ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

CENTER FOR FOOD SECURITY STUDIES

CURRENT LEVEL AND DETERMINANTS OF OPTIMAL COMPLEMENTARY FEEDING PRACTICES AMONG LACTATING MOTHERS OF CHILDREN IN AMBO TOWN, OROMIA, ETHIOPIA

BY

ASSEFA BELAY BERSISA

A THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, SCHOOL OF GRADUATE STUDIES CENTER FOR FOOD SECURITY STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN FOOD SECURTY STUDIES

NOVEMBER 2019

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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.

Declared By:

Name of Student	**Signature**	**Date**
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Candidate

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This is to certify that the thesis prepared by Assefa Belay Bersissa entitled: "*Current Level and Determinants of Optimal Complementary Feeding Practices Among Lactating Mothers of Children in Ambo town, Oromia, Ethiopia"* and submitted in partial fulfillment 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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Chair of the Center or Graduate Program Coordinator

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Definition of Terms

- **Adequacy of complementary food:** refers to capacity of complementary food to provide sufficient energy, protein, and micronutrients to meet a growing child's nutritional needs (WHO, 2001).
- **Complementary feeding:** refers to the process starting when breast milk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are introduced to the infant, along with breast milk (PAHO/WHO, 2003).
- **Complementary feeding practices: covers:** time of introduction of solid and semi-solid foods or soft foods; frequency of feeding, dietary diversity; consumption of iron-rich foods and continued breastfeeding among children 6-23 months old (PAHO/WHO, 2003).
- **Complementary food:** Any solid, semi-solid or soft food, whether manufactured or locally prepared, suitable as a complement to breast milk or to infant formula, when either becomes insufficient to satisfy the nutritional requirements of the infant (PAHO/WHO, 2003).
- **Introduction of solid, semi-solid or soft foods:** Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods during the previous day (WHO, 2008b).
- **Minimum acceptable diet:** Proportion of breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day, and non-breastfed children 6–23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day (WHO, 2008b).
- **Minimum dietary diversity:** Proportion of children 6–23 months of age who receive foods from four or more food groups during the previous day. The seven food groups used for tabulation of this indicator were: grains, roots and tubers; legumes and nuts; dairy products (milk, yoghurt and cheese); flesh foods (meat, fish, poultry and liver/organ meats); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables (WHO, 2008b).
- **Minimum meal frequency:** Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid or soft foods the minimum number of times or more (minimum is defined as: two times for breastfed infants 6–8 months; three times for breastfed children 9–23 months; and four times for non-breastfed children 6–23 months) in the previous day (WHO, 2008b).

Abstract

An appropriate diet is critical in the growth and development of children especially in the first two years of life. Poor complementary feeding of children aged 6–23 months contributes to the characteristics negative growth trends and deaths observed in developing countries. Previous studies evidence strongly call for the need to improvement of complementary feeding practices but there is a scarce evidence for overall complementary feeding practices that captured the multidimensionality of feeding practices including dietary diversity, frequency, and acceptable diet an and associated factors in the region, especially, in the study area. Therefore, this study aimed to assess current level and determinants of optimal complementary feeding practices among mothers of children aged 6 to 23 months in Ambo town. The study used cross sectional study design and targeted 336 mothers with children 6-23 months olds. Proportionate stratified sampling was used to select households in different kebeles and two stage cluster sampling was used to select households with mothers/caregivers and children 6-23 months old. A researcher administered questionnaire and focus group discussion guide were used to collect information from the respondents. Data entry and analysis was done using SPSS version 21.0 windows statistical software. Chi-square tests were made to evaluate optimal complimentary feeding practice and associated factors, and P-value < 0.05, at 95% CI was taken as cut off point for statistical significance. All (100%) the children 6-8 months old had received solid, semi-solid or soft foods. The minimum meal frequency was attained by 88.3% (95% CI 84.3-91.4) whereas the minimum dietary diversity was attained by 17.9% (95% CI 14.1-22.5). In addition, the minimum acceptable diet was attained by 15.4% (95% CI 11.9-19.8). Maternal knowledge on: importance of breastfeeding (87.3%); age of introduction of complementary foods (85.4%) and correct meal frequency for age (74.5%) was high. On the contrary, knowledge on the importance of enriching complementary foods (34.5%) was low. Mothers who knew the importance of a diverse diet were likely (chi-square test; p=0.001) to feed their children on a diverse diet. On the other hand, mothers who knew the importance of enriching complementary foods were likely to feed their children on a minimum acceptable diet (chi-square test; p=0.007) and maternal knowledge on enriching complementary foods (OR=3.41, p=0.040) were significant predictors of consumption of Vitamin A rich foods, minimum meal frequency and minimum acceptable diet respectively. Behavioral change and communication involving all the stakeholders in infant and young child feeding should be emphasized. Messages on appropriate feeding practices should include importance of dietary diversity. A longitudinal study should be conducted to effectively link feeding practices and individual growth patterns.

Keywords: *Complementary feeding, breastfeeding, Ambo town, Children age 6–23 months, Determinant*

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Acronyms and Abbreviations

AAU: Addis Ababa University

BCC: Behavioral Communication Change

CF: Complementary Feeding

CFP: Complementary Feeding Practice

CI: Confidence Interval

DDS: Diet Diversity Score

DHS: Demographic and Health Surveys

EFY: Ethiopian Fiscal Year

FANTA: Food and Nutrition Technical Assistance

FMOH: Federal Ministry of Health

ETB: Ethiopian Birr

HC: Health Center

HEW: Health Extension Workers

IYCF: Infant and Young Child Feeding

IYCFP: Infant and Young Child Feeding Practice

MCH: Maternal and Child Health

NGO: Non-Governmental Organization

PI: Principal Investigator

SPSS: Statistical Package for Social Sciences

UNICEF: United Nations Children's Fund

WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

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, which are often associated with inappropriate feeding practices (WHO, 2016b). Over one third of under-five mortality is caused by malnutrition related to inappropriate complementary feeding. Initiate safe and nutritionally adequate complementary foods at 6 months is crucial to achieve optimal growth, development and health (Hussein, 2005).

An appropriate diet is a critical component for proper growth and development of children (Aggarwal *et al.,* 2008; Butte *et al.,* 2000). The first two years of life are a critical window for ensuring optimal child growth and development (WHO, 2016a). Nutritional deficiencies during this period can lead to impaired cognitive development, compromised educational achievement and low economic productivity (Grantham *et al.,* 2007) which become difficult to reverse later in life (WHO, 2016a). Improving infant and young child feeding (IYCF) practices in children 0–23 months of age is therefore critical to improved nutrition, health and development (WHO, 2016b). Scientific evidence indicates that inappropriate feeding practices can have profound consequences for the growth, development and survival of infants and children (Saha *et al.,* 2008). Various inappropriate complementary feeding practices such as; untimely introduction of complementary food, improper feeding frequency and low dietary diversity of complementary foods have been shown to have numerous negative effects on children's health (WHO, 2013). Appropriate complementary feeding entails; introduction of complementary foods at 6 months with continued breastfeeding up to at least 2 years and beyond, correct feeding frequency for age and consumption of a diverse diet (Arimond *et al.,* 2014).

There is strong evidence that the promotion of appropriate complementary feeding practices reduces the incidence of stunting and leads to better health and growth outcome. Therefore, as an effective intervention strategy for malnutrition, WHO and UNICEF recommended introduction of adequate complementary foods at 6 months with continued breastfeeding for 2 years of age or beyond (WHO, 2013a; UNICEF, 2013b).

In sub-Saharan African Regions, suboptimal infant feeding practices, poor quality of complementary foods, micronutrient deficiencies and frequent infections have mainly contributed to the high mortality among infants and young children (Bahl *et al.,* 2005). Similarly, malnutrition is a significant health problem for infants and young children in Ethiopia. In Ethiopia, age appropriate infant and young child feeding practice is alarmingly low; only 7% of children ages 6-23 months have met the criteria for a minimum acceptable diet (Belete *et al.,* 2017). Another study conducted using composite indicators, Ethiopia Demographic Health Survey (EDHS) 2016 and study conducted in Northern Ethiopia showed the level of appropriate complementary feeding to be too low, 7% and 15% respectively.

To improve complementary feeding practice through this essential time of growth and development of the child, assessment of complementary feeding practices and its factors are vital (WHO, 2016). This study aimed at assessing the level and determinants of appropriate complementary feeding practices among mothers of infants and children aged 6–23 months residing in Ambo Town.

1.2. Statement of the Problem

Poor complementary feeding practices have been widely documented in Ethiopia despite the government and other stakeholders implementing a number of strategies aimed at improving IYCF practices (Belete *et al.,* 2017). In line with this, a significant proportion of infants and young children in Ethiopia are exposed to the hard consequences of poor complementary feeding practices and the situation is likely to be worse among the urban poor (Gebru, 2007). Despite all these, the prevalence of appropriate complementary feeding practices in different part of Ethiopia are lower than international recommendation. In 2016, nearly 4 in 10 (38%) of children under five in Ethiopia are stunted, or too short for their age (EDHS, 2016). Inappropriate complementary feeding practices such as untimely introduction of complementary foods, improper feeding frequency and low dietary diversity of complementary foods have been widely shown to increase the risk of underweight and stunting especially among the urban poor (Tigist *et al.*, 2015). Study done in Oromia region showed that more than half of the caregivers or mother did not timely initiated complementary feeding. The main reason for too early initiation of complementary feeding was lack of knowledge and perceive inadequate breast milk production (Neme and Olika, 2017).

There was limited scientific data on complementary feeding practices and its relation to the nutritional status of children 6-23 months old in urban poor in Ethiopia. These evidences strongly call for the need to improvement of complementary feeding practices but there is limited scientific data on complementary feeding practices that captured the multidimensionality of feeding practices including dietary diversity, frequency, and acceptable diet and associated factors in the region, especially, in the study area. To improve complementary feeding in low-resource settings during this critical period of growth and development, assessment of optimal complementary feeding practices is essential. Therefore, this study aimed to assess current level and determinants of optimal complementary feeding practices among mothers of children aged 6 to 23 months in Ambo town.

1.3. Research Questions

Having the above problem in mind, this study was designed to assess current level and determinants of optimal complementary feeding practices among lactating mothers in Ambo town; accordingly, the study tries to answer the following basic questions:

- How the current level of complementary feeding practices among the mothers/caregivers of infants and young children aged 6-23 months old in study area?
- What are the determinants factors of complementary feeding practices among the mothers/caregivers of infants and young children aged 6-23 months old in study area?

1.4. Objectives

This study has general and specific objectives as discussed below:

1.4.1. General Objective

The main aim of the study was to assess the current level and determinants of optimal complementary feeding practice among mothers of infants and young children aged 6 to 23 months in Ambo Town, West Shoa Zone, Oromia regional state of Ethiopia, 2018/19.

1.4.2. Specific Objective

The following are specific objectives:

- assess current level of optimal complementary feeding practices among mothers of infants and young children aged 6 to 23 months in the study area.
- identify factors that influence optimal complementary feeding practice among mothers of infants and young children aged 6 to 23 months in the study area.

1.4. Scope of the Study

The study considered infants and young children aged between 6-23 months old living in the Ambo town. This is because those infants and young children are normally the most at risk of inappropriate complementary feeding practices and vulnerability for malnutrition within households and communities in study area.

1.5. Limitation of the Study

Complementary feeding practices can be best depicted over a prolonged period of time. The data was collected from a cross-sectional study and therefore did not reveal whether reported complementary feeding practices varied over time.

1.6. Significance of the Study

The findings from this study was add to the body of literature that will help the Ambo Town Health Office and other stakeholders to address the gaps in nutritional interventions and programs to reduce malnutrition rates and its complications among children in the target area. It can provide the relevant information concerning complementary feeding practice being practiced in the target area and other similar areas. In addition, it also addresses the challenges and barriers that parents are facing to promote complementary infant feeding practices in target area. The study has also contributed knowledge to ongoing research efforts on complementary feeding.

1.7. Organization of the Paper

This thesis has five chapters. Accordingly, the first chapter deals with the background of the study and defines the problem of the study, basic questions and objectives of the study, the scope and limitation of study and the significance of the study. The second chapter includes concepts on determinants of complementary feeding practices and definition of terms, empirical literature review and conceptual framework. The third chapter deals with study area description, research design and approach, source of population and study population, data sources, sample size determination, sampling technique and procedures, data collection instruments procedures used data processing and method of data analysis. The fourth chapter presents results, discussions, and the fifth chapter of this paper deals with conclusions and recommendations.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1.The Concept of Child Nutrition

2.1.1. Role of Appropriate Infant Feeding in the Health, Development and Nutritional Status of Children

The most recent estimates of the global burden of malnutrition in children younger than five years of age show that 178 million are stunted, 112 million are underweight and 55 million are wasted. Together they account for 21% of all under-5 deaths (Black, 2014), with over two-thirds of these deaths occurring during the first year of life (WHO, 2013a). Malnutrition is also a direct cause of mortality, and a major disabler preventing children who survive to reach their full developmental potential (WHO, 2013b).

In the causal matrix of under-nutrition (UNICEF, 2010), an important underlying determinant of child under-nutrition is the care provided to the child. The key care practices that could impact on child nutritional status include breast feeding and complementary feeding (Arimond and Ruel, 2012). Exclusive Breast Feeding (EBF) for the first 6 months of life followed by optimal complementary feeding are critical public health measures in ensuring good nutritional status and reducing mortality significantly (UNICEF, 2013a).

Appropriate complementary feeding which comprise introduction of complementary foods at 6 months with continued breastfeeding to at least 2 years, correct feeding frequency for age and consumption of a diverse diet can prevent 6% of child deaths per year (Jones *et al.,* 2013). There is, therefore, sufficient reason to both prevent and appropriately manage malnutrition in early childhood through appropriate child feeding, if both the short-and long-term consequences are to be avoided (Ramji, 2014).

2.2.Empirical Related Review

This section provides empirical related review on the magnitude of the problem as well as on the determining factors that affects the breastfeeding and complementary feeding worldwide as well in Ethiopia.

2.2.1. Breastfeeding Practices

2.2.1.1. Importance of Breastfeeding

Vast scientific literature demonstrates substantial health, social and economic benefits associated with appropriate breastfeeding (Venneman *et al.,* 2011). A multi-centre cohort study done in India, Ghana and Peru showed that infants who were not breastfed had a 10-fold higher risk of dying of any cause and a 3-fold higher risk of being hospitalized for any cause compared to those who had been predominantly breastfed (Bahl *et al.,* 2012).

A study carried out in Chittagong, Bangladesh showed that infants who were exclusively breastfed from 0-6 months had a significantly lower prevalence of diarrhoea and acute respiratory infection than those infants who were not exclusively breastfed (Mihrshahi *et al.,* 2012). Association between breastfeeding and a number of chronic or non-communicable diseases including allergies, obesity, diabetes, hypertension, cancer, and Crohn's disease have been observed by various studies (Leon-Cava *et al.,* 2012).

Despite an increase in EBF rates in Ethiopia from 13.2% in 2013, (EDHS, 2013) to 32% in 2014, (CSA, 2016) the number of children who are EBF drops significantly to only 3.6% at 6 months. The prevalence of EBF has yet to reach the WHO acceptable rate of 90% (WHO, 2013) and is below the global prevalence currently at 37% (UNICEF, 2013a). Studies conducted in Addis Ababa and other urban areas in developing countries have shown that almost all (90%) of children below the age of 2 years have ever been breast feed (Gesesse, 2010; Gebru, 2009). Continued breastfeeding has shown a positive picture in developing countries with the majority of the children being breastfed for one year and above (CSA, 2016).

2.2.1.2.Continued Breastfeeding at 1 Year and 2 Years

A study in Brazil by Parada *et al.,* (2007) assessing complementary feeding practices in children during their first year of life found out that continued breastfeeding rates at 8, 10 and 12 months were 51.0%, 43.1% and 37.8%, respectively. A cohort study in Burkina Faso by Sawadogo *et al.,* (2011) established that the duration of breastfeeding was ideal with more than 98% and 61% of children still breastfeeding at 18 and 24 months, respectively. In contrast to Sawadogo's *et al.,* (2011) findings; Gebru (2010) in a study assessing breastfeeding practices in Addis Ababa,

established that 90% of the children in the study population continued breastfeeding into the child's second year and beyond.

A study aimed at assessing complementary feeding practices and nutrient intake from habitual complementary foods of infants and children aged 6-18 months old in Zambia by Owino (2008), found out that majority of the mothers (88%) were still breastfeeding and average cessation of breastfeeding was at 19 months. Data from EDHS conducted in 2013-14 showed that 84% and 59% of children aged 12-17 and 18-23 months old were still being breastfed (CSA, 2016).

2.2.2. Complementary Feeding Practices

2.2.2.1. Overview of Complementary Feeding Practices

Complementary feeding refers to gradual dietary transition characterized by introduction of solid and semisolid foods to an infant's diet when breast milk alone becomes insufficient in meeting the nutritional needs of the infant. The recommended age range for complementary feeding is generally taken to be 6 to 24 months even though breastfeeding may continue beyond two years (WHO, 2013a).

The complementary feeding period is defined as the period during which breast milk must be complemented by other foods of sufficient quantity and quality to cover infant's nutritional needs (WHO, 2013). According to WHO (2013), complementary feeding period starts from 6 to at least 24 months and this is the most critical period for infants' growth and development (WHO, 2013). The nutritional inadequacy of the complementary diet, both in quality and quantity, and the undermining effects of infections on the nutritional status of the child remain major problems affecting infants and young children in the world today (Nti and Lartey, 2014).

Guidelines on complementary feeding outlined in the Ethiopian National Policy on Infant and Young Child Feeding, as adopted from the WHO recommendations, are comprehensive. They include the following: Commencing complementary feeding at six months with small amounts of food increased gradually as the child gets older. Food variety and consistency should also be gradually increased. Another recommendation is frequent, on-demand breastfeeding until two years of age or beyond and the use of responsive feeding which directs that infants are fed directly and older children assisted with eating. It is also recommended that infants and young children be slowly and patiently fed, thus encourage eating without use of force (Belete *et al.*, 2017).

2.2.2.2. Initiation of Solid, Semi-Solid or Soft Foods

Complementary feeding should be timely, meaning that all infants should start receiving foods in addition to breast milk from 6 months onwards (WHO, 2006). A community based cross-sectional study assessing low adherence to exclusive breastfeeding in Eastern Uganda by Engebretsen *et al.,* (2007), found that 30% of the infants had started receiving other foods in addition to breast milk before 6 months.

In Ethiopia, comparative study between World Vision Project and non-project areas in Enemay indicated that 37.5% and 68.3% of infants 0-6 months in the project and non-project areas respectively, were introduced to complementary foods within the first three months (Gessese *et al.,* 2014). The above findings concur with 2013-14 EDHS data, which indicated that complementary feeding begins early with 24% of newborns less than two months of age receiving complementary foods (CSA, 2016). Early introduction of complementary foods before the recommended age of 6 months is a common practice in Ethiopia.

2.2.2.3.Dietary Diversity

Children 6–23 months old should receive foods from 4 or more food groups out of the 7 recommended food groups namely: grains, roots and tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry and organ meats); eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables (WHO, 2013b). The cut-off of at least 4 of the above 7 food groups above was selected because it is associated with better quality diets for both breastfed and non-breastfed children (FANTA/AED, 2014). Breast milk is not counted because the indicator is meant to reflect the quality of the complementary food diet. As a consequence, this indicator may show 'better' results for children who are not breastfed than those who are breastfed in populations where formula and/or milk are commonly given to non-breastfed children (WHO, 2013b).

A study conducted to assess dietary diversity of complementary foods and its relationship to micronutrient deficiencies in Mongolia (Lander *et al.,* 2010) found out that most children consumed less than 2 food groups out of the recommended 7 groups. That was way below the recommended minimum dietary diversity of ≥4 foods groups as recommended by WHO (2013b). Food group analysis in a study assessing complementary feeding in India by Gard and Chadha

(2009) showed that the mean intake of cereals and animal milk was highest with consumption of vegetables and fruits being the lowest among the infants. However, by 9 months, 45% of the infants consumed at least 1 serving per day of food from each of the 3 food groups (cereals, fruits and vegetables and meats or meat substitutes).

In Ethiopia, Nationally, over half (54.0%) of children are fed from the requisite number of food groups (≥4 food groups) (CSA, 2016). The overall picture is that dietary diversity is low in most settings in the developing countries. The specific food groups that lack in the diets of children vary from one country to another and over time. Identifying the specific food groups that are lacking in the diets of children is therefore essential in order to include this information in nutrition education and counselling of mothers and caregivers on appropriate complementary feeding practices. Review of the available literature did not reveal any study showing the shift in consumption from traditional to processed foods in the study area and similar areas in Ethiopia.

2.2.2.4. Meal Frequency

Minimum meal frequency is defined as the proportion of children 6-23 months old who receive solid, semi-solid or soft foods (but also including milk feeds for non-breastfed children) the minimum recommended number of times or more (WHO, 2013a). The number of meals should be 2 times for breastfed infants 6–8 months; 3 times for breastfed children 9–23 months and 4 times for non-breastfed children 6–23 months (WHO, 2013b).

In Ethiopia, the national data indicates that 72.5%, 65.0%, 60.7% and 57.7% of children are fed the minimum recommended times or more for 6-8months, 9-11 months, 12-17 months and 18-23 months' age sub-categories, respectively (CSA, 2016). Overall, scientific evidence shows that complementary feeding practices are suitable in terms of minimum meal frequency but are inappropriate in terms of initiation of complementary foods, minimum dietary diversity and minimum acceptable diet. Nonetheless, there is inadequate data, especially among the urban poor residing in informal settlements in Ethiopia.

2.2.3. Factors Associated with Complementary Feeding Practices

2.2.3.1.Socio-Demographic and Economic Factors

A systematic review found that maternal age, level of education and employment had been shown to influence complementary feeding practice. Younger maternal age, lower maternal education, unemployment and inadequate maternal exposure to mass media such as newspapers, radio or television (Wijndaele *et al.*,2009), are risk factors associated with inappropriate complementary feeding practice in developing countries. A prospective study conducted in Delhi showed that knowledge about the correct timing of complementary feeding significantly correlated with maternal and paternal education levels (Aggarwal *et al.,* 2008). Gebru (2007), in a study in Addis Ababa, found that working mothers were more likely to introduce complementary foods before 6 months (OR=0.37) compared to mothers who stayed at home. Sawadogo *et al.,* (2011) in Burkina Faso also found that late introduction of complementary food to be more frequent in mothers aged less than 25 years.

Maternal socialization has also been demonstrated as a significant determinant of CFP with mothers being likely to feed their infants in the same manner in which they themselves or their siblings were fed (Sawadogo *et al.,* 2011). Predictors of early introduction of complementary foods include the desirability of the pregnancy of the index child and the place of delivery. Ante natal attendance and mother's perception of child's size are other factors that influence feeding practices (Joshi *et al.,* 2011). The same study showed that having never been in union/married was associated with higher risk of early introduction of complementary foods.

2.2.3.2.Maternal Knowledge and Perceptions Factors

A study assessing feeding practices of children in an urban slum of Kolkata in India by Roy (2009) showed that children below 6 months of age were introduced to complementary foods due to a perceived lack of sufficient breast milk by their mothers.

Joshi *et al.,* (2012) established that 56% of women started giving supplementary foods like animal milk before 6 months of age because they felt that their breast milk was not sufficient for the child. Romulus-Nieuwelink *et al.,* (2011), in a study in Brazil, established that mothers with greater knowledge of healthy eating habits choose to give healthier products to their children. A study by Siegel *et al.,* (2006) in Nepal established that mothers were less likely to give animal

source foods to infants under one year of age due to a misperception that they cannot digest animal source foods.

2.2.3.3.Infant Factors

Infant characteristics that have been associated with complementary feeding practice are multiple. Birth order, birth weight and fussiness of the infant have been demonstrated to have a profound impact on infant feeding practices (Disha *et al.,* 2012). The sex of the child has also been shown to influence CFP with boys being likely to be introduced to complementary feeds earlier. Anecdotal evidence indicates that boys are introduced to complementary foods early because breast milk alone does not meet their feeding demands (Black *et al.,* 2014).

2.3.Conceptual Framework for the Study

The variables under study have been represented diagrammatically to show the relationship between them by illustrating the influence of the independent variables on the dependent variable in order to give coherence to this report. The study used a conceptual framework adapted by the researcher from the determinants factors of complementary feeding practices in different states of the world's children report (UNICEF, 2009a). Proximate determinants were a result of inter-related underlying factors, encompassing: poor complementary feeding practices; inadequate care givers knowledge and inappropriate complementary feeding practices which consist of untimely introduction, improper feeding frequency and low dietary diversity of complementary foods result to inadequate dietary intake of the infants and children (Kapur *et al.,* 2005; WHO, 2001).

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

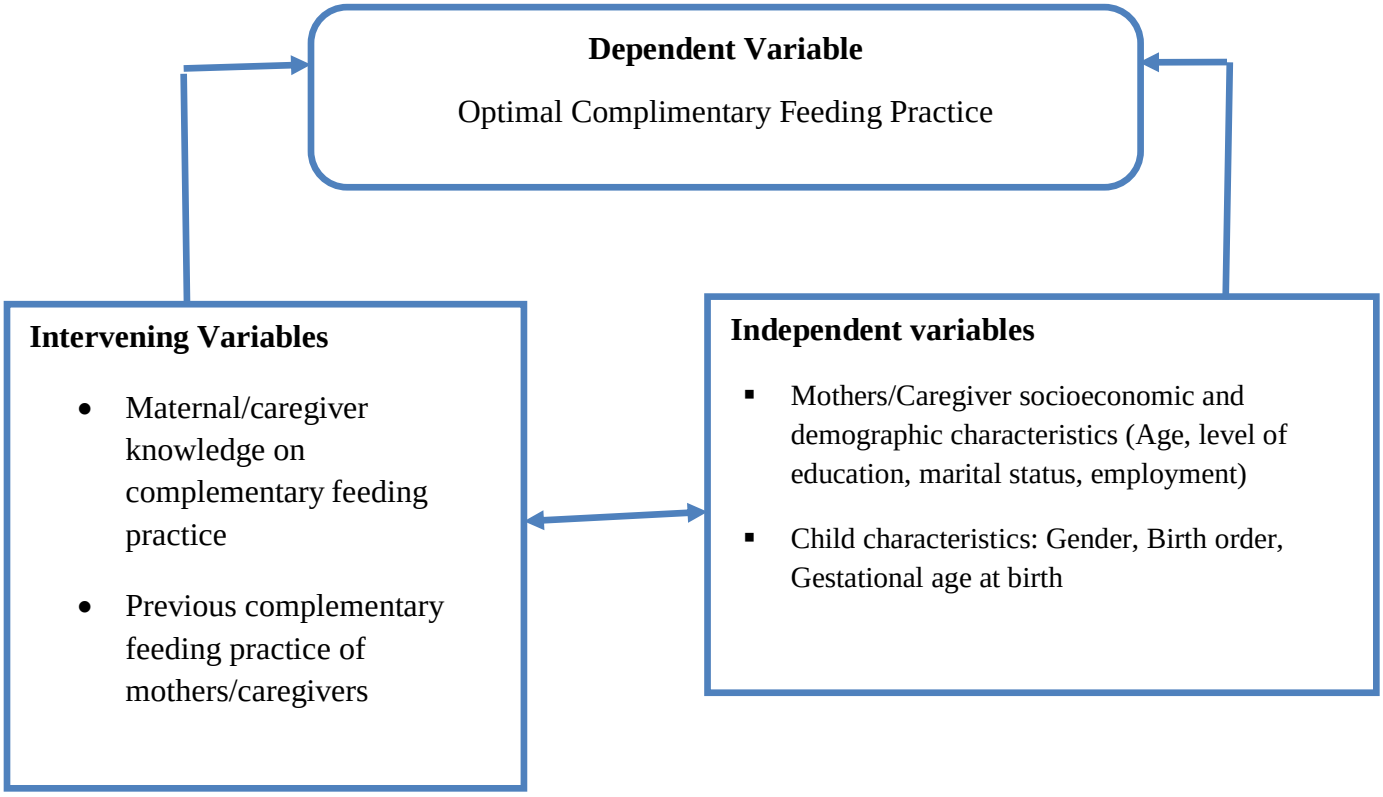

Figure 2.1: Adopted and modified conceptual framework of determinant of complementary feeding practices of children aged 6-23 months (*Source: UNICEF, 2009a)*

CHAPTER THREE: DESCRIPTION OF THE STUDY AREA AND RESEARCH METHOD

3.1.Description of Study Area

The study was carried out in Ambo town, which is one of the 22 *woredas* of West Shoa administrative zone of Oromia National Regional State. It is located 114 km west of Addis Ababa. As indicated in Figure 2, astronomically it is located at about $9^0$45'28"- $9^0$48'16" North latitude and $38^0$21'55" - $38^0$23'45" East longitude and an elevation of 2101 meters.

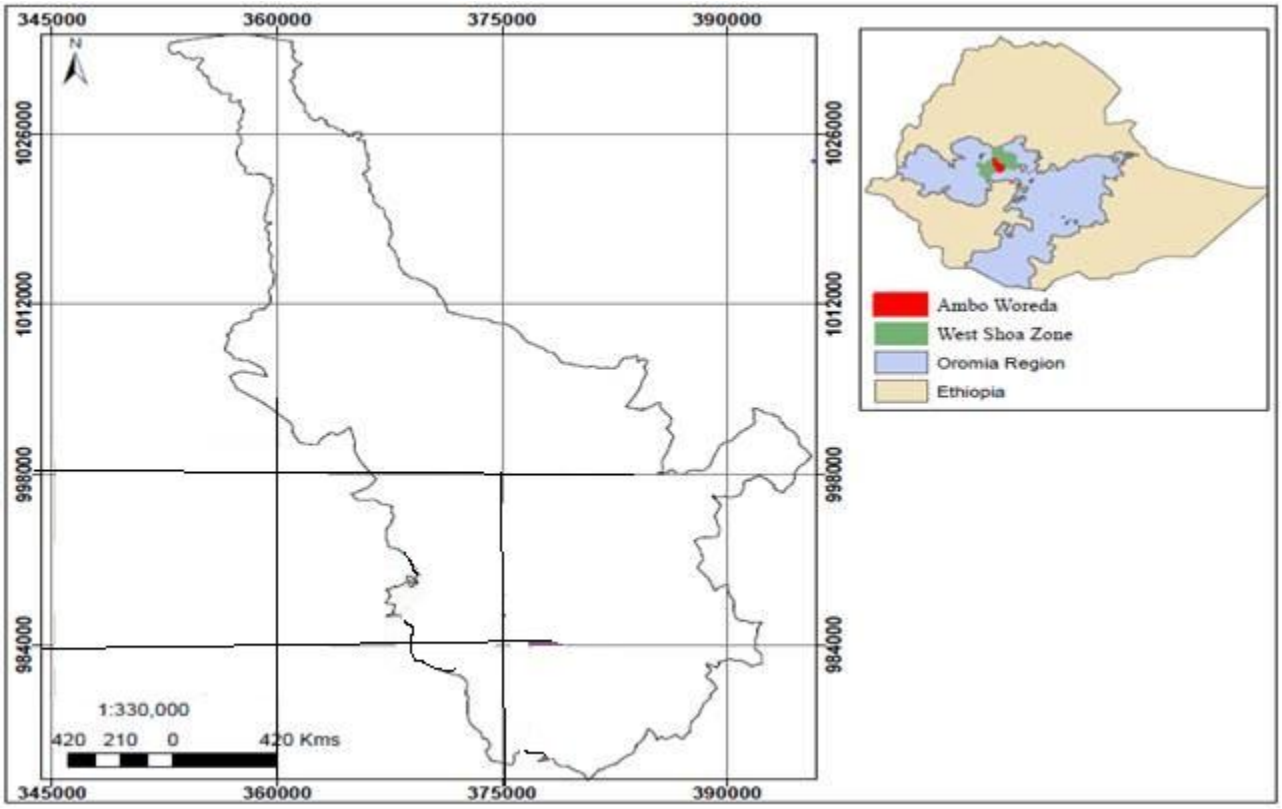

Figure 3.1: Location of Ambo town in its national and regional settings (Source: http://www.maps of world.com; November, 2018)

According to information obtained from Ambo Town Health office, there are estimated projected total populations of 83,053 in Ambo town of which about 41,061 are women and the rest are males based on 2009 Ethiopian Fiscal Year (EFY) of Central Statistics Agency estimation. There are six *kebeles* in the town namely 01, 02, 03, Senkele (04), Kisose (05) and Awaro (06) and with total population of 40018, 16725, 9163, 7968, 5976 and 3203, respectively. There are also 17,303 households and Children aged 6–23 months of age in the town constituting 5.21 % (4319)

of the population (2083, 870, 476, 414, 310 and 166, respectively). In the town, there is one Referral hospital, one General Hospital, two Health centers, three Health posts, twenty-eight private clinics and one Non-Governmental Organization working on maternal and child health. According to the Ambo Town Health office 2017 annual report, Malnutrition is one among the ten top diseases. The livelihood of majority of the town population is based trade. 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.Study Design and Period

Community-based cross-sectional 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 current level and determinants of optimal complementary feeding practice among mothers of infants and young children aged 6 to 23 months in Ambo town; from February 15 to March 15 2019.

3.3. Population

3.3.1. Source Population

The source populations were mothers having children in age group of 6 to 23 months residing in the study area.

3.3.2. Study Population

Study population was randomly selected mothers with children aged 6–23 months and resided in the study area for more than 6 months.

3.3.3. Inclusion and Exclusion Criteria

Mothers/caregivers of children and infants 6-23 months old who were residents of Ambo town for the past 6 months and are willing to participate in the study. Mother who declines to participate in the study and mother of very sick infants and young children, those with known anomalies or those requiring emergency care at the time of the study was not include in the study. The status of the above conditions was determined based on mother/caregiver self-reports, observation and records on the child health card.

3.4.Data Sources

Both primary and secondary sources of data were used to gather the information required for the study. The primary data was collected from eligible respondents. Whereas, secondary data were collected from available document at Ambo town Health Office.

3.5. Sample Size Determination and Sampling Techniques

3.5.1. Sample Size Determination

To determine the children to be included 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,

$$n = \frac{(Z\alpha/_2)^2 pq}{d^2}$$

Where:

n = is the desired sample size

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

p = estimated proportion of an attribute that is present in the population, (expected prevalence

q = p-1

d = desired level of precision

To estimate the sample size the expected prevalence of complementary feeding practices for the study area is not known. Therefore, assume p = 0.50 (maximum expected prevalence). Accordingly, the desired level of precision 5% with 95% level of confidence the Z value equals 1.96. The estimated sample size to be:

$$n = \frac{(Z\alpha/_2)^2 p}{d^2} = 384$$

The total population (total children age 6-59 months) of the town is 1552; need to adjust using finite population correlation factors. 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: nα = required sample size

N = total population of the mothers of children age 6-23 months in the study area

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

Thus, the final sample size

$n_\alpha = \frac{384}{1 + \frac{384-1}{1552}} = 308$

Considering, the sample size was 308 and with non-response rate of 10%, the final sample size was: $n_\alpha = 308 + 10\%\ (308) = 339$

3.5.2. Sampling Techniques

A multi stage stratified sampling was used, considering old and new as strata, two *Kebeles* from the old and two *Kebeles* from the new, then 4 *Kebeles* was randomly selected from both new and old using simple random sampling (SRS) method. The projected total population size in the four selected *kebeles* is 60,352 of which 3,139 is children 6–23 months of age. List of households with children 6 to 23 months in the selected *Kebeles* was obtained from health extension office before data collection. By Proportional to Size (PPS) sampling technique, Study participants was allocated to select four *Kebeles* 339 households with eligible children 6 to 23 months was selected using systematic random sampling technique from households with children 6 to 23 months in this four *Kebeles*. Members 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 have adequate information regarding infant feeding in the study area were selected. To enhance homogeneity, each FGD participants were made up of 6 to 12 mothers with children below 2 years who was not part of the main sample. The FGDs were 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 the following (Figure 3).

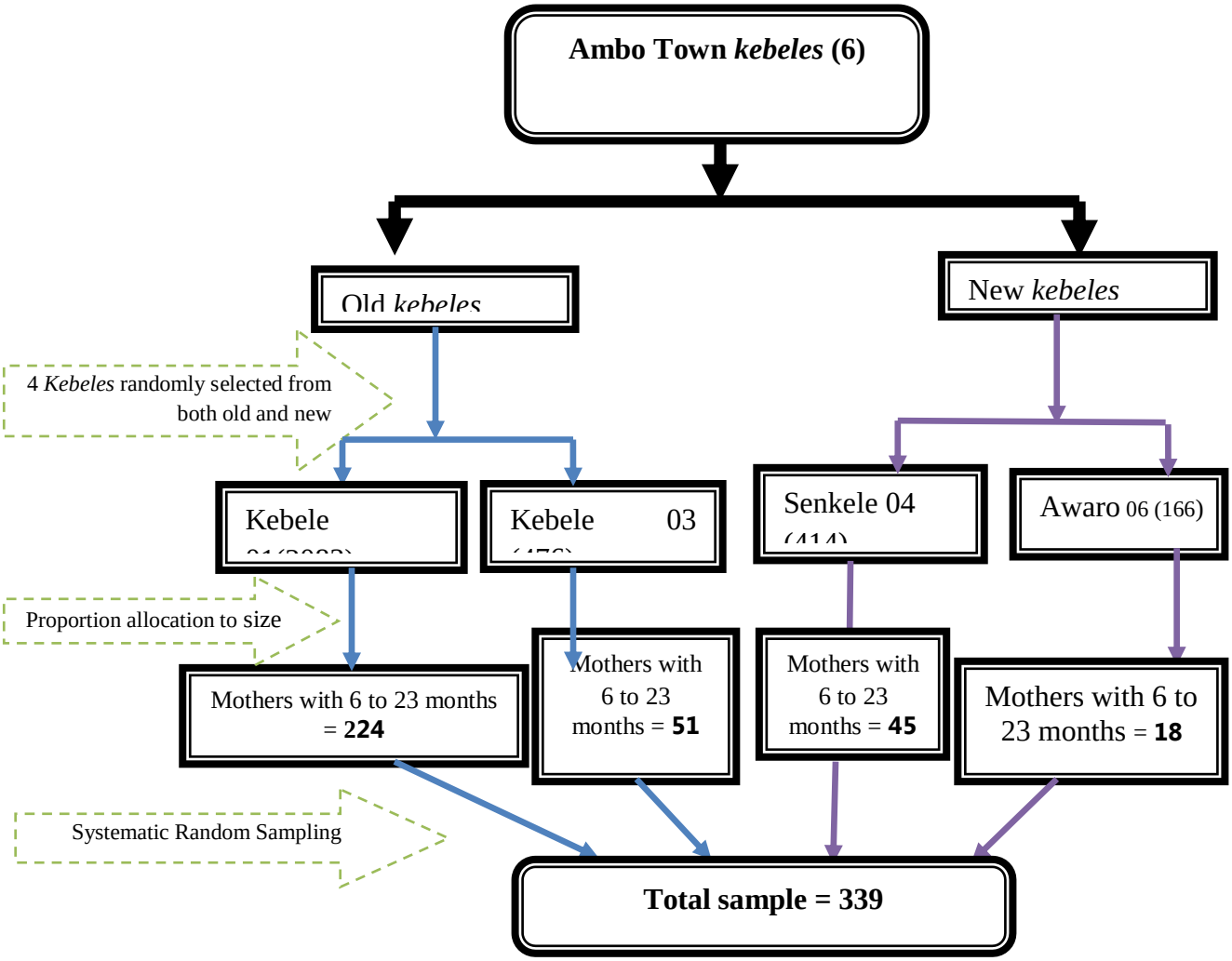

Figure 3.2: Schematic procedures of sampling techniques used for the selection of participants

3.6.Data Collection Instrument and Procedure

As indicated earlier the research design that was employed in this study is partially mixed quantitative and qualitative method. Therefore, in addition to socio-demographic and economic characteristics, quantitative and qualitative data was generated by using survey questionnaire, focus group discussions and key informant interviews. The pre-testing was conducted to establish accuracy of questions and clarity and to determine the length of interviews. During pre-testing an effort was made to check for consistency in the interpretation of questions and to identify ambiguous items. After review of the instruments all suggested revisions was made before being administered in the actual study.

Questionnaire Survey: This was vital data acquisition technique in this study. A semi-structured questionnaire consisting of closed and open-ended questions was used to elicit responses from the study participants. The socio-demographic and economic characteristics of respondents, Infants characteristics, maternal knowledge and previous complementary feeding practices and intakes of complementary foods using 24-hours recall adopted from the WHO infants and Young Child Feeding Indicator questionnaire (WHO, 2010b). In addition, some modification of the questioner was done based on the objectives and local situation of the area. The questionnaire captured data on each of the objectives of the study and was coded to facilitate data entry analysis. Data was collected by self-administered questionnaire to the mother/caregiver in face-to-face interviews during a one-time visit to the household. The questionnaire was first prepared in English and later translated into *Afan* Oromo and back translated into English to check for its conceptual equivalence. Mothers will be asked specific questions to elicit information on socio-demographic and economic characteristics, regarding practices of complementary feeding of the child, mothers will be requested to respond the age at which complementary feeding started, types of complementary feeding given for their child, frequency of complementary feeding in per/day and time of breastfeeding stopped from the child. The Diet Diversity Score (DDS) and a 24-hour recall method was conducted with mothers regarding their child's intake. Mothers/caregivers was requested to list all the foods consumed by the child both at home and other places. The consent of each respondent were also be sought and secured prior to the commencement of the actual survey processes.

Key Informant Interview: Key informant interviews were carried out with the intention of capturing more information on optimal complementary feeding. The key informants were comprised of the Elderly, Health extension workers, Health administration officials and managers of *kebeles*. Each interview was carried out by the researcher with the aim of making further investigations based on the information received from the respondents.

Focus Group Discussion (FGD): Four focus group discussions will be carried out with representatives from different economic status (well-off and indigent), religion, gender, age group and community-based organizations. This technique will be used to extract information in a participatory manner so that the perceptions and views of the community will be captured and

interpreted. Suitable conditions were set for the discussants so that they would be able to describe the issues under investigation precisely in their own language, *Afan* Oromo. The participants were respectfully requested for their time. Topics related to infants and children feedings, determinants of complementary feedings, knowledge and perceptions on the adequacy of complementary feeding in community was addressed. Each FGD should a minimum of 6 and a maximum of 12 mothers/caregivers with children below 2 years. Members of the FGDs were recruited by the supervisors with the help of community leaders, Health Extension Workers and village elders. The supervisors moderate the discussions while one of his assistants took notes and the discussions were tape recorded and non-verbal communication documented.

3.7. Data Quality Assurance

To ensure the quality of research data, data collectors, and supervisors were take one-day training on the objective, methodology, sampling technique, ethical issues, data collection instrument and data collection procedure. In addition, the instruments were pretested on 5% sample size of Ambo town. Data was analyzed by SPSS 21.0 version. Systematic Random Sampling and bivariate analysis was used to prevent selection bias and variable confounder effects respectively. The principal investigator was checked the quality of data collection process.

3.8. Study Variables

3.8.1. Dependent Variables

The dependent variables for the study were optimal complementary feeding practices.

3.8.2. Independent Variables

Socio-demographic characteristics of mothers or guardians and infants (Age, sex, residence, marital status, occupational status, educational status, income, religion, ethnicity, parity, household size); maternal knowledge and perception on complimentary feeding practices.

3.9. Data Processing and Analysis

All the collected data was checked for completeness and internal consistency by cross checking, then was coded, and double enters for analysis; the data was exported to Statistical Package for Social Science (SPSS) version 21.0 software. The generated data was compiled by frequency tables, charts and graphs. Descriptive statistics (frequency, mean, media, standard deviation and percentage) was used to describe socio-demographic and economic characteristics, health related characteristics, and complementary feeding indicators of infants.

To test for the association between two variables such as material or infant characteristics and infant and children feeding practices, Chi-square was used to determine significance of association. Logistic regression was used to identify predictors of complementary feeding practices. A P value of < 0.05 was used as the criterion for statistical significance. Data from FGDs was transcribed, coded and common themes established. Selected responses from FGDs were directly quoted to exemplify common perceptions among the respondents. Conclusions were finally drawn and triangulated with quantitative data from the questionnaires.

3.10. Ethical Consideration

The study involved the use of human participants; ethical considerations were taken into account. Permission was sought beforehand from the relevant institution which is Addis Ababa University School of Graduate studies ethical board, obtained a letter of authority to conduct the study. Official letter was taken to Ambo town administrative office for commencing the study, the data collection was beginning after permission, and cooperation letter is written to each selected *Kebeles* authorities on which the study was carried out. At the house hold level, informed signed or thumb print consent was sought from the respondents. The study, purpose, procedure and duration, possible risks and benefits of the study were clearly explained for the participants using local language. Respondents were guaranteed confidentiality and informed that the information provided was only be used for research purposes. Confidentiality was assured by not including respondent names on the questionnaires but only identity numbers.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1.Results

4.1.1. Overview of Results

The data was collected using close ended questionnaire. The questionnaires were self-administered to the respondents. Out of 339 questionnaires that were issued 336 questionnaires were returned. This represents about a response rate of 99.1%, which was significant to give reliable findings for this study. According to McBurney (2001), a low response rate could have a potentially biasing effect on the study results. However, 70% and above response rate is acceptable for any study. The table 4.1 below shows the response rate.

Table 4.1: Response Rate in Ambo Town, Oromia, Ethiopia, 2018/9

	Frequency	**Percentage**
Non Respondent	3	0.9%
Actual Respondent	336	99.1%
Target population	**339**	**100%**

Source: field research of the thesis, May, 2019

4.1.2. Characteristics of the Study Population

4.1.2.1. Socio-Demographic Profiles of the Households

Three hundred and thirty six (336) mothers and caregivers representing the same number of households were interviewed during the study. The median age of the mothers was 24 years with the youngest and oldest mothers being 16 and 54 years old respectively. Majority of the study participants (87.5%) were Oromo by ethnicity and more than half (55.1%) protestant religion followers followed by orthodox religion (41.4%). Majority (74.5%) of the mothers were married, 16.1% single, 6.5% widowed while 2.8% were separated. Over half (59.6%) of the mothers had primary school education while 29.5% had secondary education. The average size of a household was 4.6 (range 1-9) people (Table 4.2).

Table 4.2: Socio-demographic Characteristics of the Study Population in Ambo Town, Oromia, Ethiopia, 2018/9

Socio-demographic characteristics	N=336	%
	N	
Maternal/caregiver age (years): Median (range)	24(16-54)	
<25 years	189	56.2
25-34 years	119	35.4
35 years and above	28	8.4
Ethnicity Oromo	294	88
Amhara	31	9
Guraghe	10	3
Others*	1	0
Religion: Orthodox	139	41
Protestant	185	55
Muslim	10	3
Wakefata	2	1
Marital status: Single	54	16.1
Married	250	74.5
Separated	10	2.8
Widowed	22	6.5
Education: No formal education	19	5.6
Primary school level	200	59.6
Secondary school level	99	29.5
Tertiary level	18	5.3
Parity (number of Children): Median (range)	2(1-7)	
Household size: Mean (range)	4.63(1-9)	

Other*: Tigre

Source: field research of the thesis, May, 2019

4.1.2.2.Socio-Economic Profiles of the Households

Over three quarters of the families (77.0%) depended on casual labour as their main source of income followed by small-scale business (16.1%) and lastly formal employment (6.8%). Nearly all (94.1%) the households obtained food through purchasing from the market. Nearly half (46.3%) of the households estimated to allocate medium percentage (30%-65%) of their income to food while (39.4%) allocated the largest percentage (>65%) of their income to food and only (14.3%) allocated the smallest percentage (<30%) of their income to food (Table 4.3).

Table 4.3: Socio-economic Characteristics of the Study Population in Ambo Town, Oromia, Ethiopia, 2018/9

Socio-economic characteristics	**N=336**	
	n	%
Main source of family income:		
Formal employment	23	6.8
Casual labour	259	77.0
Small scale business	54	16.1
Estimated % household of income allocated to food:		
Largest percentage (>65%)	132	39.4
Medium percentage (30%-65%)	156	46.3
Smallest percentage (<30%)	48	14.3
How food is obtained:		
Farming	14	4.0
Purchase	316	94.1
Food aid/donation	4	1.2
Others	2	0.6
Provider* of food in a household:		
Father/Husband	257	76.4
Mother	70	20.8
Grand parents	4	1.2
Relatives	5	1.6

Source: field research of the thesis, May, 2019

4.1.3. Feeding Practices Among Children 6-23 Months Old in Ambo Town

Infant feeding practices were measured by a set of simple, valid and reliable indicators developed by WHO (2008b) over a period of 5 years. The indicators focus on selected food related aspects of child feeding associated with both breastfeeding and complementary feeding,

amenable to population level measurement. Even though the study focused on complementary feeding, it was worth to give a snapshot of some breastfeeding practices.

4.1.3.1.Breastfeeding Practices

Nearly all the children (92.0%) had ever been breastfed with slightly over two-thirds (68.8%) having been initiated to breastfeeding timely (within 1 hour of birth). Whereas, half (50.0%) of those who never breastfed was due to the fact that their mothers had no breast milk others (42.3%) chose not to breastfeed their children (Table 4.4).

Table 4.4: Breastfeeding Practices in Ambo Town, Oromia, Ethiopia, 2018/9

Breastfeeding practices	**N=336**		
	n	%	95% CI
Ever breastfed N= 336	309	92.0	
Timely initiation of breastfeeding N= 336	231	68.8	
Reasons for not breastfeeding: N=26			
Did not have milk	13	50.0	
Did not want to breast feed	11	42.3	
Other reasons	2	7.7	
Children 6-23 months still breastfeeding N= 298	265	88.9	84.8 -94.0
Continued breastfeeding at 1 year N= 79 (children 12-15 months old)	69	87.3	78.1 -93.2
Continued breastfeeding at 2 years N= 49 (children 20-23 months old)	32	65.3	51.3-77.1
Bottle feeding N=336	99	29.6	
Age of cessation of breastfeeding (months) N=33			
Mean, (SD), range	9.18; (±3.25); 4-18		

Source: field research of the thesis, May, 2019

Majority (87.3%, 95% CI; 78.1-93.2) of the children 12-15 months old were still breastfeeding compared to their 20-23 months old counterpart who rated slightly lower at (65.3%, 95% CI 78.1-93.2). During the FGDs, mothers reported that it was challenging to breastfeed up to 2 years and beyond due to lack of breast milk and occupations, which kept them away from, home most

of the time. Slightly above a 38 quarter of the children (29.6%) received food or drink from a bottle with a nipple/teat in the previous day (Table 4.4).

4.1.3.2. Complementary Feeding Practices

4.1.3.2.1. Introduction of Solid, Semi-Solid or Soft Foods

All the children 6-8 months (100%) had received solid, semi-solid or soft foods the previous day. During the FGDs, mothers reported to have introduced other foods apart from breast milk as early as when their babies were 2 months old.

4.1.3.2.2. Dietary Diversity of Complementary Feeding Diet

Dietary diversity was determined based on a 24-hour recall. The mothers were requested to state what their children consumed the previous day. Dietary diversity was then computed based on 7 food groups as recommended by WHO (2008b) which comprise of: grains, roots and tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry and organ meats); eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables. Consumption of any amount of food from each food group was sufficient to count except if a food item was only used as a condiment. Nearly all the children (94.4%) consumed foods made from grains, roots and tubers. Over half of the children consumed grains, roots and tubers. Vitamin-A rich fruits and vegetables were consumed by 47.8%, dairy products by 32.1%, other fruits and vegetables by 31.2% and finally legumes and nuts by 18.2% of the children aged 6-23 months old. Consumption of animal origin foods was low, barely 4.6% of the children consumed eggs while consumption of dairy products and flesh foods was at 32.1% and 13.0% respectively (Figure 4.2).

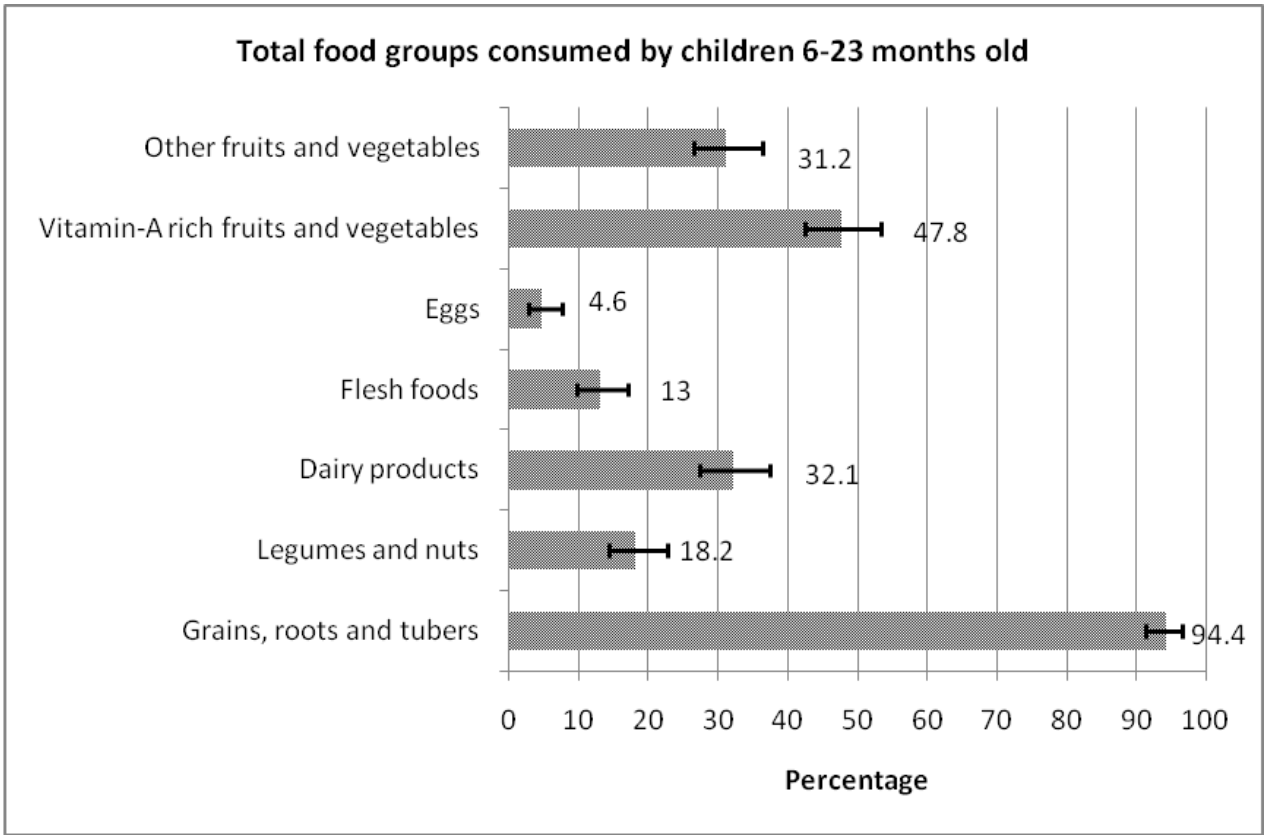

Figure 4.1: Types of Food Given to Children Aged 6–23 Months in Ambo Town, 2019

The mean dietary diversity score for children aged 6-23 months old was 2.4, (± 1.3, 95% CI 2.3-2.6) and the scores ranged from 1 to 7. Slightly over one-tenth (13.6%) of the children aged 6-23 months old consumed iron-rich and iron fortified foods. The percentage of those who consumed iron-rich foods was more or less the same in the other age categories with 10.5% in 6-11 months, 15.7% in 12-17 months and 16.5% in 18-23 months old (Table 4.5).

To determine minimum dietary diversity, a cut-off of at least 4 out of the above listed 7 groups was selected because it is associated with better quality diets for both breastfed and non-breastfed children (FANTA, 2007). Consumption of foods from at least 4 food groups on the previous day would mean that the children have a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable that day, in addition to a staple food (grain, root or tuber) (WHO, 2008b).

Table 4.5: Foods Consumed and Dietary Diversity in Ambo Town, Oromia, Ethiopia, 2018/9

Dietary diversity	N=**336**		
			95% CI
Mean Dietary Diversity:	Mean, (SD), (range)		
6-23 months N=336	2.4, 1.2 (1-7)		2.3- 2.6
6-11 months N=148	2.2, 1.2 (1-6)		
12-17 months N=106	2.6, 1.3 (1-7)		
18-23 months N=82	2.5, 1.2 (1-7)		
Consumption of Iron rich and iron fortified foods:	N	%	
6-23 months N=336	44	13.6	10.3-17.8
6-11 months N=148	15	10.5	
12-17 months N=106	16	15.7	
18-23 months N=82	13	16.5	
Minimum dietary diversity 6-23 months N=336	60	17.9	14.1-22.5
Breastfed N=276	49	17.7	
Non-breastfed N=60	11	18.6	
6-11 months N=148	24	16.1	
Breastfed N=131	21	15.6	
Non-breastfed N=17	3	20.0	
12-17 months N=106	20	19.6	
Breastfed N=91	18	21.2	
Non-breastfed N=15	2	11.8	
18-23 months N=82	16	19.0	
Breastfed N=54	10	17.3	
Non-breastfed N=28	6	22.2	

Source: field research of the thesis, May, 2019

Less than a two-tenths (17.9%, 95% CI 14.1-22.5) of children 6-23 months old received foods from 4 or more food groups in the previous 24 hours. In the same age category, 17.7% and 18.6% of breast fed and non-breastfed children attained minimum dietary diversity respectively. Minimum dietary diversity was highest (19.6%) in 12-17 months old category (21.2% and 11.8% for breast fed and non-breastfed children respectively). This was followed by 18-23 months old category (19.0%) (17.3% and 22.2% for breast fed and non-breastfed children respectively). The

last was the 6-11 months old category (16.1%) (15.6% and 20.0% for breast fed and non-breastfed children respectively) (Table 4.5)

4.1.3.2.3. Meal Frequency

The mean meal frequency for all the aged children 6-23 months old was 3.45 (±1.14) (95% CI 3.3-3.6). The number of meals consumed by the children in all the age categories ranged from 1 to 6.The minimum meal frequency was achieved by most (88.3%; 95% CI 84.3-91.4) of the children 6-23 months old with the same trend in the 6-11 months (86.7%), 12-17 months (92.2%) and 18-23 months (86.1%) old age categories. The percentage of breastfed and non-breastfed children who attained minimum meal frequency in the different age categories was 88.3% and 88.1% in 623months old; 87.5% and 80.0% in 6-11 months old; 91.8% and 94.1% in 12-17 months old and 84.6% and 88.9% in 18-24 months old respectively. During the FGDs mothers reported that children 6-23 months old should consume at least 3 meals in a day (Table 4.6).

Table 4.6 Meal Frequency in Ambo Town, Oromia, Ethiopia, 2018/9

Meal frequency	**Mean, (range), (SD)**		**95% CI**
Meal frequency:			
Children 6-23 months old N 336	3.6, (1-6), 1.1		3.3- 3.6
6-11 months (N=148)	3.3, (1-6), 1.2		
12-17 months (N=106)	3.6, (1-6), 1.0		
18-23 months (N= 48)	3.4, (1-6), 1.2		
Minimum meal frequency:	N	%	
6-23 months N=336	297	88.3	84.3-91.4
Breastfed N=276	244	88.3	
Non-breastfed N=60	53	88.1	
6-11 months N=148	128	86.7	
Breastfed N=131	115	87.5	
Non-breastfed N=17	13	80	
12-17 months N=106	98	92.2	
Breastfed N=91	84	91.8	
Non-breastfed N=15	14	94.1	
18-23 months N=82	71	86.1	
Breastfed N=54	46	84.6	
Non-breastfed N=28	25	88.9	

Source: field research of the thesis, May, 2019

4.1.4. Maternal/caregivers' Knowledge on Complementary Feeding Practices

In order to determine maternal knowledge on complementary feeding practices, mothers/caregivers were asked questions with regards to: initiation of semi-solid, solid or soft foods; dietary diversity and frequency of complementary foods; suitable preparation of complementary food and importance of breast feeding. The respondents were asked a total of 12 questions (Appendix II). Maternal nutrition knowledge was determined based on nutrition knowledge scores. Scores were coded as 1 for a correct response and 0 for an incorrect response, resulting in a total possible score of 12. The overall nutrition knowledge score for each respondent was determined by the number of correct responses. Respondents with higher scores reflected higher nutrition knowledge on complementary feeding than those with lower scores.

4.1.4.1.Knowledge on Breastfeeding Practices

Majority of the mothers (87.3%) interviewed knew that breastfeeding ensures proper growth and development and protects the baby from illness compared to the 69.9% who knew that breast milk alone can sustain the baby for the first 6 months of life (Table 4.8).

Table 4.8: Maternal Knowledge on Breastfeeding in Ambo Town, Oromia, Ethiopia, 2018/9

Knowledge on breastfeeding	**N=336**	
	N	%
Breastfeeding ensures proper growth and development and protects the baby from illness	293	87.3
Breast milk alone can sustain the baby for the first 6 months	235	69.9
Baby should be breast fed on demand	232	69.1
Breastfeeding should continue for at least 2 years and beyond	201	59.9

Source: field research of the thesis, May, 2019

4.1.4.2.Knowledge on Complementary Feeding Practices

In the current study, most of the mothers (85.4%) knew that semi-solid, solid and soft foods should be introduced at 6 months. Slightly less than three quarters of the mothers (70.5%) did not know the risks of starting complementary feeding late. Malnutrition was the main consequence pointed out by mothers who knew the risk of introducing complementary feeding too late (Table 4.9).

With regards to dietary diversity, mothers who stated that a child should consume a diverse diet were 65.8%. Almost about 74.5% of the mothers were aware that a 6-23 months old child should

consume 2 meals or more in a day in addition to breast milk. Mothers' knowledge with regards to the importance of animal foods in complementary diet was low with only 18% of them pointing out that animal source foods are rich in nutrients and should form part of the complementary diet (Table 4.9).

Slightly more than a third (34.5%) of the respondents stated that enriching complementary food (through adding other foods like milk, fruit juices and fat to the main dish) makes it more nutrient dense/diverse and adequate to meet the dietary needs of the children especially as they grow. Just one-tenth (7.5%) of mothers knew that child's porridge should be made of one type of flour. In addition to that mothers reported using mixed flour to prepare children's porridge during the FGDs (Table 4.9).

Table 4.9: Maternal Knowledge on Complementary Feeding Practices in Ambo Town, Oromia, Ethiopia, 2018/9.

Knowledge on complementary feeding practices	**N=336**	
	n	**%**
Introduction of semi-solid, solid and soft foods: Complementary foods should be introduced at 6 months	287	85.4
Starting complementary feeding after 6 months may cause malnutrition N=336	99	29.5
Dietary diversity and frequency of feeding: A child should consume a diverse diet	221	65.8
A child should consume more than 2 meals per day	250	74.5
Animal source foods are nutrient rich	61	18.0

Source: field research of the thesis, May, 2019

4.1.5. Maternal/Caregivers' Knowledge Score on Complementary Feeding

The overall mean maternal knowledge score on complementary feeding was 6.8, (±1.7) out of a total score of 12 and scores ranging from 3 to 10 (Table 4.10).

Table 4.10: Maternal Knowledge on Complementary Feeding Practices in Ambo Town, Oromia, Ethiopia, 2018/9

Overall maternal/caregivers' knowledge score on complementary feeding	**N=336**	
Mean overall score: Mean, (SD), (range)	6.47, (1.6), (3-10) n	 %
<4 scores	11	3.4
4-7 scores	212	63.1
8-10 scores	113	33.5

Source: field research of the thesis, May, 2019

Maternal/caregivers' knowledge score was also computed by maternal age categories, marital status, education level and occupation. Analysis of variance (ANOVA) was done to establish any significant differences in maternal knowledge on complementary feeding by the various maternal characteristics. There was no significant difference in the maternal knowledge score by age (p= 0.097) and marital status (p=0.383) and occupation (p=0.827) (Table 4.11).There was a significant difference in maternal knowledge scores among mothers of different education levels (p=0.017). Post hoc results showed that mothers who had secondary education had significantly higher total maternal knowledge score (p=0.037) compared to mothers who had primary education primary (p=0.017) (Table 4.10).

Table 4.11: Maternal Knowledge on Infant and Young Child Feeding by Maternal Characteristics in Ambo Town, Oromia, Ethiopia, 2018/9.

Maternal/caregivers' knowledge verses maternal characteristics			**ANOVA**
	Mean	SD	Overall and post hoc p value
Maternal age category N=336	6.8	1.7	0.097
<25 years N=189	6.6	1.7	
25-34 years N=119	7.0	1.7	
35 years and above N=28	7.0	1.4	
Marital status N=336	6.8	1.7	0.383
Single N=54	6.7	1.8	
Married N=250	6.7	1.7	
Separated N=10	7.2	1.0	

Widowed N=22	7.2	1.4	
Occupation N=336	6.8	1.7	0.827
Not employed/house wife N=239	6.7	1.7	
Employed (salaried) N=29	6.8	1.6	
Small scale trading N=40	7.0	1.8	
Casual labour N=28	6.6	1.4	
Education level N=336	6.8	1.7	0.017*
No formal education N=19	7.5 a	1.3	0.200
Primary N=200	6.5 ab	1.7	0.017**
Secondary N=99	7.0 ab	1.6	0.037**
Tertiary N=18	7.2 a	1.2	0.552

** P values after post hoc test

Means followed by one superscript (a) are not significantly different at p= <0.05 after post hoc while means followed by two different superscripts (ab) are significantly different. **Source**: field research of the thesis, May, 2019

4.1.6. Maternal Perceptions and Beliefs on Complementary Feeding

One FGD was held in each of the four *Kebeles* at the end of quantitative data collection making a total of four FGDs. Each FGD had a minimum of 6 and a maximum of 12 mothers of children below 2 years of age. The discussions were guided by the questions in the focus group discussion guide.

4.1.6.1.Sources and Relevance of Information on Complementary Feeding

Most of the mothers said that they got information regarding complementary feeding from the health facility. Mothers also reported they got information from family, friends and at the kebele 01 meeting. The following statement made by mothers in town shows how mothers obtain information on child feeding other sources of information apart from the health facility:

"When we take our children to the health facility, health workers talk to us on how we can appropriately feed our children but we also discuss a lot on child feeding with our friends and relatives and once in a while we are sensitized by HEWs during meetings at the kebeles."

Information obtained by the mothers especially from the health facility focused on dietary diversity, continued breastfeeding to 2 years and beyond, exclusive breastfeeding and the type of foods suitable for initiation of complementary feeding with soft foods. They also reported that the information they received especially from the health facilities was beneficial in ensuring that the child becomes healthy but few mothers put the information into practice due to poverty and lack of food (Table 4.11).

The following statement demonstrates these sentiments: *"We are told by the health workers to feed our children on a balanced diet ensuring that we include foods like meat and fruits in the child's diet. We agree with the information given and we are willing to put into practice what we are taught but cannot afford even flour for preparing porridge!"*

4.1.6.2. Introduction of Complementary Food, Dietary Diversity and Frequency Of Complementary Foods

Mothers reported that they did not follow health worker's advice on the age of introducing complementary foods. They introduced food as early as when the infants were 2 months old because the mothers were not at home most of the times to practice exclusive breastfeeding. The following statement made by mothers in kebele 03 illustrates that mothers introduced complementary food earlier:

"We don't follow health worker's advice on introducing complementary foods. We initiate complementary foods as early as 2 months because our babies cry frequently due to hunger and we have to leave children at home and go to work to look for income"

Mothers reported that beans, mangoes, oranges, vegetable soups, mixed flour porridge, milk, avocado, tea and rice were foods commonly given to children 6-23 months old. Street foods; cooked rice and beans were also given to children. Mothers reported that meal frequency was mostly dependent on whether they had access to food or not (Table 4.11).

4.1.6.3.Challenges Experienced on Complementary Feeding Practices in the Study Area

Mothers pointed out a number of challenges they experienced in ensuring optimal complementary feeding of their children. These included; food shortages due to inadequate income to purchase enough food, high food prices, poverty, occupations that keep mothers away from home most of the time, many children to cater for and lack of reliable jobs that can provide steady income.

4.1.7. Factors Associated With Complementary Feeding Practices

Socio-demographic and economic factors: age, parity, household size, sex of the household head, occupation, main source of family income, provider of food in the household. In addition, the estimated percentage of household income allocated to food and how food is obtained in the household and their association with complementary feeding practices (consumption of vitamin A rich foods, consumption of iron rich foods, minimum dietary diversity, minimum meal

frequency and minimum acceptable diet) was investigated. Chi-square test was used to determine the association between categorical/nominal independent variables and the indicators of complementary feeding practices, which were also of categorical nature.

4.1.3.1.Socio-Demographic and Economic Factors and their Relationship With Complementary Feeding Practices

Maternal age and occupation, proportion of income allocated to food and the decision maker on how family income is used were the only socio-demographic and economic factors having an association with complementary feeding practices. Children belonging to young mothers were more likely (chi square test; p=0.024) to achieve minimum meal frequency. Mothers who were not employed were more likely (chi square test; p=0.045) to feed their children with vitamin A rich foods (Table 4.13).

Table 4.13: Significant relationship between demographic and socio-economic factors and complementary feeding practices in Ambo Town, Oromia, Ethiopia, 2018/9.

Characteristic	**Complementary feeding practice**						**Chi-square test; P value,**
Mothers' age N=336	**Minimum meal frequency**						0.024*
	Yes		No		Total		
	n	%	n	%	n	%	
<25 years	174	92.3	15	7.7	189	56.2	
25-35 years	100	84.2	19	15.8	119	35.4	
>25 years	22	77.8	6	22.2	28	8.3	
Occupation	**Consumption of vitamin A rich foods**						0.045*
	Yes		No		Total		
	n	%	n	%	n	%	
Not employed	119	49.8	120	50.2	239	71.1	
Employed	42	43.4	55	56.5	97	28.3	
Percentage of income allocated to food	**Minimum Dietary diversity**						0.048*
	Yes		No		Total		
	n	%	n	%	n	%	
Largest (>65%)	28	21.3	105	78.7	133	39.4	
Medium (30%-65%)	29	18.8	126	81.2	155	46.2	
Smallest (<30%)	3	6.5	45	93.5	48	14.3	
Decision maker on how family income is used	**Consumption of vitamin A rich foods**						0.045*
	Yes		No		Total		
	n	%	n	%	n	%	
Husband/partner	11	36.7	20	63.3	31	9.3	
Wife/mother	141	46.2	164	53.8	305	90.7	

Source: field research of the thesis, May, 2019

Children belonging to households which allocated more than 65% of their income to food were more (chi square test; p=0.048) likely to consume a diverse diet compared to children whose households allocated less than 65% of their income to food. Children belonging to households where mothers decided on how family income is used were more likely (chi square test; p=0.045) to achieve minimum dietary diversity compared to children belonging to households where husbands decided (36.7%) on how income is used (Table 4.13).

The following variables; sex of the household head, mothers' age, mothers' occupation, marital status and main source of family income had no significant associations with complementary feeding practices (Table 4.14, Appendix VI).

4.1.3.2.Maternal/Caregivers' Knowledge and Its Relationship with Complementary Feeding Practices

Children belonging to mothers who knew the importance of feeding their children on a diverse diet were likely (chi square test; p=0.001) to achieve minimum dietary diversity compared to children belonging to mothers who were not knowledgeable. Children of mothers who knew the importance of enriching complementary foods we more likely (chi square test; p=0.007) to achieve minimum acceptable diet compared to mothers who were not knowledgeable on the importance of enriching complementary foods (Table 4.15).

Table 4.15: Relationship between Maternal Nutrition Knowledge and Complementary Feeding Practices in Ambo Town, Oromia, Ethiopia, 2018/9

Characteristic	**Complementary feeding practices**						**Chi-square test; P value,**
Knowledge on the importance of diverse diet	**Minimum dietary diversity**						**0.001***
	Yes		No		Total		
	n	%	n	%	n	%	
Correct response by the mother	32	28.2	83	71.8	115	34.2	
Incorrect response by the mother	28	12.7	193	87.3	221	65.8	
Knowledge on the importance of enriching complementary food	**Minimum acceptable diet**						**0.007***
	Yes		**No**		**Total**		
	n	%	n	%	n	%	
Correct response by the mother	43	19.5	176	80.5	219	65.2	
Incorrect response by the mother	9	8.0	108	92.0	117	34.8	

Source: field research of the thesis, May, 2019

Maternal knowledge on the importance of a diverse diet, frequency of feeding and importance of flesh foods had no significant association with complementary feeding practices (Table 4.16, Appendix VI).

4.2.Discussion

To improve complementary feeding in low-resource settings during this critical period of growth and development, factors associated with complementary feeding practices should be investigated to provide information necessary for focused and appropriate interventions. The study adopted a cross-sectional analytical design to investigate complementary feeding practices of children aged 6-23 months in Ambo town.

4.2.1. Socio-Demographic and Economic Characteristics of Mothers/Caregivers of Children 6-23 Months

As a whole, the participants were young, married and of primary level of education. The findings on marital status are in agreement with those conducted in other in informal settlements in Kenya (Mututho, 2012; Kimani-Murage *et al.*, 2011; Ochola, 2008) and in Ethiopia (Gebru, 2007). The high poverty levels in Ambo town as reported by mothers during FGDs may have resulted to early school dropout by most of the girls and subsequently leading to early marriages. High levels of poverty may also lead to students discontinuing their studies because of lack of money to finance their education.

On the whole, most of the husbands were casual labourers while most of the mothers were unemployed and depended on their spouses for provision of food and other necessities. The majority of the households allocated over half of their income to food expenditure indicating high levels of poverty in the study area. As expected in an urban setting, nearly all the households obtained food through purchase. High levels of poverty, low purchasing power and lack of own production of food may have had a negative effect on the attainment of minimum acceptable diet by children aged 6-23 months old in majority of the households.

4.2.2. Feeding Practices among Children 6-23 Months Old in Ambo Town

4.2.2.1.Breastfeeding Practices

The minority of the mothers who did not initiate breastfeeding in this study reported that the main reason for not doing so was lack of breast milk. These findings agree with those of studies in other informal settings in Nairobi (Kimani-Murage et al, 2011 and Ochola, 2008).

A high percentage of the children who are one year old were still being breastfed. At 2 years of age, the rate of breastfeeding dropped to about two-thirds, indicating that one-third of the children had prematurely stopped breastfeeding and therefore missing on the benefits of the practice. A similar trend was noted in all the studies conducted by Sawadogo *et al.*, (2011) with the rate of breastfeeding decreasing from 100% at 6 months to 61% at 24 months.

The median age of cessation of breastfeeding in this study was 9.0 months, a much lower rate. The relatively low duration of breastfeeding in this study could be partly explained by the fact that most mothers had to leave their children at home to look for casual jobs and thus could not continue with breastfeeding. This finding implies that a significant proportion of children were therefore likely to miss the health benefits of continued breastfeeding for the recommended duration of 2 years or more (UNICEF, 2011).

4.2.2.2.Complementary Feeding Practices

All the children (aged 6-8 months old) in this study had appropriately introduced to complementary feeding. Nonetheless, some of the children had been introduced to complementary foods as early as 2 months as reported by mothers during the FGDs. The finding on early introduction of complementary feeding is in agreement with those of other studies conducted in informal settlements in Kenya (Muchina, 2007).

Nearly all the children aged 6-23 months old consumed foods made from grains, roots and tubers mainly in form of porridge. The consumption of vitamin-A rich fruits and vegetables and other fruits and vegetables was low. These findings compare with those of studies conducted in Kenya by Chelimo, (2008) and in Nepal by Joshi *et al.*, (2011). The low consumption of vitamin A-rich foods may have been contributed by the high poverty level in the town and therefore limited income to purchase foods. Again, the low consumption of animal origin foods may be contributed to the high poverty level in the town and therefore limited income to purchase foods.

The findings of this study showed that complementary feeding was low in dietary diversity. The mean dietary diversity was (2.4 ± 1.3), implying that many children ate foods from only 2 out of the 7 recommended groups (WHO, 2008b) with the number of food groups consumed increasing with the age of the child. These findings are in agreement with those from various studies; Sawadogo *et al.*, (2011) in Burkina Faso and Joshi *et al.*, (2011) in Nepal. In a study conducted

in Ethiopian (Gebru, 2007), the minimum dietary diversity rate, was higher (7%) than in the present study but lower than what was found in Zambia (37%) by Disha *et al.*, (2012).

The study established that most children aged 6-23 months old received one to three meals a day with a mean meal frequency of 3.5 (± 1.1). In conclusion, complementary feeding, in this study was sufficient in terms of meal frequency.

4.2.2.3. Mothers/Caregivers Knowledge and Perceptions on Complementary Feeding in the Town

Overall, mothers' and caregivers' demonstrated a high knowledge on breastfeeding compared to complementary feeding practices. The aspects on which mothers demonstrated high knowledge included: the importance of breastfeeding and in particular the correct duration of exclusive breastfeeding; age of introduction of complementary foods and correct meal frequency, findings that are comparable to those of a study conducted in a Nairobi slum (Muchina, 2007). During the FGDs mothers reported to have received knowledge on infant feeding mainly from the health facilities and this partly explains the high level of maternal knowledge on the above mentioned factors.

Over two-thirds of the mothers in this study were aware of the ability of breast milk alone to sustain the baby for the first 6 months of life. Such findings are in contrast with the findings of a study conducted in Zambia (Owino *et al.*, 2008) where more than a third of mothers were doubtful of the nutritional adequacy of breast milk to meet the nutritional needs of an infant. The mean maternal knowledge score on complementary feeding was 6.5 ±1.6 out of a possible total score of 12. These findings were slightly lower compared to those of Adere (2007) in Kibera slums. The average maternal knowledge, poverty and being away from home may have been some of the factors contributing to the relatively low adherence to appropriate complementary feeding practices as reported in the FGDs.

4.2.3. Factors Associated with Complementary Feeding Practices

4.2.3.1.Socio-Demographic and Economic Factors and Complementary Feeding Practices

Several studies have established different maternal factors related to complementary feeding practices. In the present study, younger mothers and those who were not employed were significantly more likely to feed their children at the required minimum meal frequency and also to feed them on vitamin A rich foods respectively. The null hypothesis that there is no significant association between maternal demographic and socioeconomic characteristics and complementary feeding practices among children aged 6-23 months in town is thus rejected.

Younger mothers of whom majority were unemployed had fewer children to provide for and thus lesser workload compared to older women. This contributed to younger mothers offering better quality care to their children.

More children belonging to households where mothers decided on how family income is used significantly achieved minimum dietary diversity compared to those in households where husbands decided on how family income was used. This is because mothers are likely to purchase food items in the household when they are the ones deciding on how family income will be used compared to when fathers are the ones doing it (Acharya *et al.*, 2010). The proportion of total income allocated to food was also related to complementary feeding practices. Significantly, more children from households, which allocated more than two-thirds of their income to food, consumed a diverse diet compared to those from households in which less than two-thirds of the income was allocated to food. The more income a household spends on purchasing food, the more is the likelihood that the children will achieve the minimum dietary diversity.

4.2.3.2.Maternal Knowledge and Complementary Feeding Practices

Maternal nutritional knowledge about appropriate food and feeding practices significantly influences complementary feeding practices and is often a greater determinant of malnutrition than the lack of food (Aggarwal *et al.*, 2008). Mothers should therefore be equipped with the necessary knowledge on complementary feeding practices (Sethi, Kashyap & Seth, 2003).

Mothers who were aware of the importance of a diverse diet were more likely to feed their children on a diverse diet. On the other hand, mothers who were aware of the importance of enriching complementary foods fed their children with a minimum acceptable diet. The findings emphasize the importance of maternal nutrition knowledge as a tool towards achieving appropriate complementary feeding in children aged 6-23 months old. The null hypothesis that there is no significant association between maternal/caregivers' knowledge on complementary feeding practices and complementary feeding practices among children aged 6-23 months in town was thus rejected. The findings on the positive association between maternal knowledge and complementary feeding practices agree with those conducted in northern Ethiopia (Belete *et al.*, 2017), which showed that mothers with greater knowledge of healthy eating habits choose to give nutritious foods to their children.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The following are the major conclusions drawn from the findings of the study:

Overall, appropriate complementary feeding practices in Ambo town fell below the recommended level because of the relatively low percentage of children who attained the minimum diet diversity and the low prevalence of minimum acceptable diet among children 6-23 months old. Initiation of complementary feeding at the recommended time of six months was seen in the majority of children and comparatively higher proportion of children met the recommended minimum meal frequency. However, the quantity of complementary feeding was insufficient. Occupational of mothers and husband, monthly income sex and age of child were the significant determinants of achieving the recommended dietary diversity. Mothers/caregivers who knew the importance of a diverse diet were likely to feed their children on a diverse diet. On the other hand, mothers who knew the importance of enriching complementary foods were likely to feed their children on a minimum acceptable diet.

5.2. Recommendations

In the country child malnutrition, was the major public health problem identifying and understanding factors that determine feeding practices in different setting provide valuable information for policy makers and practitioners working in the area.

Therefore, based on the finding of the study, the following recommendations are forwarded.

- Knowledge, attitude and awareness should be enhanced at household and community level on complementary feeding practices by Ambo town 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 importance of dietary diversity.
- The ministry of agriculture should sensitize households in town on innovative and cost-effective agricultural and livelihood strategies, for example, multi-storey and kitchen gardening to improve access to vegetables and fruits that will in turn improve micronutrient intake and dietary diversity of the children.

- Strategies to promote complementary feeding should target all the stakeholders and not only mothers of children. The strategies should target mothers-in-law, grandmothers, fathers and community leaders as they play a key role in influencing the mothers' choice of complementary feeding practices.
- A longitudinal study should be conducted to track infant and young child feeding practices throughout the period from birth to 24 months of age. This will determine the quantity of dietary intake of the children to establish the adequacy of nutrient intake of the diet.

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Appendices

Appendix I: Informed Consent

Letter of Introduction

My name is Assefa Belay; I am a graduate student at Addis Ababa University, pursuing a Master of Science in Food Security Studies. I am carrying out a research on: ***Current level and Determinants of optimal complementary feeding practice among mothers of children age 6-23 months in Ambo Town.***

I am seeking your consent to participate in the study whose findings might be beneficial to your child and other children. There will be no direct reference of your name nor will your contact information be published at the end of the study. There is no financial or other personal benefit from participating in this study and there are no risks to you resulting from your participation. Your participation is voluntary and it will be highly appreciated.

When you sign or thumb print below, it shows that you have understood the purpose of the study and you have agreed to participate.

Contact information: If you have any questions, concerns and complaints contact me through my official address: Principal researcher: Mr. Assefa Belay, MSc. candidate at centre for food security studies, Addis Ababa University.

Address: email: - asse430@gmail.com

Cell phone: +251-910-123-974

+251-973-112-621

Signature/ thumb print of the participant…….

Date……

Appendix II: Questionnaires (English version)

Current level and Determinants of optimal complementary feeding practice among mothers of children age 6-23 months in Ambo Town.

Interviewer administered questionnaire for Mothers

Introduction and Consent

My name is _____ and I am a graduate student at Addis Ababa University. I am studying Food Security and Development Studies with a focus on Food Security Studies. I am collecting information about complementary feeding of children. The information given by you will be kept confidential and used for research purpose only. The information given by you will be very useful and expect that you will cooperate with us for the research study. If you are willing, I will like to ask you some questions.

If respondent does not agree, write the reasons.

Name of Investigator and signature _____ Date of interview_____

Signature of Supervisor_____

1. Identification of Particulars

Kebele: _____ Goti: _____ Code: _____

No. of children 6-23 months of age: _____ Age: _____ sex: _____

2. Demographic & Socio–Economic Profile

No	Questions and filters	Responses	Skip
2.1	Age of child (in months)	----------months	
2.2	Sex of child	1. Male 2. Female	
2.3	Age of mother	--------years	
2.4	Birth order	1. first child 2. second child 3. third child 4. fourth child 5. others (specify…)	
2.5	Pregnancy history	1. Term 2. Preterm	

		3. Others(specify)	
2.6	Educational qualification of mother	1. Can't read and write 2. Grade 1-4 3. Grade 5-8 4. Grade 9-10 5. Grade 11-12 6. certificate 7. College diploma 8. Degree and above 9. Others (Specify)	
2.7	Marital status	1. Single 2. Married 3. Widowed 4. Divorced	
2.8	Occupation of mother	1. Housewife 2. Govt. Service 3. private business 4. Merchant 5. Daily Laborer 6. Others	
2.9	Occupation of father	1. farmer 2. Govt. Service 3. private business 4. Merchant 5. Daily Laborer 6. Others (Specify)	
2.10	What is your religion (mother)?	1. orthodox 2. protestant 3. Muslim 4. Wakefata 5. Other (Specify)	
2.11	Family size	---------	
2.12	What is the total monthly income of family from all sources?	Eth. Birr _____	
3. 3.	**Determinants of Complementary feeding**		
3.1	Previous s practice of complimentary feeding	1. Yes 2. No	
3.2	What do you understand by complementary feeding?		
3.3	Why giving of complementary food is important?		
3.4	Do you know the disadvantages of formula feeding?	1. Yes 2. No	
3.6	If yes, what?		

4. **Practice Of Complementary feeding**					
4.1	Have you started complementary feeding to your child?	1. Yes 2. No			If no, go to Q 4.2
4.1.1	If yes, at what age you have started complementary feeding?	Months Don't know			
4.2	If complementary feeding (semi-solid and solid food items) not introduced what were the reasons?				
4.3	Now I would like to ask you about the food ------- ate yesterday during the day or at night, either separately or combined with other foods: Did eat:	1. Yes 2. No 3. Don't know			
		Yes	No	Don't know	
	1. Plain water				
	2. Infant formula				
	3. Milk such as tinned, powdered or fresh animal milk				
	4. Juice or juice drinks				
	5. Yogurt				
	6. Thin porridge				
	7. Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits				
	8. Any other fruits or vegetables				
	9. Any oil, fats, or butter, or foods made with any of these				
	10. other foods made from grains				
	11. Eggs				
	12. Any cheese, yogurt or other milk products?				
	13. Any dark green leafy vegetables				
4.4	What was the consistency of meal given to child	1. Solid 2. Semi solid 3. Liquid 4. Semi liquid			
4.5	How many times did you feed your child morning to night yesterday?	1. One time 2. Two times 3. Three times 4. Four times 5. > 4 times 6. Others (specify)			
4.6	How much did you feed your child from morning to night yesterday ?(other than breast milk)	1. ½ cup at each meal 2. ¾ cup at each meal 3. Full cup at each meal 4. Other (specify)			

4.7	How the feed was given (other than breast milk)?	1. Bowl and Spoon 2. Bottle 3. Hands 4. Others (specify)	
4.8	Do you prepare separate food for child?	1. Yes 2. No	If yes, go to Q4.9
4.8.1	If no, how do you modify the family food to make it appropriate for your child?		
4.9	Does the child eat in a separate bowl/plate?	1. Yes 2. No	
4.10	How do you come to know that the child is hungry?	1. Child cries 2. Child tries to eat whatever comes in his/her hand 3. Child tries to take food from Others plate when they are eating 4. Others (specify)…….	
4.11	How do you come to know that child has eaten to full satisfaction?	1. Leaves the food 2. Goes to Sleep 3. Start playing Doesn't want to take more food 4. Others (specify)----------	
4.12	What difficulties do you face in feeding the child?	----------	
4.13	How do you overcome those difficulties?	----------	
4.14	What all you do to maintain hygiene while feeding your child?	1. Wash hands before and after feeding 2. Wash/ clean feeding utensil	
4.15	Do you avoid giving any specific/particular food to your child?	1. Yes 2. No	If no go to Q 4.16
4.15.1	What are the reasons for avoiding these foods?		
4.16	What do you feed to your child during his/ her illness?	1. Normal home cooked food 2. Prepare special/separate food 3. Modified the home food 4. Others (specify)……	

Appendix III: Diet Diversity Score Assessment Tool

Quick food list form

Now I would like to ask you about some liquids, solid or semi-solid food that *your child* may have had yesterday during the day or at night Questioner ID_____ House No _____ Interviewer sign_____ Supervisor sign_____		*sex*_____ age: _____ date of intake_____ date of interview:_____
Occasion	**Place of intake**	**Type and list of food**
Morning before breakfast		
Breakfast		
After breakfast		
Lunch		
After lunch		
Snack		
After snack		
Dinner		
Over night		
Out of home		
While the child play		
While the mother		

Appendix IV: Focus Group Discussion Guide

[The discussion should be based on both breastfeeding and complementary feeding but with special focus on complementary feeding]. [The discussion should include why they think it is adequate or not adequate]. [The discussion should also include the following aspects; introduction of solid, semisolid foods and soft foods, dietary diversity, frequency of feeding and continued breast feeding to 2 years and above].

1. What is your view on the adequacy of feeding children in this community?

   _____
   _____

2. What are the sources of information on complementary feeding in this community?

   _____
   _____

   Is the information beneficial? (If yes-how or no-why?)

   _____
   _____

   Is the information received adequate?

   _____
   _____

   What other aspects of CF would you like to receive information on?

   _____
   _____

3. In your opinion, do mothers initiate complementary feeding at the appropriate time?

   _____

4. What are foods commonly given to children 6-23 months old in this community?

   _____
   _____

5. In your opinion, do mothers feed their children at the required meal frequency?

   _____
   _____

6. Does poor/inappropriate complementary feeding affect infant/child nutrition status?

   _____
   _____

7. What are the challenges experienced by mothers in complementary feeding in this community?

   _____

Thank you and End!

Appendix V: Questionnaire (Afan Oromo version)

Qorannoo "Determinants and levels of optimal complementary feeding practice among mothers of children age 6-23 months in Ambo Town''.

Gaffii fuulaf fulatti haati gaafatamtu!

Seensa fi fedha gaafachuu

Ani maqaan koo ---------- kan jedhamu barataa yuuniversiitii Finfinee muummee Qorannoo Wabbii Nyaata Sayaanssifi Misooma kan baradhu raga kophii qorannootiif funaanaa waanan jiruuf mata dureen qorannoo kootii waa'ee nyaata dabalataa ijoolee ji'a ja'aa hanga ji'a 23tti 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 fi mallattoo_____ Guyyaa dalagame_____

mallattoo to'ataa_____

1. **Eenyummaa gaafatamaa**

Ganda: _____ Gooxii: _____ koodii: _____

Baayina ijoollee umuriin isaanii ji'a 6- jia 23 ta'an, _____ umurii: _____ saala: _____

2. **Gaaffii hawaasdinagdee**

Lakk	Gaaffii fi calaltuu	Deebii	Irra utaali
2.1	Umurii mucaa ji'aan	---------- (ji'a)	
2.2	Saala	1. Dhiira 2. Dhaala	
2.3	Umurii haadhaa	--------(wagaadhaan)	
2.4	Tartiiba dahumsaa	1. Kan jalqabaa 2. 2ffaa 3. 3ffaa 4. kan biro…ibsi	
2.5	Haala ulfaa	1. Gahee kan dhalate 2. Osoo hin ga'in kan dhalate 3. Kan biroo…	
2.6	Sadarkaa barnoota haadhaa	1. Barreessuu fi Dubbisuu kan hin dandeenye	

		2. Kutaa 1-4 3. Kutaa 5-8 4. Kutaa 9-10 5. Kutaa 11-12 6. Ragaa kan fudhattee 7. Diploomaa 8. Digrii fi isaa oli 9. Kan biro….	
2.7	Haala gaa'elaa	1. Kan hin heerumne 2. Kan heerumte 3. Gursummaa 4. Kan hiikte	
2.8	Haala hojii Haadhaa	1. Haadha manaa 2. Qotee bulaa 3. Hojii mootummaa 4. Daldalaa 5. Hojjetaa guyyaa 6. Kan biroo	
2.9	Haala hojii Abbaa	1. Qonnan bulaa 2. Hojii mootummaa 3. Hojii dhuunfaa 4. Haldalaa 5. Hojjetaa guyyaa 6. Kan biroo	
2.10	Amantii Haadhaa	1. Ortoodoksii 2. Prootestaantii 3. Musiliima 4. Waaqeffataa 5. Kan biroo---------	
2.11	Baay'ina maatii	…….	
2.12	Galii ji'aa kan walii gala	Eth. Birr _____	
3.3. Nyaata dabalataa wantoota murteessan			
3.1	Muuxannoo nyyata dabalaataa ijoolleef kana dura qabdaa?	1. Eeyyee 2. Lakkii	
3.2	Nyaata dabalataa jechuun maal jechuudha jettee yaadda?	1. Nyaata harma haadha irratti dabalamee kennamu 2. Nyaata qal'aa ykn dhangala'aa mucaaf kennamu 3. Nyaata garaagaraa mucaaf kennamu fedha nyaata guutuuf 4. Hin beeku 5. Kan biro	

3.3	Nyaata dabalaataa kennuun maaliif fayyada jettee yaadda?	1. Guddina mucaatiif gargaara 2. Humnaa fi wanttota qaamaaf barbaachisoo ta'an dabalaaf 3. Televiishiiniirraa mucaaf akka barbaachisu daawwadheera 4. Ogeessa fayyaatu nu gorse 5. Haadha kootu natti hime 6. kan biro			
3.4	Rakkoo aannan cufamee xaasaadhaan gabaarra bitamuu beektaa?	1. Eyyee 2. Lakki			
3.6	Yoo beekta ta'e maal dha?				
4. Hojimaata nyaata dabataa					
4.1	Nyaata dabalataa mucaa keetiif kennuu eegalteettaa?	1. Eyyee 2. Lakkii			If no, go to Q 4.2
4.1.1	Ji'a meeqatta eegalteef?	Ji'a Hin beeku			
4.2	Yoo hin eegalleef ta'e maaliif hin eegalleef?				
4.3	Nyaata kaleessarraa eegalee hanga har'aatti mucaan nyaate yoo yaadatte wal duraa duubaan natti himtaa?	1. Eyyee 2. Lakkii 3. Hin beeku			
		Eyyee	No	Hin beeku	in
	1. Bishaan duwwaa				
	2. Aannan formulaa daa'immanii				
	3. Nyaata akka foonii(ittoo lukkuu,horii,re'ee.kalee.tiruufi qurtummmi				
	4. Cuunfaa garaa garaa				
	5. Itittuuu				
	6. Nyaata akka baaqelaa.miisira,ocholonii,lawziifi atara				
	7. Keekii,karameellaa,paastaa ykn biskuutii				
	8. Muduraa fi kuduraalee biro				
	9. Kuduraafi muduraa akka qullubbii,timaatima,raafuu burtukaana				

	10. Nyaata akka mocoronii,ruuzii,daabboofi buskuti				
	11. Hanqaaqu				
	12. Baaduu,itittuu ykn dhama				
	13. Nyaata akka zayitaa,cooma fi dadhaa				
	14. Nyaata vitiamini Aof keessa qaban kan akka karotii,avocado				
4.4	Qabiyyeen nyaataa mucaadhaaf kennamee maalidha?	1. Jajjaboo 2. Gariin jajjaboo 3. Dhangala'oo 4. Gariin dhangala'oo			
4.5	Mucaa keetiif nyaata guyyaatti al meeqa kennitaaf?	1. Al tokko 2. Si'a lama 3. Si'a sadi 4. Si'a afur 5. > 4 times 6. Kan biroo			
4.6	Al tokko yeroo mucaa kee nyaachiftu hagam kennitaaf?	1. Kubbaayyaa walakkaa 2. Kubbaayyaa tokko) 3. ¾ kubbaayyaa) 4. Kubbaayyaa guutuu 5. Kan biroo			
4.7	Nyaata harmaa haadhaatiin ala ta'an maaliin kenniteef?	1. Saayinii fi fal'aana 2. Xuuxxoo 3. Harka 4. Kan biroo			
4.8	Nyaata addaa mucaa keetiif kophaatti ni qopheessitaa?	1. Eyyee 2. Lakkii			If yes, go to Q4.9
4.8.1	Yoo hin qopheessine akkamitti nyaata maatii kan mucaatti jijjiirtaree?	1. Qabiyyee hir'isuun 2. Kan akka dhadhaa, Sukkaara fi zayita itti dabaluudhaan? 3. Kan biro			
4.9	Does the child eat in a separate bowl/plate?mucaan saayinaa qophaa isaatti fayyadamaa?	1. Eyyee 2. Lakki			
4.10	Mucaan kee akka beela'e akkamiitti beekta?	1. Ni boo'a 2. Waanuma argeta gara afanitti yeroo fudhatu 3. Yeroo maatiin nyaatu mucaan nyaata fudhachuuf shaakala			

		4. Kan biro	
4.11	Akka mucaan kee nyaata quufe akkamitti beekta?	1. Nyaata yoo dhiisu 2. Ni rafa 3. Tapha yeroo eegalu 4. kan biroo …….	
4.12	Yeroo mucaa nyaachiftu rakkoon si mudate jiraa?	----------	
4.13	Rakkicha akkamitti furte?	----------	
4.14	Yeroo mucaaf nyaata kennituu fi qopheessitu qulqinq ni eeggatta?	1. Harka dhiqachuunyaata duraafi booda 2. Qoodaan nyaataa ni dhiqama	
4.15	Nyaata mucaan kee akka hin nyaanne gootu jiraa?	1. Eyyee 2. Lakki	If no go to Q 4.16
4.15.1	Maaliif dhorkatta?		
4.16	Yeroo mucaan kee dhukkubsatu nyaata akkamii kennitaaf?	1. Nyaata manatti qophaa'u 2. Nyaata addaan qopheessaaf 3. Nyaata jiruun fooyyeessee hojjedhaaf) 4. Kan biroo……	

Diet Diversity Score assessment tool

Quick food list form

Now I would like to ask you about some liquids, solid or semi-solid food that *your child* may have had yesterday during the day or at night Questioner		
Yoom akka kennameef	**Eessatti akka kennameef**	**Gosa nyaataa fi maal akka kennameef**
Ganama ciree dura		
Ciree irratti		
Ciree booda		
Laaqana irratti		
Laaqana booda		
Giddu keessatti		
Irbati osoo hin ga'in		
Irbaata irratti		
Halkan		
Mana alatti		
Yeroo taphatutti		
Yeroo haadhi hojjetutti		

Galatomii dhumateera!

Appendix VI: Factors insignificantly associated with complementary feeding

Table 4.14: Insignificant association between demographic and socio-economic factors and complementary feeding practices in Ambo Town, Oromia, Ethiopia, 2018/9

Characteristic	Complementary feeding practice	Chi-square test; P value,
Sex of the household head	Consumption of Iron rich foods	0.433
Sex of the household head	Minimum meal frequency	0.586
Sex of the household head	Minimum dietary diversity	0.691
Sex of the household head	Minimum acceptable diet	0.902
Mothers age	Consumption of Iron rich foods	0.750
Mothers age	Minimum dietary diversity	0.372
Mothers age	Minimum acceptable diet	0.154
Mothers occupation	Consumption of Iron rich foods	0.331
Mothers occupation	Minimum meal frequency	0.262
Mothers occupation	Minimum dietary diversity	0.229
Mothers occupation	Minimum acceptable diet	0.126
Marital status	Consumption of Iron rich foods	0.564
Marital status	Minimum meal frequency	0.786
Marital status	Minimum dietary diversity	0.505
Marital status	Minimum acceptable diet	0.485
Main source of family income	Consumption of Iron rich foods	0.535
Main source of family income	Minimum meal frequency	0.873
Main source of family income	Minimum dietary diversity	0.646
Main source of family income	Minimum acceptable diet	0.939

Table 4.16: Insignificant relationship between maternal nutrition knowledge and complementary feeding practices in Ambo Town, Oromia, Ethiopia, 2018/9.

Characteristic	Complementary feeding practice	Chi-square test; P value,
Maternal knowledge on importance of a diverse diet	Consumption of Iron rich foods	0.300
Maternal knowledge on importance of a diverse diet	Consumption of vitamin A rich foods	0.658
Maternal knowledge on frequency of feeding	Minimum meal frequency	0.788
Knowledge on the importance of enriching complementary food	Consumption of vitamin A rich foods	0.286
Maternal knowledge on consumption of flesh foods	Consumption of flesh foods	0.808
Maternal knowledge on consumption of flesh foods	Minimum dietary diversity	0.356