired brain development (Black *et al*., 2013; UNICEF, 2013). It is the failure to grow both physically and cognitively and the effects of stunting often last a lifetime (UNICEF, WHO, World Bank, 2015, cited by Save the Children, 2016).

Wasting: refers to a child who is too thin for his or her height. Wasting is the result of sudden or acute malnutrition, where the child is not getting enough calories from food and faces an immediate risk of death (UNICEF, WHO, World Bank, 2015, cited by Save the Children, 2016).

Underweight: denotes Weight-for-age Z-score below -2SD from the median of WHO reference population (WHO, 2009).

Anthropometry: is the study of the measurements and proportions of the human body. In nutrition, anthropometry is the measurement of weight and height to estimate indices that are used to diagnose stunting, underweight, and wasting (Liz et al., 2014). These indices were based on Z-score below-2 standard deviations of the WHO median reference for height-for-age, weight-for-age and weight-for-height are defined as stunted, underweight and wasted respectively (WHO, 2009).

1.7. Organization of the paper

The study is organized into five sections. The first section is the introduction section which consists of the background of the study, statement of the problem, the objective of the study, significance, scope, limitation and ethical consideration of the study. The second section covers the concept and relevant literature review of both theoretical and emphatically literature and incorporates conceptual frameworks. The third section of the study describes the research methods and materials. It includes a study area, research design, sampling techniques, sample size, source of data and analysis methods. The fourth section presents the result and discussion. Finally, the last section presents some conclusion and recommendation were presented.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

In order to develop a better understanding of the research objective, a comprehensive literature review has been conducted focusing on identifying the prevalence of under nutrition and associated factors among children aged 6-59 months its effects and on the way how to manage these practices, control and administrate it.

2.1 Under nutrition concept

Nutrition: the word nutrition first appeared in 1551 and comes from the Latin word nutrire, meaning "to nourish." Today, we define nutrition as the sum of all processes involved in how organisms obtain nutrients, metabolize them, and use them to support all of life's processes (Maureen and Beth, 2006). According to Beauman *et al.,* (2005). nutrition is the provision of adequate energy and nutrients (in terms of amount, mix, and timelines) to the cell for them to perform their psychological function of growth, reproduction, defence, repaired. Good nutrition can help prevent disease and promote health. There are six categories of nutrients that are the body needs to acquire from food: protein, carbohydrate, fat, fibber, vitamins and minerals. Eastwood (2003), defined nutrition as the intake of food, considered in relation to the body's dietary needs. Good nutrition – an adequate, well balanced diet combined with regular physical activity – is a cornerstone of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity.

A scientist like Smith and Haddad (2000), Delineates nutrition seeing that a science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism, and excretion. From the above definitions it can be said that nutrition is one of the most vital inputs to child survival and early development. Damage in early childhood can have deleterious long-term effects on an individual's well-being and that of the next generation. Good nutrition is an important part of leading a healthy lifestyle. Combined with physical activity, your diet can help you to reach and maintain a healthy weight, reduce your risk of chronic diseases (like heart disease and cancer), and promote your overall health. A healthy diet throughout life promotes healthy pregnancy outcomes, supports normal growth, development and ageing, helps to maintain a healthy body weight, and reduces the risk of chronic disease leading to overall health and well-being. Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development, Economic growth and human development require well-nourished populations who can learn new skills, think critically and contribute to their communities.

Different scholars, in different area; define malnutrition as pathological condition of varying degree of severity, and diverse clinical manifestation, resulting from the deficient assimilation of the components of the nutritional complexes (Gomez, 1995). Similarly; Malnutrition is a condition that results from eating a diet in which one or more nutrients are either not enough or are too much such that the diet causes health problems. It may involve calories, protein, carbohydrates, vitamins or minerals. Not enough nutrients are called under nutrition or undernourishment while too much is called over nutrition. Malnutrition is defined as acute or chronic state of nutrition in which a combination of varying degrees of excess or deficiency of nutrients, imbalance of energy and inflammatory activity led to a change in body composition, impairment in function and clinical outcome (Sauer *et al*., 2012). Malnutrition refers to deficiencies, excesses or imbalance intake of energy and nutrient. The term malnutrition covers two broad groups of conditions according to WHO (2014), Malnutrition or undesirable physical or disease condition related to nutrition can be caused by eating too little, too much or unbalanced diet that does not contain all nutrients necessary for good nutritional status.

Concern's Supplementary Feeding Program (SFP) training manual (SFP, 2009) define malnutrition as a nutritional disorder or condition resulting from inadequate nutrition/diet. Compare and contrasting different views and definitions, the researcher used (EFMOH, 2007). Definition: a long term year round phenomenon due to chronic inadequacies in food instance combined with high levels of illness" for this particular study. According to Aberash (2014), Added that malnutrition or undesirable physical or disease condition related to nutrition can be caused by eating too little, too much or unbalanced diet that does not contain all nutrients necessary for good nutritional status. Malnutrition in this study is often used to specifically refer to under nutrition where an individual is not getting enough calories, protein, or micronutrients. According to Olaniyan and Okemakinde, (2008) declared that if under nutrition occurs during pregnancy, or before two years of age, it may result in permanent problems with physical and mental development. Extreme undernourishment, known as starvation, may have symptoms that include: a short height, thin body, very poor energy levels, and swollen legs and abdomen. People also often get infections and are frequently cold. The symptoms of micronutrient deficiencies depend on the micronutrient that is lacking. Malnutrition results from a poor diet or a lack of food. It happens when the intake of nutrients or energy is too high, too low, or poorly balanced. According to Andolfatt *et al.,* (2000), Poor diet may lead to a lack of vitamins, minerals, and other essential substances. Too little protein can lead to kwashiorkor, symptoms of which include a distended abdomen. A lack of vitamin C can result in scurvy. Malnutrition during childhood can lead not only to long-term health problems but also to educational challenges and limited work opportunities in the future. Malnourished children often have smaller

babies when they grow up. Malnutrition is a silent killer that is underreported, under addressed, and as a result under prioritized. Every hour and minute of every day, 300 and 5 children die due to malnutrition respectively. In the world today, one child in four is stunted because of malnutrition, and in underdeveloped countries this figure is as high as one in three and specifically in Africa two out of five children will suffer from malnutrition.

Under nutrition: Individuals need adequate amount of a variety of quality, safe food to be healthy and well nourished. Under nutrition, can results from an insufficient intake or an improper balance of protein, energy, and micronutrients. Nutritional consequences of insufficient food or under nutrition include protein. According to Aberash (2014), under nutrition is lack of proper nutrition caused by not having enough nutrients to eat**.** Inadequate intake or absence of nutrient it can cause several problems which includes: low weight for age (stunting), low weight for height (wasting) and low weight age (underweight) and micronutrient deficiencies or insufficiencies of important vitamins and minerals. Under nutrition in a child is seen when the child is unable to obtain sufficient food to meet its nutritional needs. Children rely on nutrients to facilitate their development and up until the age of five they are especially vulnerable, which is why this age is often used as a cut-off point, also in this paper (UNICEF, 2009). When a child is suffering from under nutrition it lacks both macro- and micronutrients, which exhibits different manifestations. The child can suffer from acute under nutrition, wasting, chronic under nutrition, stunting, or both. To distinguish between acute and chronic under nutrition the measurements weight-for- height (W/H) and height-for-age (H/A) applies. Acute under nutrition is a sign of short-term nutritional deprivation and weight loss and weight compared to height is a good measure. Chronic under nutrition is a sign of long-term nutritional deprivation affecting the growth of the child, and therefore height compared to age is useful.

A child is under nourished if the Weight for Height or Height for age measures is more than -2 SD from the median According to the WHO Growth monitoring standards (2013). Underweight is another way to measure child under nutrition. It's measured as weight-for-age .A child needs a right amount of calories on daily basis (calories depend upon the nature and type of the body). Some time we take nutrients, which do not provide calories according to the need of the daily activities and type a physique a person has. In such situations an Individuals are malnourished, or suffer from under nutrition. In many parts of the world under nutrition resulted from a lack of adequate food. In some cases, however, undernourishment may stem from a health condition, such as an eating disorder or a chronic illness that prevents the person from absorbing nutrients. Under nutrition can lead to delayed growth or wasting, while a diet that provides too much food, but not necessarily balanced, leads to obesity.Under nutrition is a serious and pervasive problem, with long-term consequences for child development, and ultimately for adult productivity and national economic growth. Despite the

existence of practical and inexpensive nutrition intervention that have proven effective in diverse country contexts, roughly 30 % of children in the developing world remain malnourished (Burchi, 2006).

Over nutrition: Over nutrition refers an excess intake of nutrient it can cause overweight, obesity it can cause diet-related non communicable diseases**.** According to Schaffer, (2011) over nutrition taking too much calories also have negative effects and also cause different health problems. People are also malnourished, or suffer from over nutrition if they consume too many calories.

2.3 Empirical related review

This section provides empirical related review on the magnitude of the problem as well as on the prevalence and associated factors that affects the nutritional status of children worldwide as well in Ethiopia.

2.4 Under nutrition among under-five children

Different studies indicate that poor nutrition during childhood is one of the most important conditions that impede the physical and the mental development of children which ultimately propagates the vicious cycle of intergenerational malnutrition. Consequently, the effects of under-five malnutrition are permanent and cross into the adulthood stage of the child (Jesmin *et al.,* 2011). A study carried out on influence of socio-economic factors on nutritional status of children in a rural community of Nigeria revealed that the prevalence rates of underweight, wasting and stunting were 23.1%, 9 % and 26.7% respectively and according to the trends on under-five children's nutritional status, there was a downward trend in the proportion of children stunted and underweight over the past two EDHS of 2011 and 2006 but the proportion of children who are wasted has remained unchanged. Information from the EDHS (2016), Ethiopia demographic health survey results revealed that in Ethiopia there was a very high prevalence of chronic child malnutrition in that more than one out of two under-five children (38%) was stunted. These Figures are very high even compared to the developing countries which are severely affected by the problem of child stunting. Regional difference is prominent in Ethiopia, more than two in five children are stunted with Amhara region (46.3%) leading to Benishangul (42.7%) and Afar regions (41.1%). There was a decline in the proportion of under-five stunted children in Ethiopia from 38% to 33% which is an indicator of improvement in under-five nutrition over the past five years. A similar pattern is observed among the under-five children who were underweight due to a drop in the proportion from, (16%) in 2006 to (14%) in 2011(ICF International Inc 2012). A well-nourished child is one whose weight and height measurements compare very well with the standard normal distribution of heights and weights of healthy children with same age and sex categories.

Nutritional status is primarily measured by a child's growth in height and weight and is directly influenced by food intake and the occurrence of infections. Chronic malnutrition in form of stunting, wasting and underweight are assessed at the population level through the Demographic and Health Surveys (ICF Macro 2010). Although a cross-sectional survey conducted in a rural locality called Gumbrit, the overall prevalence of malnutrition in the community was high with 28.5% of the children being underweight, 24% stunted and 17.7% wasted. Similarly, study done at Beta-Israel community revealed that, the prevalence of stunting, Underweight and wasting were 37.2%, 14.6%, and 4.5%, respectively. Moreover, severe stunting, severe underweight and severe wasting were seen in 14.8%, 2.9%, and 0.5% of the Children respectively (Ghetahun and Eidelman, 2011). A community based cross-sectional survey conducted West Gojam zone revealed that 49.2 % children were found to be under-weight, 43.2 % of the children under age five were suffering from chronic malnutrition and 14.8 % acutely malnourished (Baka *et al.,*2006). The cross sectional survey conducted rural communities of Tigray region also revealed that, the levels of stunting, underweight and wasting were 42.7%, 38.3% and 13.4%, respectively (Afework *et al.,*2005). According to research conducted in Gimbi district Oromia region indicated that, 32.4 % stunted, 23.5 % underweight and 15.9% of the children were wasted. Prevalence of severe stunting, severe underweight and severe wasting respectively were 15.7%, 8.0 % and 5.7% (Kebede, 2007). The finding of the studies done in different area are helpful to encourage local community to improve current nutritional status by improving feeding pattern of children also serve as helpful guide to plan suitable nutritional and health programs and this also the helpful to foster urban communities based on the facts discovered from these different studies.

2.4.1. Causes of child under nutrition

An understanding of the most important causes of malnutrition is imperative if the current unacceptably high numbers of malnourished children are to be reduced. Most researchers and scholars like Smith *et al.,* (2000) assumed that the primary cause of malnutrition is food insecurity. But contrary to this, World Bank (2012) Studies suggest that food is not the only and not even the main cause of malnutrition. Many children in food secure environments and those in non-poor families are malnourished because of poor maternal knowledge, inappropriate caring practices, lower women status in the house hold relative to men and inadequate access to health, water and sanitation services. Child's nutritional status is the result of the interactions between the child's dietary intake and the child's health status, at the immediate level. Smith and Haddad (2000) argue that a child with inadequate dietary intake is more susceptible to disease and, disease in turn depresses appetite, inhibits the absorption of nutrients in food, and competes for a child's energy.

Thus, dietary intake must be adequate in quantity and in quality, and nutrients must be consumed in appropriate combinations for the human body to be able to absorb them.

2.4.1.1. Child related factors of under-five under nutrition

There are a number of demographic variables that researchers have found significant in influencing under-five under nutrition however the study focused on few of them that included sex of child, age of child, birth order, birth interval and mother's age at birth.

Sex of the child: The cause of this discrepancy is not well established in the literature but it is believed that boys are more influenced by environmental stress than the girls (Nguyen and Kam, 2008). According to Babatunde (2011) A study done in *Kwara* state Nigeria show that there was a significant relationship between sex of a child and malnutrition, Male children were more likely to be malnourished than their female counterparts. This is probably due to increased attention paid to female children unlike the male children. Another study done in Botswana revealed that stunting, wasting and underweight were also significantly more prevalent among boys than girls (Salah and Nnyepi, 2006).

Age of the child: Under nutrition in a child is seen when the child is unable to obtain sufficient food to meet its nutritional needs. Children rely on nutrients to facilitate their development and up until the age of five they are especially vulnerable, which is why this age is often used as a cut-off point, also in this paper (UNICEF 2009). Shrimpton *et al.,* (2001) pointed out that younger children are less likely to be malnourished than the older children. However, after weaning, the children begin to get adequate nutrition when they get used to complementary feeding. According to study EDHS and Macro International (2014) Malnutrition increases with the age of the child through the first three years of life before declining in the fourth and fifth year the increase is especially rapid during the first two years of life, as evidenced in the rise from 13 present among children aged 6-8 months to 45 present among children aged 18-23 months. It is expected that parents give less attention to older children when they give birth to a new child who needs much attention and care. Similar findings have been reported in different countries because of stunting is a cumulative effect of long term food deficient, care and exposure to chronic diseases (Abebe and Tigest, 2018).

Birth order: A community based cross-sectional survey conducted in Bangladesh, the prevalence of stunting increased with birth order hence most of the children who were of birth order more than two had greater chances of stunting and wasting (Rayhan and Hayat, 2006). The birth order of child is found to be a statistically significant determinant of wasting. For instance, if we compare the first and second birth order the child in the second birth order has less likely to be wasted than the first.

This result is in harmony with finding Girmay *et al.,* (2010) which found birth order was the most important determinants of children nutritional status in Ethiopia.

Birth interval: In another study conducted in Bangladesh, children within the first birth interval were 1.66 times more likely to be stunted and children whose preceding birth interval was less than two years were 1.32 times significantly more likely to be stunted as compared to children of a preceding birth interval 24 months or above, Similar results were observed for underweight children (Nure *et al.,* 2011).

Feeding practise: Infant feeding practices is a strong determinant of stunting as well as of underweight among the under-five year's children. Studies have shown that the proportion of underweight and stunted children is significantly lower whose mothers initiated breastfeeding within six hours of birth. A higher prevalence of both stunting and underweight is found among under-five children who are deprived from colostrum. Improper complementary feeding is a risk factor for underweight among children. More underweight children were found among the groups who did not get proper complementary foods follow their needs (Kumar *et al.,* 2006). Duration of exclusive breastfeeding is an important determinant of child nutritional status. Children of mother's who were exclusively breastfeeding their infants for less than six months, had a higher risk on being underweight, stunted and wasted compared to the children whose duration of exclusive breastfeeding is up to six months (Hien and Kam, 2008). Inadequate dietary intake by the children due to frequent infectious diseases is considered to be an immediate cause of stunting (Frongillo *et al*., 1997).

2.4.1.2. Maternal related factors of under nutrition among under-five children

A lot has been written about the socio-economic determinants of under nutrition among children under-five children by several researchers in both developed and developing countries. The study focussed on maternal education, marital status and maternal occupation.

Mothers age at birth: Mothers age at birth has been associated with malnutrition among under-five year old children for example it was found out in Bangladesh that children whose mothers were less than 20 years at the time of birth were 1.22 times more likely to be stunted, wasted and underweight compared to children whose mothers were 20 years and above at birth (Nure *et al.,* 2011). A number of studies have reported that mother's age at birth is one of the most important determinants of malnutrition among under-five children. Similarly, under-five malnutrition is higher also among children whose mothers give birth when they are older especially after 35 years. However, it is important to note that children of the younger mothers are traditionally cared for by their grandmothers in Turkey and this was associated with low levels of malnutrition among children of younger mothers less than 24 years (Ergin *et al.,* 2007).

Maternal education: Mother's education level affects child's nutrition through her choices and health seeking skills related to nutrition, hygiene, preventive care and disease treatment. Mother's responsibility to care for herself during pregnancy and her child through the most vulnerable stages of its life significantly affects under-five child malnutrition. Several studies have found out that mother's education is associated with good nutrition practises and particularly under-five child nutrition (Babatunde *et al.,* 2010). This implies that educated mothers are better aware about the nutrition requirements of their children by providing improved health care (Babatunde, 2011). With increasing level of mother's education, the proportion of children who are malnourished goes down as found out in the EDHS of 2006 (CSA and Macro International Inc 2007).

As study on an influence of socio-economic factors on nutritional status of children in a rural community of Osun state, Nigeria, Children of mothers who were not educated beyond secondary school level had one and a half to two times the prevalence rate of stunting. On the other hand, children of mothers with post-secondary education were apparently more often affected by wasting than those with less educated mothers but there was no consistent trend in the pattern of wasting or stunting with respect to paternal educational level. In a similar study in Bangladesh, children of mothers with no education and primary education were 28% and 33% respectively more stunted than children of mothers with secondary or higher education. Wasted and underweight children also showed similar results. Children whose mother had no education or had primary education were more times significantly stunted and underweight than children whose mothers had secondary or higher level. However, for wasting, children whose mothers had primary or secondary education had 0.87 times lower odds of wasting than those of mothers with higher education (Nure *et al.,* 2011).

According to Lisa, (2000) education of a mother has several potentially positive effects on the quality of care of children and consequently malnutrition. More educated women are better able to process information, acquire skills and model positive caring behaviours. More educated women tend to be better able to use healthcare facilities to interact effectively with health care providers, to comply with treatment recommendations and to keep their living environment clean. Education also increases women's ability to earn income but these increases the opportunity cost of their time which may mitigate against some important care giving behaviours for example breastfeeding.

Marital status: On the study about mothers' marital status and under-five child nutrition, findings in Ethiopia reveal that child's malnutrition is significantly associated with marital status. It was found out that under-five child malnutrition is higher among unmarried rural and divorced/separated women compared to married ones (Teller, 2000). Similarly, being a married mother was positively associated with good nutritional status among children under five years in the Volta region of Ghana (Appoh and Krekling, 2005).

Maternal occupation: Previous studies have found out that mother's occupation is one of the determinants of under-five malnutrition in most developing countries. A study in Vietnam revealed that children from mothers who were labourers or farmers and housewives had a greater prevalence of stunting, underweight and wasting than those from mothers who worked in office or were housewives (Nguyen and kam, 2008). Mother's occupation is one of the indicators for access to adequate food supplies, use of health services, availability of improved water sources, and sanitation facilities which are prime determinants of child nutritional status (UNICEF, 1990).

It is little wonder therefore that malnutrition was found to decrease with mother's occupation although the pattern is not uniform according to CSA and Macro International Inc, (2007) study that conducted the EDHS in 2006. In a study done in Botswana on the effect of maternal occupation on under-five malnutrition, it was found out that underweight occurred to a lesser extent among children whose mothers worked in agriculture (7.5% in livestock and 28.6% for those working in crops) than among children (40.0%) whose mother was involved in informal business (Salah and Nnyepi, 2006).

Monthly income: Low maternal income and overcrowding were associated with higher prevalence of wasting. However, no association was found between the source of drinking water or social class and malnutrition study conducted by Girmay *et al.,* (2010) income is another factor for the children from the households who had less than 1500 ETB monthly income are more likely to be wasted compared to children of household with higher monthly income. This result conformity with studies by Danbo and Tayen, (2015) implies that monthly household income was highly associated with under-five children wasting.

2.4.1.3. Socio-economic and health factors of under-five children

Family food security level: The household food security is comprised of four factors: availability, access, stability and utilization. A household should at all times have enough food immediately available, have the sufficient resources to acquire it and be able to consume it, in order to have an active and healthy life (Smith *et al,*. 2000). If a household is food insecure it becomes vulnerable to food shocks, such as low production, failed harvests, price fluctuations of goods, etc. Studies from South Africa have shown that common strategies to cope with insufficient food security is for the caregiver to change their strategies, limit food variety, portion size and skipped meals (Oldewage *et al,*. 2006). All of these common strategies seriously affect the nutritional status of a household.

Employment: Income poverty and unemployment are also very closely linked, and by default unemployment and malnutrition are correlated. In countries with a high unemployment rate, often results in a large part of the population being dependent on subsistence farming. Little extra income

is generated and the rural population can become increasingly food insecure and it can thereby affect dietary intake, as well as the access to health facilities. Employment is a good way to relieve the household of the vulnerability of lacking availability (Sen, 1999). By increasing a household's income and diversifying where this income is generated, the access to food and health facilities are also increased, and by default of the UNICEF model, this should be reflected in the under nutrition prevalence.

Residence: Residence has a significant impact on child nutritional status. Based on an observational study, it has been found that rural and mountainous children have a higher risk to become under nourished for all three forms of anthropometric indices (underweight, stunting and wasting) compared to urban children. Children of mountainous areas are the most vulnerable among the three area of residence (Hien and Kam, 2008). Also, a study in Democratic Republic of Congo depicted that the area of residence is an influential factor of stunting. Rural children are more stunted than urban children. The rate of stunting among children is differing from their place of birth. More stunted children were found among the ones not born at hospitals (Kandala *et al.,* 2011).

Family Size: Family size has been positively associated with the nutritional status of under-five children. However, the number of under-five children in a household negatively associated with the nutritional status. In families having more than three children, the children were on average four or even more times are more likely to be underweight, stunted, wasted compared to those having less than three children (Hien and Kam, 2008).

A study showed that with a 10 % increase of the number of under-five children within the family, the chance of being stunted increased by 3.7 %. Several studies revealed that households with a small number of children have more chance to consume adequate energy. Intra-household food distribution does not favour the food intake of young children, especially female children (Garrett and Ruel, 1999).

2.5 Conceptual framework

This conceptual framework adapted and modified for the prevalence and associated factors of under nutrition among 6 to 59 months aged children in Bishoftu town. In developing countries and particularly in Sub-Saharan Africa, under-five child under nutrition is normally associated with a large number of factors to the extent that it sometimes becomes difficult to predict the risk factors (Victoria *et al.,* 1997). Such associated factors act through a number of interrelated proximate determinants to bring about under-five under nutrition that is stunting, underweight and wasting. Depend up on the concepts of prevalence on child malnutrition (immediate, underlying and basic) and the evidence from empirical studies the framework below conceptualize how different

associated factors affect child under nutrition. These determinants are demographic factors which incorporate age of child and birth order of child were direct determinant of child under nutrition. Socio-economic factors integrate maternal education, household monthly income, and family size in the household which are the determining factors of child under nutrition. This has associated with child under nutrition: Breastfeeding factors deals exclusive breastfeeding, frequency of breastfeeding, currently breastfeeding and preparation and provision of complementary food, personal factors which associate awareness and exposure to information for instance mothers/caregivers frequency visit by health extension worker. The single arrow shows how those associated factors directly affect the child under nutrition and there is no backward association between determining factors as well as child under nutrition.

Based on the literature review the conceptual framework of the study is:

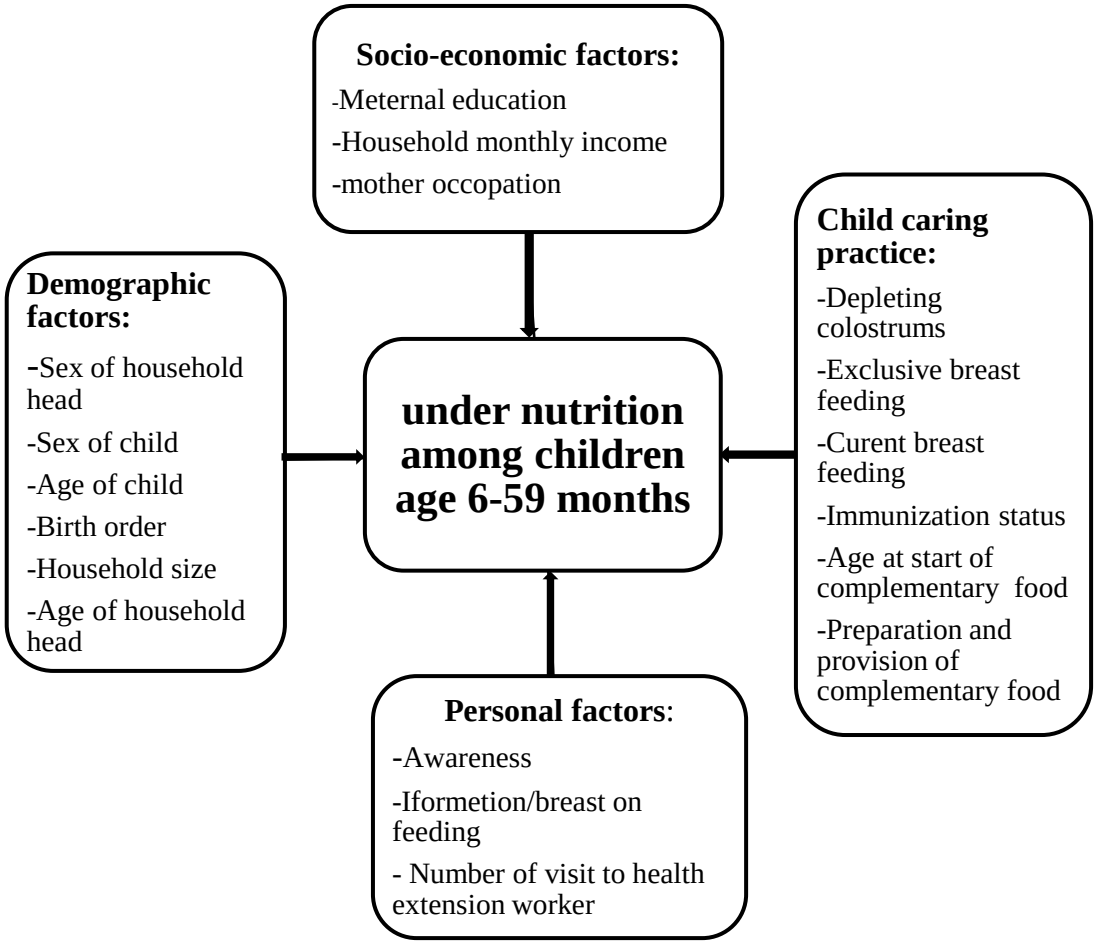

Figure 2.1: Conceptual Framework showing the prevalence of under nutrition and associated factor of UFAC.

Source: *own constructed.*

CHAPTER THREE: DESCRIPTION OF THE STUDY AREA AND RESEARCH METHODS

3.1. Description of the study area

The study was conducted in Bishoftu town which is geographically located in the Eastern Shewa Zone of the Oromia Region located between 8^0 45 North latitude and $38^0$59 East longitude with an elevation of 1,920 meters.

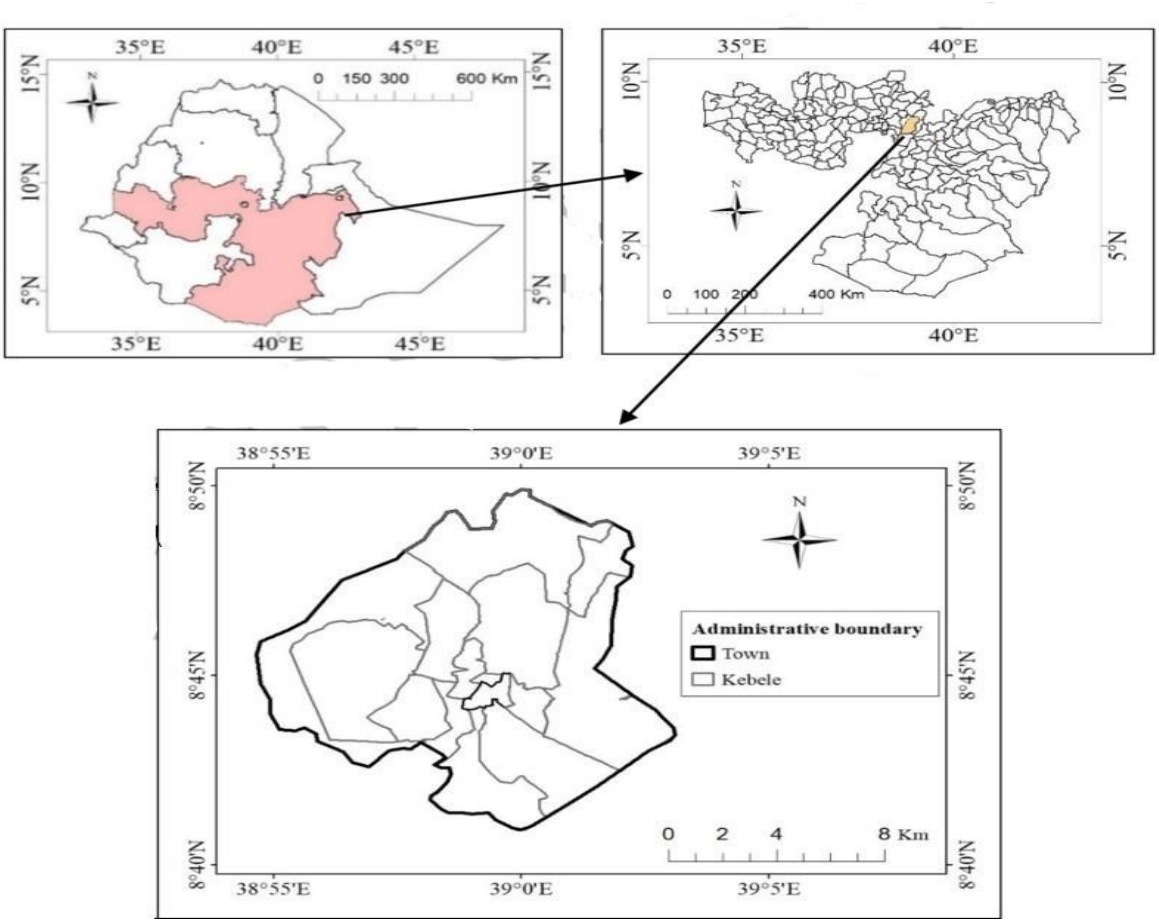

Figure: 2.2 Location of Bishoftu in National and Regional Settings

Source: *http://www.maps of world.com; November, 2018*

According to information obtained from Bishoftu Town Health office, there are estimated projected total population of 325,000 in Bishoftu town of which about 137,500 are women and 187,500 males based on the 2012 National Census Agency estimation. People are engaged in various Socio economic activities Small and micro enterprises, large scale, government employees etc. The wealth status of the people range from categories is poor to wealthy as projected by CSA (2005). The weather condition of Bishoftu is 35.3% temperate (*bada* in *Afan* Oromo) (*dega* in Amharic), 50% sub-tropical *(bada-dare in Afan* Oromo*) (woina-dega in Amharic)*, 14.7% lowland. Bishoftu town have 15 *kebele* one referral Hospital Five Health canter and 45 health extension agents that they providing health service, basic health and health extension services. According to the Bishoftu Town Health office 2017 annual report, Malnutrition is one among the ten top diseases. The main food

sources that are accessed by the surrounding residents include cereals, legumes, vegetables like potatoes, carrot, beetroot, tomato, cabbage, and fruits like banana, orange, mango, papaya, apple, dairy products like milk, cheese, yoghurt, butter and whey, poultry products and livestock

3.2. Research approach and design

In this study community-based cross-sectional descriptive survey study was employed to collect relevant and sufficient information within short period of time. The study design was used quantitative and qualitative research approach to assess the complexes variables of the child under nutrition prevalence and associated factors among under-five children in Bishoftu town from January 18 to February 22 2018/19.

3.3. Study population

The study population was children age 6-59 months pair with their mothers or caregivers lived in Bishoftu Town. This is because of the fact that children of this age group have higher risk and vulnerable for under nutrition. And also, up to five years the growing and survival of children basically based on their nutrition and care they received from their parents. So, it is important to focus on this age group to understand the prevalence and associated factors of under nutrition.

3.4. Inclusion Criteria

Mothers or caregivers who have children age 6-59 months lived in the study area at least for six months prior to data collection were incorporated under this study.

3.5. Exclusion Criteria

Mothers falling to participate in the study, mother of Infant or child below 6 or above 59 months of age and mother of very sick infants and young children, those with known anomalies or those requiring emergency care at the time of the study were not be included in the study. In the same manner visitors of the selected household during the data collections that have a child age 6-59 months were not be included under the study.

3.6. Data sources

In this study both primary and secondary sources of data were used to gather the information required for the study. The primary data was collected from eligible respondent's mother or caregiver of the index child and anthropometric measurement. Secondary data were collected from available document at Health Centre, Bishoftu Health Office and Health Extension workers.

3.7. Sample size determination and sampling techniques

3.7.1. Sample size

To determine sample size in the study different methods were employed in order to get representative sample size. Therefore, Cochran (1963:75) formula to yield the required sample for proportions was used as Cited by Israel (1992).

Thus,

$$\mathbf{n = \frac{(Z\alpha/_2)^2\, p(1-p)}{d^2}}$$

n = is the desired sample size

Z = is the standard normal deviation at a confidence level set at 95% which is 1.96

p = prevalence of stunting in Oromia region (stated in EDHS 2016).

q = is the proportion of an attribute that without population, (expected prevalence).

d = desired level of precision

$$\mathbf{n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}}$$

$$= \frac{(1.96)^2\ (0.37)\ (1-0.37)}{0.05^2}$$

$$= \frac{0.89547696}{0.0025} = 358$$

The total population (total children age 6-59 months) of the towns are 12,257; need to adjust using finite population correlation factors. Because, it is advisable to adjust the sample size. Finite population correction factor applied when the sample represents a significant (e.g. over 5%) proportion of the population as cited by Susan et al. (2015). The formula should be:

$$n_a = \frac{n}{1 + \frac{n - 1}{N}}$$

Where:

n_α = the required sample size

N = the total population of the children age 6-59 months in the study area

n = the sample size estimated based on the assumption of $p = 0.50$

Hence substituting the formula sample size

$$n_\alpha = \frac{358}{1+\frac{358-1}{325{,}000}} = 358$$

So with adjustment for non-response (10%) n= (358+36), the final sampling size was **394** children.

3.7.2. Sampling techniques

The study area is purposively selected multistage sampling technique followed by simple random sampling was used to select children from households. From 15 *kebeles* namely kebeles 01, 03, 05 and 07 *kebeles* were select by simple random sampling method. Study participants/households/care takers were also selected *kebeles* by proportionate allocation from each selected *kebeles.* Study participants were selected by simple random sampling based on frame existing in health posts, from households with children 6 to 59 months in these four *Kebeles*. Participants of the focus group discussions (FGDs) were purposively and conveniently selected to take part with the help of village elders and Health Extension Workers (HEWs). This ensured that participants who were easily accessible and those who have adequate information regarding child feeding in the study area have been selected. To enhance homogeneity, each FGD of participant was made up of 6 to 14 mothers with children below 2 years who will not be part of the main sample. The FGDs will be held in all the four *Kebeles* after quantitative data had been collected. In short, the schematic procedure of sampling techniques of this study is shown in Figure 3)

Formula used to calculate sample size of each selected *kebeles*

$\boldsymbol{n_i = (n_a}*N_i)/$ where n_i = sample size of each selected *kebeles*

n_a = total sample size

Ni = total number of household in each selected *kebee*

N = total number of household in all selected

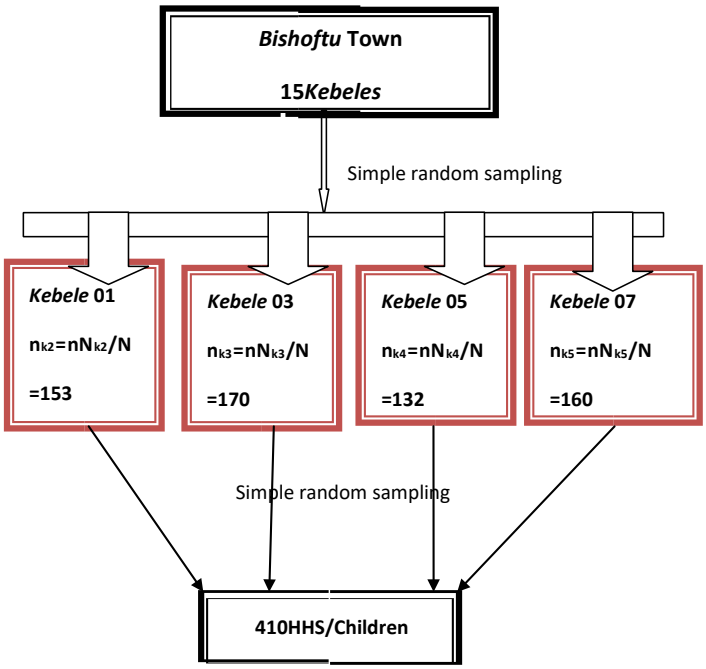

Figure 3: Schematic presentation of sampling procedure

Key notes

n_k = number of sampling for each kebelesby proportionate allocation
N_k = tot al number of household/study participants in each selected kebeles
O = kebele 01(612), kebele 03 (680), Kebele 05 (528), Kebele 07 (640)
N = total number of Household/participant in all selected *Kebeles /2,460/*

3.8. Tools and techniques of data collection

In this study the qualitative and quantitative research method was used to collect the information on the determinants of child under nutrition. The structured questionnaire was administered to eligible respondent's mothers or caregivers of eligible child to collect quantitative data. The data was collected by 6 data collectors who have health related background and able to communicate, reading and writing Afan Oromo and Amharic languages. The data collectors were recruited from Hospital and health canter. Inanition two days training has been provided for data collectors with regards to administration of the questionnaire and anthropometric measurement. Focus group discussion was also conducted to collect qualitative data.

A close supervision of enumerator during the field work and administration (FGD) from different economic status household was done through the principal investigator. In addition to investigate the nutritional status of the children anthropometric measurement on height, weight, and MUAC was taken from each sample child. Weight of the child has been measured by using weight scale and their height was measured through measuring board while MUAC was measured using WHO standard MUAC tape. The height of infants aged 6-23 months (less than 85cm) calculated in recumbent position while for children aged 24-59 months was measured in stand up position. Accordingly, Weight of the infants and measured to the nearest 10 g by standard weight scale for a child who stand alone and as well for not stand alone the mother was weighted together with a child and then without the child. The difference during data collection the researcher has checked and followed up in the field and observed how well data collectors were doing their task. At the end of the data collection check the completeness of filled questioner. At the end of every day filled data collection.

3.9. Data quality assurance

To maintain the quality of data the questionnaire was first prepared in English and later translated into Afan Oromo (the local language of the study area) and back translated into English to check for its conceptual equivalence. To ensure the quality of research data, data collectors were taken one-day training on the objective, methodology, sampling technique, ethical issues, and data collection instrument, how to administer structured questionnaires and how to take anthropometric

measurements. Measurements was taken using standard instruments of weighting scale and height board and routinely checked and adjusted to maintain its accuracy, precision and validity. For instance, every day similar weight was taken by investigator before starting weighting of child and zero reading was checked following weighing child.

3.10. Data analysis procedure

To ensure the quality of data, all filled questionnaires were checked for completeness and consistency. The quantitative data collected through structured questionnaire was entered into Epi-Data version 3.1 and exported to STATA 13 for analysis. To convert the anthropometric data into Z-scores of the indices WHO Anthro 2011 version 3.2.2, software was used for stunting HAZ (Height for Age Z-score), underweight WAZ (Weight for Age Z-score) and wasting WHZ (Weight for Height Z-score) and exported STATA 13 for further analysis. Descriptive statistical analysis was used to compute frequency percentage, mean and standard deviation was used to organize distribution of child demographic, household's demographic, socioeconomic, and maternal & child caring practice. Bivariate regression model was used first to identify the association between independent determinants and outcome variables. As well multivariate regression used to estimate the imperative determinants that influence on under nutrition of children and general structural equation model used to analyse structural relationships.

3.11. Study variables

3.11.1. Dependent variables

Under nutrition of children aged 6-59 month indicated by wasting, underweight and stunting.

3.11.2. Independent variables

Factors assessed as independent variables were**; f**eeding, health care seeking, hygiene and immunization**, a**ge, Sex, birth order, gestational age, types of birth, place of delivery, breast-feeding status and morbidly status, head of HHs, ethnicity, religion, family size, marital status, occupation income, education, ownership of livestock and farm land. Moreover, extra food during pregnancy/lactation, number of children ever born, use of extra food during pregnancy or lactation and autonomy in decision-making on use of money were also taken as independent variables.

3.12. Dissemination study result

The final report of this study is expected to be presented to Addis Ababa University School of Graduate studies as a thesis in partial fulfilment of Masters of Degree in Food Security studies. It will also be sent to Bishoftu Town Health Office and other concerned governmental and non-governmental organizations as electronic copy. Effort will be made to disseminate through publication and soft copies.

3.13. Ethical consideration

The study had taken into consideration of the ethics of the research concept. Before proceeding to conduct the study, the researcher obtained an official letter from Addis Ababa University College of Development Studies to provide the concerned bodies to get permission. Besides this, the contacted respondents got essential information about the study purpose and benefits to the community. It was planned to get the consent earlier before starting to obtain the data from respondents or any one with children before starting the interview or taking body measurements. Those respondents who were not willing to participate in the study were not forced to be involved. The respondent also being informed that all data from them measurements were kept confidential by using coding instead of any personal identifiers and is intended only for the purpose of the study. Finally, the researcher has tried to mention and acknowledged all the information taken from scholarly literatures and data generated by other individuals or organizations.

3.14. Diagnostic test

Prior to model analysis it is mandatory to check whether there is multicollinarity problem or not and contingency coefficients among the selected independent variable (Gujarati, 2004). The correlation coefficient of above 0.80 and below -0.80 is used as a critical point to show that serious multicollinarity problem (Wooldridge, 2009 and Stock and Watson, 2007). Thus in this study the coefficients of all independent variables were found to be below 0.7853 and above -0.0921 (see appendix 3). Hence, there is no severe multicollinarity problem among explanatory variables.

CHAPTER FOUR: RESULT AND DISCUSSION

4.1. Background characteristics of children and caretakers

In this chapter the result of the study is presented as background characteristics of respondents and children, analysis of leading factors which contribute for under nutrition, bivariate analysis and multivariate analysis results of the relationship among independent variables (predictor factors) and under nutrition. From the total planned study subjects, complete response was obtained for 410 (100%). Moreover, the result is presented using tables.

The background characteristics are divided into demographic and socio-economic characteristics of children and maternal factors which are in Bishoftu district are presented in Table 4.1 and 4.2 below.

4.1.1. Demographic characteristics of children and caretakers

The background characteristics are divided into child and maternal factors in Bishoftu town are presented in Table 4.1 below. Two hundred seventeen 52.93 % male children and One hundred ninety-threes were females included in the study. The average age of children incorporated in this study was 28.62 with a minimum age 6 months and maximum age of 59 months. Normal family size of households involved in the study was 3.87 with a minimum 3 and maximum 6. In this study as shown in table 4.1 maximum number of children aged 6 up to 59 months in a household were 3 and minimum was 1 and in average there were 1.32 children. According to the bellow table the maximum described by the respondents was 43 and minimum age was 21, the mean ages of the respondents were 30.22.

Table 4.1: Demographic characteristics of children in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

No.	Issues	Frequency		Percent		
1	Sex of child					
	Male	217		52.93		
	Female	193		47.07		
	Total	410		100		
2	Variable	Obs	Mean	Std. Dev.	Min	Max
	Child age in month	410	28.62	15.54	6	59
3	Family size	410	3.87	.97	3	6
4	Number of under 5 years	410	1.32	.55	1	3
5	Mother's age with children	410	30.22	5.59	21	43

4.1.2. Socio- economic characteristics of respondents

As indicated in table 4.2 below, the resident of most of respondents 365 accounted for more 89 % under the survey were in rural area while 45 (10.98%) were from urban area. In this sample, 47.32 % of the mothers were orthodox Christian, 24.39 % were Muslims, 23.9 % were Protestants 2.2 % were Catholics whereas the remaining 2.2 were worshiping traditional believes. The majority of the

mothers 34.15 % have received secondary schooling, 33.66 % had college and above educational level 20.4 % were no education, while, 7.4 % had have not studied beyond the primary level and the remaining 4.88 % were only able to write and read. As it was shown in the table below women who employed in different organizations were 60.85 %, 17.21 % were participated in daily labour works, 12.97 % of them were taking a part of merchandizing jobs 4.49 % of the respondents were agro pastoralists while the remaining 4.49 % mothers were farmers.

No.	Items	**Frequency**		Percent		
1	Residence					
	Urban	45		10.98		
	Rural	365		89.02		
2	Religion of the Mothers					
	1 Orthodox Christian	194		47.32		
	2 Muslim	100		24.39		
	Catholic	9		2.20		
	Protestant	98		23.90		
	Traditional	9		2.20		
	Total	410		100.00		
3	Mother education					
	No Education	83		20.24		
	Read and Write Only	20		4.88		
	Primary School	29		7.07		
	Secondary School	140		34.15		
	College and above	138		33.66		
	Total	410		100.00		
4	Occupation the Mothers					
	Farming	18		4.49		
	Agro pastoralist	18		4.49		
	Employment	244		60.85		
	Merchandise	52		12.97		
	Labourer	69		17.21		
	Total	401		100.00		
5	Marital status Mother or care giver					
	Unmarried	82		20.00		
	Married	301		73.41		
	Divorced	9		2.20		
	Widowed	18		4.39		
	Total	410		100.00		
6	Head of Household					
	1 Mother	18		4.39		
	2 Father	270		65.85		
	3 Both	122		29.76		
	Total	410		100.00		
7	Variable	Obs	Mean	Std. Dev	Min	Max
	Monthly income	410	3652.317	1717.966	700	9050

As far as marital status concerned in the above table 4.2 study, the large amount of the women 73.41% were married, 20 % of the respondents were unmarried, 4.39 % were widowed the 2.2 % were classified as divorced. Based on the data gathered almost two third 65.35 of the households in the study area were headed by male, 4.39 % of household were headed by female and the remaining 29.76 % of households were headed by both male and female. Among the total households, the maximum monthly income was found to be 9050 ET Birr and the minimum was 700 ET Birr. The mean wage of households under this study was 3652.32 ET Birr.

Table 4.2 Socio economic characteristics of respondents in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

4.2 Prevalence of under nutrition

4.1.3. Overall prevalence of stunting, underweight and wasting in Bishoftu

With regards of prevalence of under nutrition of children among aged 6 - 59 months in Bishoftu as it was indicated in table 4.3 were 6.9 % severely stunted, 13.8 % were stunted, 2.2 % were underweight and 11.2 % were wasted. Moderate level of prevalence of under nutrition children aged 6-59 months were seen in male.

Table 4.3: Prevalence of under nutrition in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Indicators	%<-3SD	%<-2SD	Mean	SD
Length/height for age (Stunting)	6.9	13.8	1.22	2.34
Weight for age (Underweight)		2.2	0.95	1.2
Weight for Height/Length (Wasting)		11.2	0.14	1.65

4.1.4. Prevalence of stunting

Stunting is a failure to reach linear growth potential of height relative to chronological age. Shortness is used to tell if a child is abnormal in height for age as a result of under nutrition. Based on the illustrated in table 4.4 the higher level of Stunting was observed in male (27.1%) as compare with girls that was (14%). A peak degree of stunting (42.9%) was made known among children aged 6-11 months, the level of stunting among children aged 36-47 months was (30%) and followed by children aged 48-59 months were (24.4%), the lowest magnitude of stunting was perceived in children aged 12-23 months (10.02%).

Table 4.4: Prevalence of stunting in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Sex	Total Number	%<-3SD	%<-2SD	Mean	SD
Male	217	9	18.1	0.91	2.4
Female	193	4.7	9.3	1.54	2.24
Age group in month					
(6-11)	63	14.3	28.6	-0.83	2.05
(12-23)	120		8.1	2.92	2.06
(24-35)	84		10.7	1.34	1.72
(36-47)	60	15	15	0.71	2.28
(48-59)	83	12.2	12.2	0.69	1.84

4.1.5. Prevalence underweight by sex and age group weight for age in Bishoftu

The data in table 4.5 was collected to discover the happening of underweight or low weight-for-age and accordingly, 4.1% of male children were categorized as underweighted as weighed against girls. The current status of body proportion of with their sequential age 10.8 % of children grouped under the age category of 48-59 months were not linear in other word underweighted.

Table 4.5: Prevalence underweight (sex and age group weight for age) in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Sex	Total Number	%<-3SD	%<-2SD	Mean	SD
Male	217		4.1	0.98	1.42
Female	193			0.91	0.91
Age group in month					
(6-11)	63			0.78	1.13
(12-23)	120			2.26	0.5
(24-35)	84			0.52	0.76
(36-47)	60			0.94	0.44
(48-59)	83		10.8	-0.38	0.82

4.3.4 Prevalence of wasting sex and age group weight for height/length

The data in table 4.6 was collected to discover the happening of wasting loss of weight and the onset of under nutrition as compared child's weight with sequential age, and (10.6%) of boys and (12%) of girls were wasted in addition (31.1%) and (23.8%) occurrence of wasting (low weight-for-height) was seen in the age group of 48-59 months and 24-35 months respectively and this is due to the failure to receive adequate nutrition and may be the result of inadequate food intake.

Table 4.6: Prevalence of wasting (sex and age group weight for height/length) in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Sex	Total Number	%<-3SD	%<-2SD	Mean	SD
Male	217		10.6	0.47	1.35
Female	193		12	-0.23	1.86
Age group in month					
(6-11)	63			1.26	1.86
(12-23)	120			1	1.4
(24-35)	84		23.8	-0.28	1.26
(36-47)	60			-0.15	0.98
(48-59)	83		31.1	-1.42	1.14

4.1.6. Prevalence of MUAC for age Z-Score in Bishoftu

The MUAC measurement result is an indicator of immediate acute under nutrition for children age 6-59 months. To vigour the results of weight for height Z- score (wasting) MAUC for age Z-score (MUACZ) was estimated. Therefore, 2.2% % of children were affected by acute under nutrition 14.6 were slightly higher than the result observed in the weight for height measurement. As it was pointed up in table 4.7 that superior level 34.9 % of under nutrition was observed in the age group of 48- 59 moths followed by a score 23.8 % under nutrition among the age group of 24-35 months.

Table 4.7: Prevalence of MUAC for age Z-Score in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

MUAC for age Z-Score	Total Number	%<-3SD	%<-2SD	Mean	SD
MUAC for age	410	2.2	14.6	-0.96	0.89
Age group in month					
(6-11)	63			-0.66	0.57
(12-23)	120		16.7	-0.94	0.69
(24-35)	84		23.8	-1.43	1
(36-47)	60			-0.35	0.83
(48-59)	83	10.8	24.1	-1.16	0.95

4.2. Nutritional practice of family

The amount of expenditure spent for food consumption from monthly income which is determinant to under nutrition was also assessed in the study and as pointed up in table 4.8 84.63%, 6.59%, 2.2% and 6.59% were witnessed that they were paying for household food consumption, children education, purchasing of crows and purchase of clothed respectively. At the same table more than three fourth 84.63% of respondents indicated that they were buying their food from markets the remaining 10.98%, 2.2%, and 2.2% or respondents identified Aid donation, Shared market and other sources of supplies as a sources of food in chronological order.

As indicated in Table 4.8 below, the highest information gained about nutrition 31.95 % was from Health extension workers and the second 28.78 % source of information was from relatives, friends and families; whereas: 4.39% form magazine and newspaper, 12.20% form television, 10.24% from mobile telephone and 10.24% were gotten from radio. However, 2.2% of respondents indicated that they have not get information from any of the sources. With regards to the transportation system used by the respondents' majority of the respondents 59.27% were using Bajaj while 23.17 pointed out that they were transporting their food through vehicles and the remaining 17.56 % were not using transportation

Table 4.8: Nutritional practice, means of transportation and information of family in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

No.	Items	Freq.	Percent
1	Expenditure spend		
	Household food consumption	347	84.63
	Children Education	27	6.59
	Purchasing of crow	9	2.20
	Purchase of clothes	27	6.59
	Total	410	100.00
2	Main Sources of Food		
	Market	347	84.63
	Aid Donation	9	2.20
	Shared production	45	10.98
	Others	9	2.20
	Total	410	100.00
3	Source of Information about Nutrition		
	Magazine and Newspaper	18	4.39
	Television	50	12.20
	Mobile telephone	42	10.24
	Radio	42	10.24
	Relative/friend/family	118	28.78
	Health extension workers	131	31.95
	No information	9	2.20
	Total	410	100.00
4	Means of transportation		
	Vehicles	95	23.17
	Bajaj	243	59.27
	Don’t use any transport system	72	17.56
	Total	410	100.00

4.2.1. Health conditions of children

Table 4.9: Health conditions of children in Bishoftu town, Oromia, Ethiopia 2019 (N=410).

No.	Issues	Yes		No	
		Freq.	Percent	Freq.	Percent
1	Child vaccination	372	90.73	38	9.27
	BCG	343	83.66	67	16.34
	PCV	356	86.83	54	13.17
	Polio	356	86.83	54	13.17
	Measles	291	70.98	119	29.02
	Pentavalent	356	86.83	54	13.17
	Vitamin A	260	63.41	150	36.59
2	Health condition				
	Diarrhoea	36	8.78	374	91.22
	Respirator	29	7.07	381	92.93
	Measles	18	4.39	392	95.61
	Fever	47	11.46	363	88.54
	Cough	86	20.98	324	79.02
	Vomiting	27	6.59	383	93.41
	Take to health institution	74	18.05	336	81.95

As the result shows in the above table 4.9 that 83.66%, 86.83%, 86.83%, 70.9% and 63.41% of children were vaccinated in BGC, PCV, Polio, Measles, Pentavalent and Vitamin A respectively. Out of the total of children only 63.41% o were completed their vaccination among the total of 410 children included in this study 38 that is 9.27% children were not received any type of vaccination. Concerning health history of children 8.78 % of children had diarrhoea, 7.07% respiratory disease, 4.39% measles, 11.46 % fever, 20.98% cough and 6.59% vomiting.

4.2.2. Awareness towards breast feeding

Table 4.10 presents the percentage differentials of women on awareness about breastfeeding. The result shows that the majority 86.83% mother's perceived breastfeeding as crucial for the child development, however,13.17 % of respondents were not recognize breastfeeding as an important. Majority of the respondents 66.83% were providing breast milk only for their newly born child, 19.02% were deliver formula milk and the remaining 14.15% were supplying plain water with breast milk. With regards to the length of breastfeeding 42.2% were provides breast milk for more than 6 months their children, 27.56% were feed their children breast milk for 4-6 months only, 18.78 % were nourish breast milk for less than 4 months and the remaining 11.46% were never feed breast milk for their children.

The view of female towards the importance of breast milk is a determinant point for eradicating under nutrition, bearing this in mind mothers were asked for their perception to indicate whether feeding breast milk is harmful or not accordingly 91.22 % were denied it and the remaining 8.78 % were confirm that nourishing the child with breast milk is harmful. Consequently, another question was forwarded to know whether bottle feeding is harmful or not and 68.05% were agreed and the remaining 31.95% were disagreed. The practice of breastfeeding also was raised as an issue and 95.61% of respondents were previously had an experience of breastfeeding where as 4.39% of mothers do not have past experience of breastfeeding. In addition, 52.93 % of respondents were currently implementing breastfeeding while 47.07% of respondents were not currently nourishing breast milk for their children. Of total respondents 60.10% were stop to breastfeeding in order to start additional food, 13.99% were discontinue breastfeeding by perceiving breast milk has not an adequate amount of food, others 13.88% of mothers impede breastfeeding in order to prevent themselves from tiredness, 10.36% were brought to an end of breastfeeding due to pregnancy while 4.66% were ended up breast feeding based on an insight of breast milk can able to destroy child's health. Sixty-seven (28.51%) mothers reported they don't know how many times they gave breastfeed their children, and 61 (25.31%) pointed out that they provide breastfeed more than eight times a day, 51(29.6%) were notified that they offer breastfeed 4 up to 7 times a day. Only, 23 (16.17%) of mothers reported that they offered breastfeed for less than or equal to three times per

twenty-four hours. Respondents were asked about the type of food provided to their children and 42.44% have gave their children breast milk,31.22% had offer them caw's milk 16.34% have provide them fruit juice and only 10% mothers deliver formula milk for their children.

Table 4.10: Breast feeding in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

No.	Issues	Yes		No	
		Freq.	Percent	Freq.	Percent
1	Mothers' awareness towards breast feeding.				
	Breast feeding is important	356	86.83	54	13.17
2	Important for newly born	Freq.		Percent	
	Brest milk only	274		66.83	
	Breast milk with plain water	58		14.15	
	Formula milk	78		19.02	
3	Duration of EBF				
	No EBF	47		11.46	
	< 4 months	77		18.78	
	> 6 months -	173		42.20	
	4-6 months	113		27.56	
	Total	410		100.00	
	Variables	Yes		No	
		Freq.	Percent	Freq.	Percent
4	Breastfeed is harm	36	8.78	374	91.22
5	Bottle feed is harm	131	31.95	279	68.05
6	Previously practised breast feeding	392	95.61	18	4.39
7	Currently breast feeding	217	52.93	193	47.07
8	Main reason for not giving Breast milk	Freq.		Percent	
	Breast milk is not enough	27		13.99	
	Child starts to take additional solid	116		60.10	
	Breast milk make child sick	9		4.66	
	Mothers tired of breastfeeding	21		10.88	
	Mother's pregnancy	20		10.36	
	Total	193		100.00	
9	How many time did you feed in last 24 hours				
	< 3times	38		16.17	
	4-7 times	51		29.36	
	≥ 8 times	61		25.96	
	I don't Know	67		28.51	
	Total	217		100.00	
10	Type food feed last 24 hour including day and night				
	Caw's Milk	128		31.22	
	Formula milk	41		10.00	
	Breast milk	174		42.44	
	Fruit juice	67		16.34	
	Total	410		100.00	

4.2.3. Provision of complementary foods

As the result shows in table 4.11 another factor of under nutrition that contributes to under nutrition is provision of complementary food inclusively with breastfeeding. Hence the data show that 55.11 % of mothers included in this study were starts after 6 months to deliver complementary food for their children, 24.44 % were started it at 6 months while the remaining indicates that they have started before the age of 6 months.

Table 4.11: Provision of complementary foods in Bishoftu town, Oromia, Ethiopia, 2019 (N=410)

No	Variables	Yes		No	
1	Do you deliver complementary food for your children	Freq.	Percent	Freq.	Percent
		410	100	-	-
2	When start complementary feeding	Freq.		Percent	
	> 6 months	221		55.11	
	At 6 months	98		24.44	
	< 6 months	82		20.45	
	Total	401		100.00	
3	Reason for early complementary feeding				
	Inadequacy of breast milk	197		48.05	
	Being deficient in time	21		5.12	
	To motivate child to start food	9		2.20	
	Child reaching for food	40		9.76	
	Child becomes active	27		6.59	
	Child always crying	9		2.20	
	Good for child growth	51		12.44	
	Protects child from disease	29		7.07	
	No reason at all	9		2.20	
	Tradition thinking	18		4.39	
	Total	410		100.00	

Identifying the underlying grounds that push of delivery of early complementary food in a particular locality is important to solve the nutrition problems. And 48.05 % of respondents indicated inadequacy of breast milk the main reason, 12.44 % of mothers pointed out that it is because they thrust that early provision is good for the child, 9.76%, 7.07%, 6.59%, 4.39%, 5.12%, 2.2%, 2.2%, were indicates that as it is because of the fact that child reaching, to protect children from disease, to make their children active, traditional thinking, inadequacy time to feed their children, to keep out of their children from crying and without any reason respectively.

Table 4.12: Complementary food in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

No.	Issues	Yes		No	
		Freq.	percent	Freq.	Percent
1	Child take any liquid	229	55.85	181	44.15
	If no Why do not feed the diversified diet	Freq.		Percent	
	It has no advantage.	39		21.96	
	The child may not like it.	43		23.83	
	It is Culturally forbidden.	29		13.55	
	It may cause discomfort and illness for a child	9		4.21	
	High market price of vitamin A rich food source's	61		36.45	
	Total	181		100.00	
2	Frequency of breast and complementary feeding				
	Immediately/within 1hour	202		51.53	
	After first hour	51		13.01	
	After more than one day	9		2.30	
	Don't remember/ don't know	72		18.36	
	After 7-12 hour	58		14.80	
	Total	392		100.00	
3	How often does the breast feed given for a child				
	1 4-6 time a day	131		31.60	
	2 >8 time a day	279		68.04	
	Total	410		100.00	
4	Did exclusively breast feed	Yes		No	
		Freq.	percent	Freq.	Percent
		63	15.37	347	84.63
	If yes For How long?	Freq.		Percent	
	1 No EBF	9		7.14	
	2< 4 months	9		7.14	
	34-6 months	18		14.29	
	4> 6 months	27		71.43	
	Total	63		100.00	
5		Yes		No	
		Freq.	Percent	Freq.	Percent
	Give colostrum	307	74.88	103	25.12
	Reason for not giving colostrum	Freq.		Percent	
	I had not white milk	26		25.24	
	Everybody say it is shouldn't be given	21		20.39	
	First milk is dirty like bus	56		54.37	
	Total	103		100.00	

4.2.4. Preparation and provision complementary foods

The Study conducted in table 4.13 and 12 revealed that, a very high proportion of the mothers 74.39% initiated feeding of new-borns with pre-lacteal feeds primarily breast milk, 14,15% provides their preliminarily their child formula milk, 9.27% uses water with breast milk as a first nutrient for their children 2.2% mothers provides sugar with water solution. Mostly used type of complementary food indicated by majority 33.16% was porridge followed by 30.87%, 20.66% and 15.31% were

Injera, caw's milk and bread respectively. Delivery of the type of food prepared from different types of crops was carried out by 283(69.02%) of mothers.

Table 4.13: Preparation and provision complementary foods in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

No.	Issues	Frequency		Percent	
1	First nutrient				
	Water with breast milk	38		9.27	
	Breast milk	305		74.39	
	Formula milk	58		14.15	
	Sugar with water	9		2.20	
	Total	410		100.00	
2	Complementary food type				
	Injera	121		30.87	
	Bread	60		15.31	
	Porridge	130		33.16	
	Cow milk	81		20.66	
	Total	392		100.00	
3	Food prepared from different crops	Yes		No	
		Freq.	Percent	Freq.	Percent
		283	69.02	127	30.98
4	Kind complementary food prepared	Freq.		Percent	
	Cereal/grain only	59		15.05	
	Cereal mix with pulse	134		34.18	
	Pulse only (beans and peas)	60		15.31	
	Fruits and vegetables	110		28.06	
	Milk and milk products	11		2.81	
	Eggs	18		4.59	
	Total	392		100.0	
5	Did you feed the child anything from a bottle with a nipple yesterday or last night?	Yes		No	
		Freq.	Percent	Freq.	Percent
		215	52.44	195	47.56
	Material to use to feed your child?	Freq.		Percent	
	1 Spoon	27		6.59	
	2 Cup	76		18.54	
	3 Hand	166		40.49	
	4 Bottle	141		34.39	
	Total	410		100.00	

Among the mothers 34.18 % and 28.08% children were found in using Cereal mix with pulse, fruits and vegetables, where as a smallest proportion 2.81% and 4.59% of mothers were not using egg, milk and products of milk as a complimentary food for their children. As shown in the Table below the number of under-five children who received feeding from a bottle with a nipple yesterday or last night was 215 (52.44%) and out of these 40.49%, 34.39%, 18.54% and 6.59% was used hands, bottle, cup and spoon. Milk is necessary ingredients or for a person to avoid under nutrition and helps to ensure healthy diet which promote child's health. According to the findings of the study 56.61% of

mothers deliver milk to their children and among these 54.36% mothers feed their children above three times a day, 26.68% of mothers, offers milk three times per day and 18.95 nourish their children with milk less than three times.

4.2.5. Availability and preparation of cow's milk

As shown in the Table 4.14 cow's milk was not available smaller in number households on 174 (43.39%) while 227 (56.61 %) of households have received cow's milk, among these 107 (47.14%) of mothers feed cow's milk at least three times a day, while 76(33.48%) were feed cow's milk to their children less than three times per a day and the remaining 44 (19.38%) gave their children cow's milk more than three times a day.

Table 4.14: Availability and preparation of cow's milk in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

No.	Variables	Freq.		Percent	
		Yes		No	
		Freq.	Percent	Freq.	Percent
1	Is milk available	227	56.61	174	43.39
	Cow's milk feed daily	Freq.		Percent	
	>3 times	44		19.38	
	< 3 times	76		33.48	
	3 times	107		47.14	
	Total	227		100.00	
2	Preparation				
	1 Soaking alone	57		25.11	
	2 Soaking and germination	21		9.25	
	3 Soaking, germination and cooking	137		60.35	
	4 Mixing with other foods	12		5.28	
	Total	227		100.00	
3	In what form				
	1 Solid	32		14.09	
	2 Semi-solid	69		30.39	
	3 Soft foods	126		55.51	
	Total	227		100.00	
4	Number of feed meat/bread/milk/fruit for your child (diversity food)				
	1 Two or three times a week	141		34.39	
	2 More than once a day	11		2.68	
	3 Once a month	27		6.59	
	4 Once a week	135		32.93	
	6 Never	96		23.41	
	Total	410		100.00	
		Yes		No	
5	Contact health extension worker	Freq.	Percent	Freq.	Percent
		329	80.24	81	19.76

With regards to preparation of cow's milk food 137 (31.3 %) of study subject had prepared in soaking, germination and cooking, 57 (25.11%) were prepared in soaking alone, 21(9.2 5%) were

prepared soaking and germination the remaining 12 (5.28%) were prepared in mixed with other foods. From the total study participants, 126 (55.51%) prepared cow's milk food in a form of soft food, 69(30.39%) prepared cow's milk food in a type of semisolid the remaining 32 (14.09%) of the respondents have been prepared cow's milk food in the form of solid. The majority, 1419 (34.39%) of the study participant did feed meat/bread/milk/fruit diversified food for their children two up to three times a week, 135 (32.93%) children were eating diversified food once a week, 96(23.41%) were never used dietary diversity at all, 27 (6.59%) were providing dietary diversity for their children and 11 (2.68%) of mothers did provided their children feed meat/bread/milk/fruit diversified food.

4.3. Bivariate logistic regression analysis

The bivariate analysis (crude analysis) was conducted to find out the independent effect of each explanatory variable on the binary outcome variables. It helps to identify potential variables for the multivariate analysis. The variables associated at 10% level of significance were taken into account in order to not exclude potential determinants from the analysis at early stage.

Bivariate analysis result wasting

Table 4.15: Bivariate analysis result wasting in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Independent Variables	Coefficient	95%CI	
Residence place			
Rural [rc]			
Urban	-14.60 (605.00)	-1200.37	1171.16
Family size	0.32* (0.19)	-0.04	0.69
Level of Mother education			
Nofomal education [rc]			
Read and write only	15.13 (1240.09)	-2415.40	2445.67
Primary	15.13 (1029.84)	-2003.31	2033.58
Secondary	-0.43 (0.42)	-1.26	0.40
College and above	0.24 (0.46)	-.67	1.16
Birth interval	0.65*** (0.17)	0.32	0.99
Child age	−0.08*** (0.01)	-0.10	-0.05
No. children under-five	0.50 (0.35)	-0.19	1.18
Vitamin A supplements			
Yes [rc]			
No	0.86** (0.39)	0.09	1.62
Frequency of breast feed in the last 24 hour	−0.94*** (0.29)	-1.51	-0.36
Providing enough cow's milk			
Yes [rc]			
No	−1.17*** (0.39)	-1.93	-0.40

***significant at 1%, **significant at 5%, * significant at 10%,

Unmarked not significant; *rc*- reference category; the number in the bracket indicates Standard error; CI-confidence interval.

As the result shows in the above table determine the association between prevalence of wasting under nutrition and explanatory variables, bivariate analysis was performed using logistic regression. As indicated in the table 4.15 family size, birth interval, child's age, supply of vitamin A, frequency of breast feeding and provision of cow's milk were identified as significant predictors for wasting in the bivariate analysis. Maternal educational levels, number of under five years' children with in household were not statistically significant predictors wasting.

Bivariate analysis result underweight

According to bivariate statistical analysis in the table 4.16 for underweight age of child, number of children under five years with in a household, maternal age, total number of children, birth interval, children's age and the frequency of visit the household by health extension workers were found to be statistically significant indicators. However, variables such as, birth order and the previous practice breastfeeding were not significantly associated with underweight.

Table 4.16: Bivariate analysis result underweight in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Independent Variables	Coefficient	95%CI	
No children under-five	-1.47^{***} (0.45)	-2.36	-0.59
Mother age	-0.17^{***} (0.61)	-0.29	-0.06
Total number of children	-1.31^{***} (0.40)	-2.09	-0.54
Birth interval	-0.42^{*} (0.26)	-0.92	0.08
Birth order	-0.34 (0.35)	-1.02	0.34
Child age	-0.12^{***} (0.04)	-0.20	-0.05
Ever practiced breast feeding			
Yes^{rc}			
No	11.37 (451.93)	-874.41	897.14
Number of visit by health extension worker	-1.41^{***} (0.47)	-2.33	-0.50

***significant at 1%, **significant at 5% * significant at 10%, unmarked not significant; *rc*-reference category; the number in the bracket indicates Standard error; CI-confidence interval.

Bivariate analysis result stunting

As shown in Table 4.17 Bivariate logistic regression analysis was conducted to identify the independent significant variables that affect the prevalence of stunting family size, residential area, parental marital status was associated with prevalence of stunting on children based on the survey result Stunting is highly prevalence in urban than in rural residential areas.

As shown in table 4.17 other factors which were significantly associated with prevalence of under nutrition stunting were educational status of mothers, family size, residence place, marital status, Household monthly income, and children's birth order, children's sex, Birth interval, provision of vaccination, current condition of breastfeeding and exclusive breastfeeding practice of mothers. Accordingly, prevalence of stunting was of high magnitude in female as compared with males at the same time, it is more prevalence among children whose mothers are not offer breastfeeding.

Table 4.17: Bivariate analysis result stunting in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Independent Variables	Coefficient	95%CI	
Family size	0.43*** (0.16)	0.11	0.76
Residence place			
Rural rc			
Urban	1.56*** (0.34)	0.88	2.23
Mothers marital status			
Currently married rc			
Living together	.72** (0.32)	0.10	1.36
Divorced/separated	-18.51 (1848.61)	-3641.73	3604.71
Windowed	15.97 (1307.17)	-2546.03	2577.98
Level of Mother education			
Nofomal education rc			
Read and write only	16.85 (1165.23)	-2266.97	2300.67
Primary	16.85 (967.68)	-1879.76	1913.46
Secondary	1.65*** (0.34)	0. 99	2.30
College and above	2.40*** (0.41)	1.59	3.20
Household Monthly income	0.0004*** (0.00009)	0.0002	0.0006
Birth order	0.97*** (0.24)	0.50	1.44
Sex of child			
Male rc			
Female	0.93*** *(0.30)*	*0.35*	*1.51*
Birth interval	0.38*** *(0.12)*	*0.15*	*0.61*
Vaccination			
Yes rc			
No	−1.90*** *(0.36)*	*-2.59*	*-1.17*
Currently breast feeding			
Yes rc			
No	−0.48* *(0.28)*	*-1.02*	*0.06*
Exclusive breast feeding			
Yes rc			
No	1.87*** *(0.31)*	*1.26*	*2.48*

***significant at 1%, **significant at 5% * significant at 10%, unmarked not significant; rc-reference category; the number in the bracket indicates Standard error; CI-confidence interval.

4.4. Multivariate logistic regression analysis

Multivariate logistic regression analysis was conducted to identify the independent predictor variables that affect child under nutrition. All explanatory variables up to 10% level of significance in the bivariate analysis were analysed in the multivariate model to find out the imperative determinants of child under nutrition. The table below shows the estimated coefficients of explanatory variables along with the 95% confidence interval.

In multivariable analysis displayed in table number 4.18, 4.19 and 4.20 above table the multivariate analysis was identified Family size, Birth interval, Child age and Frequency of breast feed as significant determinants for wasting. While for stunting, family size, level of mother's education, birth order, currently breast feeding, exclusive breast feeding and monthly income were found as independent and statistically significant determinants. Additionally age of child and household who hadn't got advice and not visited by health extension workers was found statistically significant determinants of underweight.

Multivariate analysis result wasting

Family size: The study findings show that the higher family number in the household, the greater the chance of being wasted. However, the result is significant only at 5% significance level. This might be the care and treatment decrease as the family number increases in the household. This finding is consistent with previous studies of Abebe and Tigiest (2018) which found rather than household family size number was critical and significant determinant in aggravating wasting.

Birth interval: The birth interval of child is found to be a statistically significant determinant of wasting. The positive coefficient indicates relationship that's as birth interval of child increase the child has high probability of being wasted at 5% significance level. This result is in harmony with finding of Kasahun (2013) which found birth interval was the most important positive determinants of children nutritional status in Ethiopia.

Child age: Unexpectedly, this result revealed that age of child had a negative coefficient and significant at 5%. This implies that as age of the child increases the child has less risk of being wasted. This result is similarity with previous studies of Bealu *et al.*, (2017) and Beka *et al.* (2009b) which revealed that the risk of being wasting to be decrease as the age of a child increase. It might be because of wasting is a cumulative effect of short term food deficient, care and exposure to acute diseases.

Frequency of breast feeding: Wasting is also influenced by frequency of breast feeding with a statistically 10% significant positive coefficient indicating children from a less frequently breast fed has higher likelihood of being wasted compared to those high frequency of breast feeding. This

finding is similar to previous studies of Rajib *et al.,* (2015) and Kasahun (2013) showed that less frequently of breast feeding children was the significantly determinant of wasting.

Table 4.18: Multivariate analysis result wasting in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Independent Variables	Coefficient	95%CI
Family size	-2.73^{**} (1.16)	-5.01 -0.45
Birth interval	4.46^{**} (1.97)	0.59 8.32
Child age	-0.56^{**} (0.23)	-1.02 -0.11
Vitamin A supplements		
Yes^{rc}		
No	-3.82 (3.70)	-11.08 3.44
Frequency of breast feed in the last 24 hour	2.47^{*} (1.40)	-0.29 5.22
Providing enough cow's milk		
Yes^{rc}		
No	-0.56 (3.42)	-7.28 6.15

***significant at 1%, **significant at 5% * significant at 10%, unmarked not significant; - reference category; the number in the bracket indicates Standard error; CI-confidence interval.

Multivariate analysis result underweight

Age of child: the finding showed that the probability of child to be underweight is significantly higher among children who are relatively low age. In particular, as child age increases the probability of being normal in nutrition status among under-five children increases. This implies that as age of the child increases the child has less risk of being underweight. This result is similarity with previous studies of Bealu *et al.,* (2017) and Beka *et al.,* (2009b) which revealed that the risk of being underweight to be not increased as the age of a child increase.

Number of visit by health extension workers: The regression result revealed that limited access to information on child care and feeding practices was negatively and significantly associated with underweight at 5% level of significance. This implies that as number of visit with health extension workers increases the child has less risk of being underweight. This result is similarly with Misgan *et al.,* (2016) which revealed that the risk of being underweight to be not increased as the number of visit by health extension workers. Moreover, health extension workers assigned to the study area expected to provide basic knowledge and skill on improved child nutrition for the communities under study. However, the FGD respondents indicated that although there were some attempts made to improve our awareness on how to care and feed our children especially through health extension workers, it was adequate and we have access to get adequate awareness creation and knowledge disseminations conducted through health extension workers to improve our knowledge on child care and breast feeding practices.

Table 4.19: Multivariate analysis result for underweight in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Independent Variables	Coefficient	95%CI
No of children under five	-1.33(0.35)	-8.3 0.56
Mothers age	-006(0.042)	-0.09 0.08
Total number of children	0.47(0.33)	-1.11 0.17
Birth interval	0.10(0.21)	-0.31 0.52
Birth order	-0.34(0.35)	-1.02 0.34
Children age	-0.2**(0.01)	-0.05 -0.005
Number of visit by extension workers	-0.58**-(0.47)	-1.11 -0.05

***significant at 1%, **significant at 5% * significant at 10%, unmarked not significant; - reference category; the number in the bracket indicates Standard error; CI-confidence interval.

Multivariate analysis result stunting

Family size: The study findings show that the higher family number in the household, the greater the chance of being stunted. However, the result is significant only at 1% significance level. This might be the care and treatment decrease as the family number increases in the household. This finding is consistent with previous studies of Bezuneh, (2010) which found rather than household family size number was critical and significant determinant in aggravating stunting.

Mother's education: This study demonstrated that there is significant association between mother's education and stunting. The level of significance increased with level of education. Children whose mother's education level at secondary and college level and above had positively associated with stunting at 1% significance level. This finding is in line with study results obtained by Gazae and Nigatu, (2014) which found out children from mother which has higher education level attainment was less chance to be being stunted. The direct relationship of mother's education and stunting could be explained that educated mothers are more conscious about their children's health; child nutrition, and they tend to look after their children in a better way.

Monthly income: Stunting is also influenced by household monthly income with a statistically 5% significant positive coefficient indicating children from a household with less monthly income has higher likelihood of being stunted compared to those household higher monthly income. This finding is similar to previous studies of Rajib *et al*., (2015) and Kasahun, (2013) showed that the monthly family income was the significantly determinant of stunting.

Birth interval: The birth interval of child is found to be a statistically significant determinant of stunting. The positive coefficient indicates direct relationship that's as birth interval of child increase the child has probability of being stunted at 5% significance level. This result is in harmony with finding of Kasahun, (2013) which found birth interval was the most important determinants of children nutritional status in Ethiopia.

Currently breastfeeding: Currently breastfeeding showed an effect on being stunted with a statistically 1% significant negative coefficient indicating children who were not fed breast currently were not likely being stunted compared to those children who fed breast currently. Similar finding was reported by Beka *et al.,* (2009b) which revealed that the risk of being not currently breastfeeding practice was not associated with stunting. It might be because of stunting is a cumulative effect of long term food deficient, care and exposure to chronic diseases.

Exclusive breastfeeding: Not exclusive breastfeeding showed an effect on being stunted with a statistically 1% significant positive coefficient indicating children who were not fed breast exclusively were more likely being stunted compared to those children who fed breast exclusively. Similar finding was reported by Rajib *et al.,* (2015) not exclusive breastfeeding practice was greatly associated with stunting.

Table 4.20: Multivariate analysis result stunting in Bishoftu town, Oromia, Ethiopia, 2019 (N=410).

Independent Variables	Coefficient	95%CI	
Family size	2.30*** (0.45)	1.41	3.19
Level of Mother education			
$Nofomal\ education^{rc}$			
Read and write only	22.00 (1992.48)	-3883.20	3927.17
Primary	16.08 (1322.03)	-2575.05	2607.20
Secondary	5.80*** (0.99)	3.86	7.74
College and above	5.08*** (1.22)	2.69	7.48
Household Monthly income	0.00037** (0.00017)	0.00003	0.0007
Birth interval	2.26** (1.10)	0.11	4.41
Sex of child			
$Male^{rc}$			
Female	0.87 (0.71)	-0.53	2.27
Vaccination			
Yes^{rc}			
No	-2.70 (2.31)	-7.24	1.83
Currently breast feeding			
Yes^{rc}			
No	−3.15*** (0.60)	-4.34	-1.97
Exclusive breast feeding			
Yes^{rc}			
No	2.80*** (0.61)	1.61	4.00

***significant at 1%, **significant at 5% * significant at 10%, unmarked not significant; - reference category; the number in the bracket indicates Standard error; CI-confidence interval.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Currently under nutrition among large number of 6 up to 59 months of aged children is a principal subject in most of developing country including Ethiopia. The causes of children under nutrition are multidimensional in which it may ranges from household related factors up to socioeconomic condition of the country or districts. The study realised under nutrition in Bishoftu is prevalence and mainly arise due to demographic failures and many others socio-economic factors. According to the finding of this study the following conclusions and recommendations of the study has been presented. The study examined the prevalence and associated of child under nutrition from sampled 410 under-five children showed that 6.9% of the under five children were chronically malnourished or stunted and 13.8% of them were severely stunted. Under-five children who were under state of both acute and chronic under nutrition underweight found to be 2.2% were underweight. Similarly, it was inferred that 11.2% of the children were acutely under nourished wasted. Hence, it discloses that the prevalence of under nutrition in the study area is high.

The multivariate regression analysis showed that Age of child, Family size, Birth interval, Frequency of breast feed, Number of visit by health extension worker, Family size, Level of mother's education, Currently breast feeding, Exclusive breast feeding and Monthly income were found to be positive and statistically significant determinants of under nutrition among under-five children in the study area (at p value <1%, 5% and 10%). Additionally frequency of breast feeding in the last 24 hours was negative and significant determinant for child under nutrition (likely affect child under nutrition) at (p< 10%).

5.2. Recommendations

Based on the finding of this study prevalence of under nutrition was identified as a major challenge of child nutrition and major causes of under nutrition were investigated. Under nutrition is complex problem that hinders a child's proper growth and development and make him/her weakness and originate different kind of abnormalities among children. In order to reduce under nutrition and resulted problems the following suggestions has been forwarded.

- Knowledge, attitude and awareness should be enhanced at household and community level Bishoftu Health Office and Women and Youth Affairs Office, Education Office as well as NGO's working in the area through providing continuous training and information provision regarding the quality of care, attention provide to the children and treatment for children. Because age of child, family size, birth interval, level of mother's education, currently breast feeding, Frequency of breast feeding in the last 24 hours and not exclusive breast feeding were found statistically significant determinants for child under nutrition.

- Income creating activities should be weighted and improved through providing priority to households who has inadequate income source by Bishoftu town Finance and Development Office as well as by Bishoftu town Small-scale Initiative Office and NGO's. Because, monthly household income strongly significant determinant for child under nutrition. Also Bishoftu Town Health Office Catchment Health Centres as well as by extension workers through making service available at any time convenient for the client because number of visit by health extension worker were found significant determinants for child under nutrition.
- Yearly assessment meeting with community and experts should be incorporated by Bishoftu town health office.

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Appendices

Appendix 1: Bivariate logistic regression estimation result

```
. gsem (wasting<-ib1.residencep ,logit)(stunting<- familysize,logit)(underweight<-nounder5ny ,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -367.40306
Iteration 1:   log likelihood = -344.23201
Iteration 2:   log likelihood = -342.89375
Iteration 3:   log likelihood = -342.73203
Iteration 4:   log likelihood =  -342.7042
Iteration 5:   log likelihood = -342.69775
Iteration 6:   log likelihood = -342.69617
Iteration 7:   log likelihood = -342.69585
Iteration 8:   log likelihood = -342.69578
Iteration 9:   log likelihood = -342.69577

Generalized structural equation model             Number of obs   =        410
Log likelihood = -342.69577
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
2.residencep	-14.60366	604.9916	-0.02	0.981	-1200.365	1171.158
_cons	16.61709	604.9915	0.03	0.978	-1169.145	1202.379
stunting <-						
familysize	.4336838	.1649798	2.63	0.009	.1103293	.7570384
_cons	.0854041	.6118046	0.14	0.889	-1.113711	1.284519
underweight <-						
nounder5ny	-1.473705	.45305	-3.25	0.001	-2.361667	-.5857431
_cons	6.176888	.950956	6.50	0.000	4.313048	8.040727

```
.

. gsem (wasting<-familysize,logit)(stunting<-ib1.residencep,logit)(underweight<-motheragem,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -362.92146
Iteration 1:   log likelihood = -342.85536
Iteration 2:   log likelihood = -341.36405
Iteration 3:   log likelihood = -341.32431
Iteration 4:   log likelihood = -341.32423
Iteration 5:   log likelihood = -341.32423

Generalized structural equation model             Number of obs   =        410
Log likelihood = -341.32423
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
familysize	.323532	.18752	1.73	0.084	-.0440004	.6910644
_cons	.9285007	.7034581	1.32	0.187	-.4502518	2.307253
stunting <-						
2.residencep	1.556193	.3434237	4.53	0.000	.8830954	2.229291
_cons	.4054651	.3042903	1.33	0.183	-.1909329	1.001863
underweight <-						
motheragem	-.1742839	.0605901	-2.88	0.004	-.2930383	-.0555294
_cons	9.551362	2.195756	4.35	0.000	5.247759	13.85496

```
.
```

```
. gsem (wasting<-ib1.motheredui ,logit)(stunting<-ib1.maritalsta ,logit)(underweight<- totalchild ,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -349.13738
Iteration 1:   log likelihood = -322.85441
Iteration 2:   log likelihood = -320.46355
Iteration 3:   log likelihood =   -320.165
Iteration 4:   log likelihood = -320.10417
Iteration 5:   log likelihood = -320.08965
Iteration 6:   log likelihood = -320.08659
Iteration 7:   log likelihood = -320.08615
Iteration 8:   log likelihood = -320.08609
Iteration 9:   log likelihood = -320.08608

Generalized structural equation model             Number of obs   =        410
Log likelihood = -320.08608
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
motheredui						
2	15.13468	1240.089	0.01	0.990	-2415.395	2445.665
3	15.13468	1029.838	0.01	0.988	-2003.311	2033.58
4	-.4272796	.4225663	-1.01	0.312	-1.255494	.400935
5	.2445928	.4646651	0.53	0.599	-.666134	1.15532
_cons	2.106926	.3530339	5.97	0.000	1.414992	2.79886
stunting <-						
maritalsta						
2	.7277876	.3205187	2.27	0.023	.0995825	1.355993
3	-18.51009	1848.616	-0.01	0.992	-3641.73	3604.71
4	15.97313	1307.169	0.01	0.990	-2546.03	2577.977
_cons	1.268483	.2667947	4.75	0.000	.7455752	1.791391
underweight <-						
totalchild	-1.314641	.3960324	-3.32	0.001	-2.090851	-.538432
_cons	6.970404	1.21932	5.72	0.000	4.58058	9.360227

```
.
```

```
. gsem(wasting<-ib1.sexchildse,logit)(stunting<-montlyinco,logit)( underweight<-ib1.motheredui,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -362.36037
Iteration 1:   log likelihood = -336.48829
Iteration 2:   log likelihood = -332.71124
Iteration 3:   log likelihood = -331.75024
Iteration 4:   log likelihood = -331.54611
Iteration 5:   log likelihood = -331.49714
Iteration 6:   log likelihood = -331.48698
Iteration 7:   log likelihood =  -331.4854
Iteration 8:   log likelihood = -331.48521
Iteration 9:   log likelihood = -331.48518
Iteration 10:  log likelihood = -331.48517

Generalized structural equation model             Number of obs   =        410
Log likelihood = -331.48517
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
0.sexchildse	-.1829711	.3225269	-0.57	0.571	-.8151122	.44917
_cons	2.233592	.2296107	9.73	0.000	1.783563	2.683621
stunting <-						
montlyinco	.0004021	.0000947	4.25	0.000	.0002166	.0005877
_cons	.3906168	.3111747	1.26	0.209	-.2192744	1.000508
underweight <-						
motheredui						
2	16.38605	.	.	.	.	.
3	16.38605	.	.	.	.	.
4	16.38605	.	.	.	.	.
5	16.38605	.	.	.	.	.
_cons	2.106841	.3530221	5.97	0.000	1.41493	2.798751

```
. gsem (wasting<-spaceinter,logit)(stunting<-birthorder,logit)(underweight<-ib1.sexchildse,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -358.89354
Iteration 1:   log likelihood = -332.49642
Iteration 2:   log likelihood = -330.18607
Iteration 3:   log likelihood = -329.56902
Iteration 4:   log likelihood = -329.45966
Iteration 5:   log likelihood = -329.43412
Iteration 6:   log likelihood = -329.42813
Iteration 7:   log likelihood = -329.42682
Iteration 8:   log likelihood = -329.42655
Iteration 9:   log likelihood = -329.42649
Iteration 10:  log likelihood = -329.42647

Generalized structural equation model             Number of obs   =        410
Log likelihood = -329.42647
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
spaceinter	.6548195	.1707589	3.83	0.000	.3201382	.9895007
_cons	1.609351	.183289	8.78	0.000	1.250111	1.968591
stunting <-						
birthorder	.9731788	.2402469	4.05	0.000	.5023035	1.444054
_cons	.2456344	.348203	0.71	0.481	-.4368309	.9280998
underweight <-						
0.sexchildse	14.97753	.	.	.	.	.
_cons	3.139927	.3404081	9.22	0.000	2.472739	3.807114

```
.
```

```
. gsem (wasting<-childageinmonth,logit)(stunting<-ib1.sexchildse,logit)(underweight<-birthorder,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -355.22821
Iteration 1:   log likelihood = -329.95543
Iteration 2:   log likelihood = -329.03398
Iteration 3:   log likelihood =  -329.0271
Iteration 4:   log likelihood =  -329.0271

Generalized structural equation model             Number of obs   =        410
Log likelihood =  -329.0271
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
childageinmonth	-.0753666	.0128783	-5.85	0.000	-.1006076	-.0501256
_cons	4.815596	.5595617	8.61	0.000	3.718875	5.912316
stunting <-						
0.sexchildse	.9335822	.2988411	3.12	0.002	.3478644	1.5193
_cons	1.340832	.1674401	8.01	0.000	1.012655	1.669008
underweight <-						
birthorder	-.3406762	.3473987	-0.98	0.327	-1.021565	.3402126
_cons	4.4268	.7697761	5.75	0.000	2.918067	5.935534

```
.
. gsem (wasting<- nounder5ny,logit)(stunting<-ib1.motheredui,logit)(underweight<-spaceinter,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -346.37299
Iteration 1:   log likelihood = -323.77251
Iteration 2:   log likelihood = -322.29902
Iteration 3:   log likelihood = -322.12188
Iteration 4:   log likelihood = -322.08906
Iteration 5:   log likelihood = -322.08166
Iteration 6:   log likelihood = -322.07993
Iteration 7:   log likelihood = -322.07954
Iteration 8:   log likelihood = -322.07945
Iteration 9:   log likelihood = -322.07944

Generalized structural equation model             Number of obs   =        410
Log likelihood = -322.07944
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
nounder5ny	.4980288	.3501295	1.42	0.155	-.1882124	1.18427
_cons	1.512237	.4562346	3.31	0.001	.6180335	2.40644
stunting <-						
motheredui						
2	16.85046	1165.238	0.01	0.988	-2266.973	2300.674
3	16.85046	967.6772	0.02	0.986	-1879.762	1913.463
4	1.647029	.3358677	4.90	0.000	.9887407	2.305318
5	2.396077	.4097922	5.85	0.000	1.592899	3.199255
_cons	.2666291	.2214822	1.20	0.229	-.1674681	.7007263
underweight <-						
spaceinter	-.4217141	.2551788	-1.65	0.098	-.9218554	.0784272
_cons	4.47605	.6084868	7.36	0.000	3.283437	5.668662

```
.
```

```
. gsem (wasting<-ib1.vitaminaha,logit)(stunting<-ib1.childvacci,logit)(underweight<-ib1.diarrhealc,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -352.61854
Iteration 1:   log likelihood = -323.56849
Iteration 2:   log likelihood = -319.87802
Iteration 3:   log likelihood = -318.89933
Iteration 4:   log likelihood =  -318.6838
Iteration 5:   log likelihood = -318.63836
Iteration 6:   log likelihood = -318.63031
Iteration 7:   log likelihood = -318.62848
Iteration 8:   log likelihood = -318.62803
Iteration 9:   log likelihood = -318.62794
Iteration 10:  log likelihood = -318.62791

Generalized structural equation model             Number of obs   =        410
Log likelihood = -318.62791
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
0.vitaminaha	.8570669	.389874	2.20	0.028	.092928	1.621206
_cons	1.894116	.1839431	10.30	0.000	1.533594	2.254638
stunting <-						
0.childvacci	-1.877839	.3617102	-5.19	0.000	-2.586778	-1.1689
_cons	1.983212	.1589927	12.47	0.000	1.671592	2.294832
underweight <-						
0.diarrhealc	17.01986	.	.	.	.	.
_cons	1.098671	.3849058	2.85	0.004	.3442692	1.853072

```
.
. gsem (wasting<-ib1.sexchildse,logit)(stunting<-spaceinter,logit)(underweight<-childageinmonth,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -367.33843
Iteration 1:   log likelihood = -344.95226
Iteration 2:   log likelihood = -341.57165
Iteration 3:   log likelihood = -341.10417
Iteration 4:   log likelihood = -341.09592
Iteration 5:   log likelihood = -341.09592

Generalized structural equation model             Number of obs   =        410
Log likelihood = -341.09592
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
0.sexchildse	-.1829711	.3225269	-0.57	0.571	-.8151122	.4491699
_cons	2.233592	.2296107	9.73	0.000	1.783563	2.683621
stunting <-						
spaceinter	.3787085	.1169481	3.24	0.001	.1494944	.6079225
_cons	1.325851	.166563	7.96	0.000	.9993933	1.652308
underweight <-						
childageinmonth	-.1219633	.0374666	-3.26	0.001	-.1953965	-.0485302
_cons	8.788968	1.887011	4.66	0.000	5.090495	12.48744

```
.
```

```
. gsem (wasting<-howmanytim,logit)(stunting<-ib1.currenltyb,logit)(underweight<-ib1.practisedb,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -300.02693
Iteration 1:   log likelihood = -279.41035
Iteration 2:   log likelihood = -279.05626
Iteration 3:   log likelihood = -278.99877
Iteration 4:   log likelihood = -278.98722
Iteration 5:   log likelihood = -278.98472
Iteration 6:   log likelihood = -278.98415
Iteration 7:   log likelihood = -278.98401
Iteration 8:   log likelihood = -278.98399

Generalized structural equation model             Number of obs   =        410
Log likelihood = -278.98399
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
howmanytim	-.9399255	.2945589	-3.19	0.001	-1.51725	-.3626006
_cons	5.252919	1.028787	5.11	0.000	3.236533	7.269305
stunting <-						
0.currenltyb	-.4782054	.2764824	-1.73	0.084	-1.020101	.0636901
_cons	1.950993	.2056551	9.49	0.000	1.547916	2.354069
underweight <-						
0.practisedb	11.36686	451.9367	0.03	0.980	-874.4128	897.1465
_cons	3.750599	.337193	11.12	0.000	3.089713	4.411485

```
.

. gsem (wasting<-ib1.enoughcows,logit)(stunting<-ib1.didexclusi,logit)(underweight<-howoftenhe,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -351.28637
Iteration 1:   log likelihood = -330.04087
Iteration 2:   log likelihood =  -328.5589
Iteration 3:   log likelihood = -328.52445
Iteration 4:   log likelihood = -328.52442

Generalized structural equation model             Number of obs   =        410
Log likelihood = -328.52442
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wasting <-						
0.enoughcows	-1.172391	.38957	-3.01	0.003	-1.935934	-.4088477
_cons	2.908721	.3423035	8.50	0.000	2.237818	3.579623
stunting <-						
0.didexclusi	1.868592	.3095287	6.04	0.000	1.261927	2.475257
_cons	.2876821	.2545875	1.13	0.258	-.2113003	.7866645
underweight <-						
howoftenhe	-1.414772	.466951	-3.03	0.002	-2.329979	-.4995644
_cons	7.500432	1.425486	5.26	0.000	4.706531	10.29433

```
.
```

Appendix 2: Multivariate logistic regression estimation result

```
. gsem (underweight<-nounder5ny motheragem childageinmonth totalchild spaceinter childageinmonth howoftenhe,logit)
note: The following observed variable names will be treated as latent variables: ID, WHZ, HAZ, WAZ, MUACZ.  If this
      is not your intention use the nocapslatent option, or identify the latent variable names in the latent()
      option.

Iteration 0:   log likelihood = -128.61491
Iteration 1:   log likelihood = -124.89328
Iteration 2:   log likelihood = -124.88094
Iteration 3:   log likelihood = -124.88094

Generalized structural equation model             Number of obs   =        401
Log likelihood = -124.88094
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
underweight <-						
nounder5ny	-.1331264	.3538211	-0.38	0.707	-.826603	.5603501
motheragem	-.0060148	.0419425	-0.14	0.886	-.0882206	.0761909
childageinmonth	-.02351	.0117467	-2.00	0.045	-.0465332	-.0004868
totalchild	-.4683935	.3257211	-1.44	0.150	-1.106795	.1700082
spaceinter	.1044084	.2120249	0.49	0.622	-.3111528	.5199695
howoftenhe	-.5834602	.2709155	-2.15	0.031	-1.114445	-.0524757
_cons	5.475426	1.213262	4.51	0.000	3.097477	7.853376

Appendix 3: Multicollinearity test for wasting, stunting and underweight

Multi collinearity test for Wasting

```
. pwcorr familysize totalchild spaceinter childageinmonth vitaminaha howmanytim enoughcows
```

	family~e	totalc~d	spacei~r	childa~h	vitami~a	howman~m	enough~s
familysize	1.0000						
totalchild	0.7853	1.0000					
spaceinter	0.5853	0.7183	1.0000				
childagein~h	-0.0516	-0.1224	-0.0733	1.0000			
vitaminaha	-0.1017	-0.2221	-0.0634	0.2205	1.0000		
howmanytim	0.3098	0.2492	0.1862	0.4510	-0.0921	1.0000	
enoughcows	0.2398	0.2730	0.3183	-0.3337	-0.2721	0.1254	1.0000

Multi collinearity test for underweight

```
. pwcorr nounder5ny motheragem totalchild spaceinter childageinmonth diarrhealc howoftenhe
```

	nounde~y	mother~m	totalc~d	spacei~r	childa~h	diarrh~c	howoft~e
nounder5ny	1.0000						
motheragem	0.4645	1.0000					
totalchild	0.5263	0.6265	1.0000				
spaceinter	0.1073	0.4523	0.7183	1.0000			
childagein~h	0.0226	-0.1363	-0.1224	-0.0733	1.0000		
diarrhealc	0.0983	0.0296	0.0546	-0.0539	0.0026	1.0000	
howoftenhe	0.1045	0.2791	-0.0770	-0.1098	0.0653	0.2752	1.0000

.

Multi collinearity test for stunting

```
. pwcorr familysize residencep motheredui maritalsta montlyinco birthorder sexchildse spaceinter childvacci currenlty
> b didexclusi
```

	family~e	reside~p	mother~i	marita~a	montly~o	birtho~r	sexchi~e
familysize	1.0000						
residencep	-0.1925	1.0000					
motheredui	-0.3827	0.2729	1.0000				
maritalsta	0.2235	-0.5009	-0.1184	1.0000			
montlyinco	-0.1142	0.1835	0.5021	-0.1848	1.0000		
birthorder	0.7180	-0.2770	-0.3715	0.3140	-0.1740	1.0000	
sexchildse	0.1521	-0.1904	-0.0482	0.2786	-0.1588	-0.0881	1.0000
spaceinter	0.5853	-0.3036	0.0014	0.2454	0.0290	0.7296	-0.0319
childvacci	-0.3129	0.6143	0.5479	-0.2888	0.2637	-0.2988	-0.3014
currenltyb	0.0408	0.0909	-0.0318	-0.0894	-0.1753	0.0079	0.3245
didexclusi	0.1832	-0.4346	-0.2008	-0.0359	-0.0664	-0.0717	0.2799

	spacei~r	childv~i	curren~b	didexc~i
spaceinter	1.0000			
childvacci	-0.2377	1.0000		
currenltyb	-0.0102	0.0019	1.0000	
didexclusi	-0.0288	-0.2836	0.0360	1.0000

Appendix 4: English version questioner

Consent Form

My name is Melaku Abebaw I am researcher at Addis Abeba University, Centre for Food Security and Development study (CFSS). The purpose of the study is to assess the Prevalence of under nutrition and associated factors among under-five children in which its result will contribute to the success of this study. Furthermore, the study will be helpful for the future studies as well in terms of improving the nutritional situation of infants and young children in the area. This information will be help the government to plan health service. In addition, your child's height and weight will be measured and recorded.

Duration

There is no limit time on how long you will take in responding to the question on child dietary practice and the taking of child weight and height. If you decide to stop participating in between, there will be no penalty for your decision.

Risk

I would like to assure you that is no physical or psychological risk expected being involved in the study except for the minimum privacy invasion during dietary assessment period which doesn't cause any harm on you. In order to avoid these problem data collectors who are familiar which your living style will be recruited from local community to collect the data.

Benefits

You have the right to know the finding of study. You will be given experts advising about the appropriate childe feeding practices and nutritional status of infants and young children.

Confidentiality

Your child's personal information will only be used for the purpose of the study. Whatever information you provide will be kept confidential and will not be shared with anyone other than members of our survey team. You and your child will not be personally identified in the study report. For this purpose, the data will be secured strictly without your child name and detail identification.

Participation

You have to know that your participation is largely based on your willingness and approval. You have the right to say "no" and not participate in the study. You will not be penalized if decide not to participate. If you wish to with draw from this study you can do that at any time.

Questions: you cane aske any question about this study.

Compensation/Incentive: there will be no payments for participating in this study.

Contact information: if you have any questions, concerns and complaints contact the following people: principal researcher Mr Melaku Abebaw canter foods security and development study MSc candidate student in Addis Ababa University.

Address: email:-melakuabebaw01@gmail.com Tel. (Mobile No) +2519-23-93-25-24, +2519-13-94-57-32.

Confirmation of agreement

I have read the consent form or interviewer has read the consent form. I have understood the aim of the study and the tinges that to do if I agreed to participate in the study. I know that my participation is based on my will and have right not to do so, if I do not want to participate.

Please tell us if you agree or not?

1. Yes
2. If no, skip to the next participant

Respondent's (mother name) ----------signature----------

Date of interview: ----------time started ----------time finished----------

Interviewer name ---------- signature----------date ----------

Supervisors name ----------signature----------date ----------

Thank you for willingness to participate in this study!!!!!!

No	Question	Response	Code	Remark /Skip
PART ONE: Socio-demographic and Economic Characteristic				
1	Place of residence	Rural Urban	1 2	
2	Name of kebele			
3	Months/years lived in kebele	Months/years		
4	Religion	Orthodox Protestant Catholic Muslim Traditional No religion	1 2 3 4 5 6	
5	Total family size			
6	How many under five years' children live in the household?	In numbers		
7	Who is the head of the household?	Mather Father Both Other_____(specify)	1 2 3 4	
8	Mothers age (in years)	Years		
	Mothers marital status	Currently married Living together Divorced/separated Windowed	1 2 3 4	
9	What is the highest level of Mather education	No formal education Red and wright only Primary education secondary education college and above	1 2 3 4 5	
10	What is the main occupation of head of the house	Farmer Pastoralist Agro Pastoralist Employed Merchant Labourers Other (specify_____)	1 2 3 4 5 6 7	
11	What is the main source of income of household?			
12	What is the average monthly income of household (in birr)?	Birr		
13	Household expenditure-spend money/budget	Household food Consumption/purchasing food Purchasing crows Children education Purchasing cloth	1 2 3 4 5	
14	What are the sources of food for your household ?	Purchasing from market From food aid/donation Shared production Other (specify----------)	1 2 3 4	
Part two: maternal characteristics				

1	Total number of children ever born?	---------- children		
2	Berth order of the index child?	----------		
3	What is the usual space/berth interval bee twin your children?	----------years interval		
4	What are the major sores of information on child feeding?	Radio Television Mobile telephone Magazine and newspaper Health extension workers Relative/friend/family No information	1 2 3 4 5 6 7	
5	What are your mines of transport to market /hospital	Don't use any transport Car Moher bike Bajaj	1 2 3 4	
6	What is the Mather occupation	House wife Petty trade Government employed civil servant/NGO staff self employed	1 2 3 4 5	
Part three: Childs characteristics				
1	Sex of child	Male Female	1 2	
2	Date of birth of the child (DD/MM/YY *(if possible verify with the available documents*)	----------		
3	Has your child ever been vaccinated	Yes No	1 2	
4	If yes, what type of vaccine child take? More than one answer is possible	BCG Polio PCV Pentavalent Measles Other(specify----------)	1 2 3 4 5 6	See EPI card
5	Has the child received vitamin A supplements?	Yes No	1 2	
6	Did the child suffer from any disease in the last two weeks?	Diarrheal disease Respiratory disease Measles Fever Cough/cold Vomiting stomach ache Other (specify----------)	1 2 3 4 5 6 7	
7	Do you take your child to health institution for sickness?	Yes No	1 2	

PART FOUR: **knowledge of Mothers Towards Beret Feeding and Complementary feeding**				
1	Do you know the importance of barest feeding?	Yes No	1 2	
2	Which one of the following do you think is/are important for the new born?	Brest milk only Breast milk with plain water Formula milk only	1 2 3	
3	For how long should infant EBF?	No EBF < 4 months 4-6 months > 6 months	1 2 3 4	
4	Do you think breast feeding harm your child?	Yes No	1 2	
5	Do you think bottle feeding may harm your child?	Yes No	1 2	
6	Have you ever practiced breast feeding	Yes No	1 2	If yes skip Q# 7
7	If no why?			
8	Are you currently breast-feeding	Yes No	1 2	If yes skip Q# 9
9	If didn't breastfeed, why did you stop?	Mother pregnant Mothers sick Mothers tired of breastfeeding Child starts to take additional solid Breast milk make child sick Not enough breast milk Other reason {specify-------)	1 2 3 4 5 6 7	
10	If you are breast feeding haw many times in the last 24 hour including day and night did you breastfeed?	> 8 time 4-7 time < 3time Don't know	1 2 3 4	
11	From the following which one did you feed in the last 24 hour including day and night did?	Breast milk Plain water Formula milk Caws milk Fruit juice Tea Sugar with water	1 2 3 4 5 6 7	
12	When did your child start complementary feeding in addition to breast milk?	< 6 month At 6 month > 6 month	1 2 3	
13	What is the reason to start	No enough breast milk Not enough time to	1 2	

	complementary food for your child?	breastfeeding Avoid to start food Child reaching for food Child always crying Child becomes active Good for child growth Protects child from disease Tradition I don't know/had no reason	3 4 5 6 7 8 9 10	
14	Do you feed diversified diet for your Child?	Yes No	1 2	If yes skip Q# 15
15	If no why do not feed the diversified diet?	I don't know its advantage Fear that the child does not like it Causes discomfort for child Culturally forbidden for young Children High market price of vitamin A rich food source's Other (specify----------)	1 2 3 4 5 6	
PART FIVE: Practice of Mother Towards Breast and Complementary Feeding				
1	When did you start breast feeding after delivery?	Immediately/within 1hour after birth After first hour After 2-6 hour After 7-12 hour After more than one day Don't remember/ don't know	1 2 3 4 5 6	
2	Daily frequency of breast feeding	< 4 time a day > 4 time a day	1 2	
3	Did you exclusively breast feed	Yes No	1 2	If NO skip Q# 4
4	If yes how long EBF	2 month 3 month 4 month > 4 month	1 2 3 4	
5	Did you give colostrum to your baby?	Yes No	1 2	If yes skip Q#6
6	If your answer is no what is your reason not giving colostrum?	I had not white milk First milk is dirty like bus Everybody say it shouldn't be given	1 2 3	
7	What was the first nutrient given for the infant	Plain water Breast milk Formula milk Water with breast milk	1 2 3 4	
8	What type of foods do you prepare and	Injera Bread	1 2	

	give for child as complementary food?	Porridge Injera Other(specify----------)	3 4 5	
9	Do you prepare the food for your child from different crops?	Yes No	1 2	
10	Most of the time, from what kind of food source do you prepare complementary food?	Cereal/grain only Cereal mix with pulse Pulse only (beans and peas) Milk and milk products Root and tubers Fruits and vegetables eggs meat others(specify----------)	1 2 3 4 5 6 7 8 9	
11	Did you feed the child anything from a bottle with a nipple yesterday or last night?	Yes No	1 2	
12	What material do you use to feed your child?	Spoon Cup Hand Bottle Other (specify----------)	1 2 3 4 5	
13	Do you have enough cows' milk for your child daily?	Yes No	1 2	
14	How many times do you feed cow's milk for your child daily?	<3 times 3 times >3 times	1 2 3	
15	How do you prepare complementary food for your child?	Soaking alone Soaking and germination Soaking, germination and cooking Mixing with other foods	1 2 3	
16	How you feed your young children? In what form of complementary food?	Solid Semi-solid Soft foods	1 2 3	
17	How many times do you feed meat/bread/milk/fruit for your child?	Never Once a day More than once a day Once a week Two or three times a week Once a month	1 2 3 4 5 6	
PART SIX: Health Extension Service				
1	Do you have contact with health extension workers?	Yes No	1 2	
2	How often does the health extension worker visit you?	Daily Weekly Monthly Quarterly	1 2 3 4	

		Other (Specify----------)	5	
3	Have got any training/ type of support?	Yes No	1 2	
4	If yes how many time?	----------time		
5	Did the training change your child feeding practice?	Yes No	1 2	

Thank you very much for giving your golden time and co-operation!!

Appendix 5: Anthropometric measurements children 6-59 months

No.	Weight of children (in kg)	Height of children (in cm)	MUAC
1			
2			
3			
4			
5			
6			
7			

Appendix 6: Translated questioner (Afan oromo)

Qorannoo "prevalence of under nutrition and associated factors among under five children in *Bishoftu* town''.

Gaffii fuulaf fulatti haati gaafatamtu!

Seensa fi fedha gaafachuu

Ani maqaan koo Melaku Abebew kan jedhamu barataa yuuniversiitii Finfinee muummee Qoranno Sayaanssi fi wabii Nyataa kan baradhu raga kophii qorannootiif funaanaa waanan jiruuf mata dureen qorannoo kootii waa'ee Babalinaa nyaata dhabinsaafii sababiwaan isaa ijoolee waggaa shanii gadii irratti qabuu kan haammatu ta'ee odeeffannoon isinirraa fudhu dhimma barbaadameef qofa kan ooluu ta'a. Milkaa'isa qorannoo kootiif deebiin isin naaf kennitan murteessoo waan ta'aniif akkasumas yeroo keessan kennitanii waan na wiliin turtaniif durseen isin galateeffadha. Yoo fedha keessan ta'uu baatef, tarii sababa.

Maqaa Qoratamaa---------- mallattoo_____ Guyyaa dalagame _____

Maqaa Qorataa---------- mallattoo_____ Guyya fi yeroo dalagame _____

Maqaa To'ataa---------- mallattoo_____ Guyyaa fi yeroo dalagame _____

Galatomii!

Lakk	Gaaffii fi calaltuu	Deebii	Irra utaali
I.	**Gaaffii hawaasa – dinagdee**		
1.	Bakka Jiregnaa	Magallaa Badiyaa	1 2
2.	*Kebele* kaam kessaa jiratuu		
3.	Hangaam *Kebele*e kaana kessaa jiraataan	-------Ji'aa/Woggaa	
4.	Amantii Haadhaa	Ortoodoksii Prootestaantii katolikaa Musiliima Waaqeffataa Kan biro	1 2 3 4 5 6

5.	Baay'ina maatii	---------(…….)	
6.	Manaa kessaa Ijoollen umurin issanii waggaa shanii gadii mekkaa jiruu	----- --lakofsaaan	
7.	Ittigafatamaan maatii manaa eenyuu?	Abbaa worraa Hadhaa wiraa Kaan biroo---------(Ibsii)	1 2 3
8.	Umurii haadhaa	--------(wagaadhaan)	
	Haala gaa'elaa	Kan hin heerumne Kan heerumte Gursummaa Kan hiikte	1 2 3 4
9.	Sadarkaa barnoota haadhaa	Barreessuu fi Dubbisuu kan hin dandeenye Barreessuu fi Dubbisuu kan dandessuu Kutaa 1-8 Kutaa 9-12 Colleggii fi Isaa olii	1 2 3 4 5
10	Haala hojii Ittigafatamaan maatii manaa eenyuu?	Qonnan bulaa Horsisee bulaa Hojii mootummaa hojii dhuunfaa daldalaa hojjetaa guyyaa	1 2 3 4 5 6

		kan biro	7
11	Galii ji'aa kan maatii manaa mallii	_____	
12	Galii ji'aa kan walii gala	_____ Eth. Birr	
13	Galii ji'aa kan maatii manaa malliin bahaa	Nyaataa maatiif Bitaa nyattaafin Bitaa meeshaaf Barumsaa ijooleef Bitaa huchuuf	1 2 3 4 5
14	Bitaan nyaata kan maatii manaa essatii	Bitaa gabaa irraa Nyaataa gargarsarraa Gargarsaa waliin irraa Kan biro……..	1 2 3 4
Kutaa 2: Wa'ee hadhaa ilaalchisee			
1.	Bayinaa ijoolee qabanii	_____Ijoollee	
2.	Tartiibaa da'uumsaa	_____	
3.	Tartiibaa da'uumsaa giduugalaan	_____Waggaan	
4.	Waa'ee nyaataa ijoolee maal irraa dhaageesan	Radio Television Mobile telephonii Baruulee Ogeesaa fayyaa Firraa/Hiriiyaa Hinkabuu….	1 2 3 4 5 6 7
5.	Tajaajilaa geejibaa mal fayadamtuu	Lukkaan	1

	yeroo hospitalaa deemtaan	Konkolataa Motoora Bajajii	2 3 4
6.	Haala hojii Haadhaa	Haadha manaa Qotee bulaa Hojii mootummaa Hojjetaa guyyaa Kan biro	1 2 3 4 5
Kutaa 3 : Waa'ee muchaa ilalchisee			
1.	Salaa muchaa	Dhiraa Dhalaa	1 2
2.	Guyyaa da'uumsaa	_____	
3.	Muchaan talalii fudateraa	Eyyee Lakkii	1 2
4.	Gossaa talalii kenameefii	BCG Polio PCV Pentavalent Measles Other(specify----------)	1 2 3 4 5 6
5.	Vayitaminii A talalii kenamerafiira?	Eeyyee Lakkii	1 2
6.	Muddaanoo torbee lamaan kanaa kessaatii muchaa mudatee kami?	Garaa kassaa Dhukubbaa bussaa	1 2

		Dhukubbaa hargaansuu Golfaa Hoo'aa kaamaa Kuffaa Olbassaa Kaan biroo----------)	3 4 5 6 7 8
7.	Muccaa garraa manaa yaalaa gesitanii turee?	Eeyyee Lakkii	1 2
Kutaa 4: Beekumsaa Haadholii gamaa dubaalataa nyaataan waal kabaatee			
1.	Fayidaa nyyata dabalaataa ijoolleef kana dura qabdaa?	Eeyyee Lakkii	1 2
2.	Isaa kamituu bay'ee barbachisaa dhaa jechuudha jettee yaadda?	harma haadha koofaa harma haadha irratti bishan dabaluun harma haadha irratti anaanii dabaluun	1 2 3
3.	Harmii haadha koofaan kennuun hamamiif jeetee yaadaa?	Harma koffaa < 4 ji'aa 4-6 ji'aa > 6 ji'aa	1 2 3 4
4.	Harmii haadha koofaan kennuun muchaa midhaa jeetee yaadaa?	Eyyee Lakki	1 2
5.	Tuutootii kennuun muchaa midhaa	Eyyee	1

	jeetee yaadaa?	Lakki	2
6.	Kanaa duraa Harmii haadha koofaan kenitee beektaa?	Eyyee Lakki	1 2
7.	Yoo hin beenee ta'e maalif dha?		
8.	Ammaa Harmii haadha koofaan keenitaa?	Eyyee Lakki	1 2
9.	Yoo harmaa hin hossifnee maliif?	Ulfaa waan ta'eef Dhukbstaa waan ta'eef Sabaabaa dadhabdeef Nyaataa dabalataa sabaabaa fudhatuuf Sabaabaa muchaa dhukbsachiisuf Gahaa sababaa hin taneef Kaan biro……	1 2 3 4 5 6 7
10	Yoo harmaa hossiftaa ta'ee si'aa meeqaf s'aa 24 kessaatii hosiftaa halkaniif guyyaa dabalatee?	> 8 si'aa 4-7 si'aa < 3 si'aa Hiin beekuu	1 2 3 4
11	Kaneen kaanaa kessaa wareen kam sa'aa 24 duraa kessaatii lateef	Harmaa hadhaa kofaa	1

	muchaa guyaaf halkaan dabalatee?	Bishaan Anaanan tassaa Ananaan bineeldaa Chuunfaa kuduralee Shayii Bishaanif sukaaraa	2 3 4 5 6 7
12	Yoomii egaltee nyaata dabalataa harmaa hadhaa alaa?	< 6 ji'aa 6 ji'aaratii > 6 ji'aa	1 2 3
13	Nyaata dabalataa mucaa keetiif kennuuf maaliif eegaltee?	Harmaa hadhaa gahaa sababaa hintaneef Harmii hadhaa kenuuf yeroon issaa gahaa sababaa hintaneef Nyataa kenuu dhisuu Muchaa nyataaf gahaa ta'ee Muchaa yeroo hundaa boo'uu Muchaa yeroo hundaa gahaa ta'ee Gudinaa muchaaf garii ta'uu Dhukubaa irraa waan ittisuuf Hin beekuu/sababaa biraa	1 2 3 4 5 6 7 8 9 10
14	Yeroo meqaaf guyyaatii nyaataa dabalataa keenitaa muchaa keefii?	Eyyee Lakki	1 2
15	Lakki yoo jeetee maliif nyaata	Fayidaa issaa waan hin	1

	addaa addaa hinkenineef?	beekneef Muchaan waan hinjalaaneef Dingaataa muchaa waan dhukubuuf Addan keenyaa waan hin eyaamneef Bittaan nyaataa vitaaminaa waan guddaa ta'eef Kaan biraa yoo jiraa ta'ee…….	 2 3 4 5 6
Kutaa shaan: Gochaa haadhonii harmaa kenuu fi nyaataa dabaalata kennuu irraattii qabaan			
1.	Yeroo kami harmaa hosisuu kaan egaltee?	Yeroo da'uumsaa batalumatii Saa'aa tokko boodaa Sa'aa 2-6 boodaa Sa'aa 7-12 boodaa Guyyaa tokko boodee Hin yadaadhuu/hin beekuu	1 2 3 4 5 6
2.	Guyyaatii yerro hamamiif harmaa husiftaa	4 olii 4 gadii	1 2
3.	Harmaa hadhaa koffaa lataa?	Eyyee Lakki	1 2
4.	Eyyee yoo jetee hamamiif Harmaa hadhaa koffaa latee?	Ji'aa 2 Ji'aa 3 Ji'aa 4	1 2 3

		Ji’aa 4 oliif	4
5.		Eyyee Lakki	1 2
6.	Yoo lakkii ta’ee maliif harmaa haadhaa issaa jalqabaa hin keninee	Anaan adii waan hin taneef Qulkuluu waan hin taneef Nammonii kenamuu nin qabuu sababaa jedhameef	1 2 3
7.	Wanii jalqabbaa latameef malii?	Bishan kofaa Harmaa hadhaa Anaan Sukaraafiii bishaan	1 2 3 4
8.	Nyaata dabalataan gossaa kamiin kopayeetuu kenamaaf?	Budeennaa Daaboo Marqaa Anaan sa’aa/re’ee Kaan birroo yoo jirraa ta’ee…….	1 2 3 4 5
9.	Nyaataa yeroo kopheesituu gossaa adda addaa irratii??	Eyyee Lakki	1 2
10	Yeroo nyataa qopheessituu gosoota nyataa kaam irraa akkamitti nyaata mucaatti jijjiirtaree qopheesitaa?	Midhaan dhedhii Midhaan dhedhiifii akkaa ataraa Ataraa fii bakellaa Anaaniifii gossaa issaanii	1 2 3 4

		Hidda fi kaneen fakataan Kudurralee fi muduralee Hankakuu Foonii Kaan biroo…….	5 6 7 8 9
11	Kalessaa mucaa keetiif tuutxootii latetaaf?	Eyyee Lakki	1 2
12	Nyaata addaa mucaa keetiif maliin latee?	Saayinii fal'aana Xuuxxoo Harka Kan biro	1 2 3 4
13	Mucaa keetiif anaanii sa'aa gahaa kabdaa?	Eyyee Lakki	1 2
14	Muccaa keetiif anaanii sa'aa guyaatii si'aa meeqaa lataaf?	Si'aa sadii gadii Si'aa sadii Si'aa sadii oolii	1 2 3
15	Yeroo mucaa nyaataa dabalataa kopheesituu akkamitii qophesitaa?	Lafiisuun koffaa Lafiisuu,bikilchuun fii affeluun Midhhaan kanneen waliin	1 2 3
16	Akkamitti muchaa keetiif lattaaa yeroo nyaaata dabalataa latuu?	Jajabooo Giduugalessaa Lalafoo	1 2 3

17	Yeroo hamamiif mucaaf nyaata foon/daaboo/anaanii/fuduralee kenitaa?	Keneen hin beekuu Guyyaatii tokko Guyyattii tokko olii Toorbeetii tokko Torbeetii lamaafi issaa olii Ji'aatii tokko	1 2 3 4 5 6
Kutaa ja'aa: Tajaajilaa Gargartoota fayyaa maal fakaataa			
1	Gargartoota fayyaa waliin wal qunaamti kabaaduu?	Eyeen kabana Hinkabanuu	1 2
2	Gargartoota fayyaa waliin qunaamtii kaabduu?	Guyyaan Toorbeen Ji'aan Woggaan si'aa afur Kanabroo (----------)	1 2 3 4 5
3	Barumsaa yookiin gargarsaa garaa biro argatanii bektuu	Eeyee nii kabanaa Hinkabanuu	1 2
4	Yeeroo hangammin kabadaan?	_____ Sa'aatii issaa	
5	Baruumsii isiinif kenamee hangaam isseen jijiiree wa'ee ijoolee nyaataa irratii?	Eeyee hiinqabduu	1 2

Galatomii dhumateera!