ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR FOOD SECURITY STUDIES

NUTRITIONAL STATUS AND DETERMINANT FACTORS AMONG UNDER FIVE CHILDREN IN YEKA SUB CITY, ADDIS ABABA, ETHIOPIA

BY: MARIYE KASSAYE RETA

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

OCTOBER 2019,
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DECLARATION

I, Mariye Kassaye Reta, hereby declare that this thesis is original and has never been presented in any other institution. I also declare that primary and secondary information used has been duly acknowledged in this thesis.

Student's Name:

_____ _____ _____

Candidate Signature Date

This is to certify that the above declaration made by the candidate is correct to the best of my knowledge as an advisor.

Approved by thesis advisor:

Abebe Haile (Ph.D.) _____ _____

Signature Date

ADDIS ABABA UNIVERSITY,

SCHOOL OF GRADUATE STUDIES

This is to certify that the thesis prepared by Mariye Kassaye, entitled: "Nutritional Status and Determinant Factors among Under Five Children in four selected Woredas of Yeka Sub City, Addis Ababa, Ethiopia", and submitted in partial fulfillment of the requirements for the degree of Masters (Food Security and Development Studies) complies with the regulation of the University and meet the accepted standards with respect to originality and quality.

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Chairperson	Signature	Date

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Head, Center of Food Security and Development Studies

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List of acronyms

AOR:	Adjusted Odd Ratio
ARIs:	Acute Respiratory Infections
CFs:	Complementary Foods
CHWs:	Community Health Workers
COR:	Crud Odd Ratio
CSA:	Central Statistical Agency
DALYs:	Disability Adjusted Life Years
EDHS:	Ethiopian Demographic and Health Survey
FAO:	Food and Agricultural Organization
FGD:	Focus Group Discussion
FMoH:	Federal Ministry of Health
HAZ:	Height for Age z-score
HFA:	Height-for-Age
IDDS:	Individual Dietary Diversity Score
IYCF:	Infant and Young Child Feeding
MDGs:	Millennium Development Goals
MUAC:	Mid-Upper Arm Circumference
NGO:	Non- governmental Organization
NNP:	National Nutrition Program
PEM:	Protein Energy Malnutrition
SAM:	Severe Acute Malnutrition

SD: Standard Deviation

SDG: Sustainable Development Goals

SPSS: Statistical Package for Social Science

UN: United Nations

UNDP: United Nation Development Program

UNICEF: United Nations International Children's Fund

USAID: United States Agency for International Development

WFH: Weight For Height

WFP: World Food Program

WHA: Weight For Age

WHO: World Health Organization

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Abstract

Malnutrition is still considered one of the major public health problems in many countries, affecting more than 30% of children under 5 years of age worldwide. The poor nutritional status of children has also been a consistent problem in Ethiopia. The main objective of the study was to assess nutritional status and identifying determinant factors among under five years children in four selected woredas of Yeka sub city, Addis Ababa, Ethiopia, 2019. A community based cross-sectional study design was conducted on 422 under five year's children. Anthropometric measurements of height and weight of all those children under consideration were taken to identify the severe form of malnutrition as well as the relative factors of socio-economic and demographic, child characteristics, maternal caring and characteristics and environmental health conditions. In order to achieve the objectives of the study and thereby give answers for the basic research questions, quantitative research approach had been used. Structured questionnaire and check lists were used to collect the primary source of the data. Anthropometric data were entered under the World Health Organization anthro software. Finally, the data were analyzed using Statistical Package for Social Sciences. Both bivariate and multivariate analyses were used to identify the determinants of child malnutrition. In this study, the prevalence of stunting (<- 2SD) was 26%; whereas, 10.4% of the children were severely stunted (<- 3SD). The result of the study also reveals that stunting was more prevalent among 12–23 months children (31.9%), male children (34.7) than female (18.3%) and children whose mother is illiterate than educated mother. 8.4% of the children were underweight (<- 2SD); whereas, 1.4% of the children were severely underweight. Prevalence of underweight was higher among male (11.7%) than female (5.4%) children. According to the study, socio-economic, child characteristics, environmental health, and maternal characteristics are forefront factors for malnutrition in under five children. The two forms of malnutrition (Stunting and underweight) among under five children in the study area was very high. Sex of child, age of child, mother's education, were significant predicators of child stunting and also sex of child and paternal occupation were determinant factors of underweight. Further in-depth studies should also be encouraged to look for improved interventions.

Keywords: *Nutritional status, stunting, wasting, underweight, anthropometric measurement, bivariate, Yeka sub-city.*

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Malnutrition is still considered one of the major public health problems in many countries, affecting more than 30% of children under 5 years of age (Samiran et al., 2011). The childhood period is a very important phase in the life span of an individual with increased nutritional requirements to support growth and development. (WHO/UNICEF, 2008) concludes that poor nutrition among infants and young children results primarily from inappropriate feeding practices where the timing, quantity and quality of foods given and how they are given are often inadequate. Chronic and acute malnutrition, micronutrient deficiencies and infectious diseases are prevalent, particularly among the rural populations and the urban poor (World Bank, 2010). In addition, Preschulek *et al*., (1999) emphasized that the nutritional status of infants and children under five years of age is crucial for optimal growth and development. Normal growth is dependent on adequate nutrition and encompasses major transformations from birth to adulthood. The nutritional status of under five year children is a sensitive sign of a country's health status as well as economic condition.

Under nutrition among children remains common in many parts of the world. It is associated with more than half of all deaths of children worldwide. The primary determinants of malnutrition as conceptualized by several researchers relate to unsatisfactory food intake and/or severe and repeated infections (Rowland *et al*., 1988; Schroeder *et al*., 1994; UNICEF, 1998). The assessment of children's growth is a suitable indicator for investigating the wellbeing of children, as well as for examining the households' access to food, health and care (UNICEF, 1998; De Onis *et al*., 2013). Dietary and non-dietary feeding practices play an important role in determining the nutritional status of children. Non-dietary factors such as socio-economic factors and caregiver-child interactions contribute to children's nutritional status.

Moreover, in 2007, the Better Medicines for Children initiative of the World Health Organization (WHO) was developed in response to World Health Assembly resolution 60.20, which cited overwhelming evidence that in the worldwide nearly 50% of children under 5 years of age were dying of preventable diseases for which effective medicines existed. In recognition

of the need to improve access to evidence-based pediatric formulations which may be utilized in an optimal manner, an Essential Medicines List for children was created, alongside a children's formulary (Gitanjali, 2011). Martorell *et al (*1992), states that malnutrition is a sustaining problem in many of the developing countries. It is one of the main causes of morbidity and mortality among children under five years of age. In developing countries malnutrition is an important root of infant and young child mortality and reduced life span (UNDP, 2012).

The poor nutritional status of children has been a consistent problem in Ethiopia. Under nutrition is an underlying cause of infant and child deaths. Currently, Ethiopia ranks 126th out of 157 countries in progress toward meeting the Sustainable Development Goals (SDGs) (Sachs *et al.*, 2017). According to the most recent EDHS (2016), 25 percent of female deaths are related to pregnancy or childbearing, 77 percent of married women have the potential for having a high-risk birth, and one in 15 children will die before the age of 5 (CSA and ICF International, 2016).

There is a scarcity of evidence regarding the factors associated with nutritional status of infants and young children in many areas of Ethiopia. More fundamentally, improved nutrition is a moral imperative. We all agree that children should be well nourished, so that they survive and develop to their full potential. The aggregate costs of malnutrition at the national level constitute a key barrier to efforts to foster sustained economic growth and improved general welfare. Ethiopia seeks sustainable human and economic development. Accordingly, nutrition has long been recognized as a fundamental human right that is also upheld in the constitution of Ethiopia. In an effort to accelerate the reduction of under nutrition, the government of Ethiopia developed the National Nutrition Strategy (FDRE, 2008) and the National Nutrition Programs (NNP). Therefore, this study was investigated different influential factors such as demographic, socioeconomic, and environmental and health related factors on nutritional status among under five children.

In that regard this study tried to assess nutritional status and identify determining factors among under five years children in four selected woredas of Yeka sub city, Addis Ababa, Ethiopia. As far as the knowledge of the researcher goes, there were no similar studies conducted in the study area which assessed the prevalence and determinants of nutritional status of under-five children.

1.2 Statement of the problem

Malnutrition is an underlying cause for the death of 2.6 million children of the world each year and one-third of the global total of children (7.6 million children) die each year before their fifth birthday due to weakening of the body's resistance which exposes children to illness. Malnutrition is a silent killer that is under reported or under addressed. As a result, it is under prioritized. Three hundred and five children die every hour because of malnutrition. Worldwide, one child in four is stunted due to malnutrition. In developing countries, this figure is as high as one in three and specifically in Africa two out of five children suffer from malnutrition (Save the Children, 2012). When a child is undernourished, there are negative consequences which pursue/consistent in his/her entire life. These negative consequences also have grave effects on the economic developments of the area where she/he lives.

Over the past decade, Ethiopia has taken important strides towards reducing its high levels of hunger and malnutrition. Nutrition interventions, aimed at mothers and children together with programmes to boost agriculture, have brought forty millions of Ethiopian families to healthier life and better capability to feed themselves (AUC, WFP, UNECAF, 2013). However, the lasting effects of malnutrition still weigh heavily on the Ethiopian economy, as a new research shows.

The "Cost of Hunger in Africa" report estimates that under-nutrition costs the country billions of dollars every year in lost worker productivity. According to this report: Today, more than 2 out of every 5 children in Ethiopia are stunted; as many as 81% of all cases of child under-nutrition and its related pathologies go untreated, 44% of the health costs is associated with under-nutrition occur before the child turns 1 year-old. 28% of all child mortality in Ethiopia is associated with under-nutrition. 16% of all repetitions in primary school are associated with stunting. Stunted children achieve 1.1 years less in formal education. Child mortality, associated with under-nutrition, has reduced Ethiopia's workforce by 8%. 67% of the adult population in Ethiopia suffers from stunting as children. The annual costs associated with child under-nutrition are estimated at Ethiopian birr (ETB) 55.5 billion, which is equivalent to 16.5% of Growth Domestic Product (GDP). Hence, eliminating stunting in Ethiopia is a necessary step for growth and transformation (AUC, WFP, UNECAF, 2013).

Moreover, nationally, 44% of children under age five are stunted, and 21% of children are severely stunted. In addition, 10% of Ethiopian children are wasted, and 3% are severely wasted. Furthermore, 29% of children under age five are underweight (have low weight-for-age), and 9% are severely underweight. The proportion of underweight children generally increases with each age group (EDHS, 2011). Additionally, as the other study indicates Ethiopia ranks 8th highest out of 136 countries in terms of stunting prevalence and has 3.5% of the developing world's stunting burden (UNICEF, 2009). Comparably, the EDHS 2011 illustrates the situation still goes on without much significant improvement.

Malnutrition prevalence and the causal factors are better recognized in rural areas. However, the cause and effect of malnutrition problem under five need more emphasis and study especially in the urban areas. In fact the problem of malnutrition in Ethiopia is relatively well documented, their specific determinants particularly with regard to the relative contribution of different factors for the nutritional status of children is not well addressed (Alemu et al, 2005; and Christiaensen, and Alderman, 2001). National surveys and most small scale studies on child nutrition were descriptive in nature and limited to analysis of association between nutritional status and related variables (Woldemariam and Timotiows, 2002). Similarly, there is no adequate study which indicates the prevalence of malnutrition and causal factors among under five children in the main cities like Addis Ababa. There is also inconsistency across studies regarding the determinant factors behind child nutrition. The main reason that the researcher selects the study area is that, so far, there are not many detailed studies conducted to explore all aspects of nutrition particularly, the effects of socio-economic and demographic factors on health problem and malnutrition. Even though some concerned bodies have worked in mass, the situation remains unchanged.

Therefore, this study attempts to investigate the major socio-economic and demographic, child characteristic, child care, maternal care and characteristics and environmental factors that may affect nutritional status in the study area that help to highlight the difficulty in fighting against malnutrition.

1.3. Objectives of the study

1.3.1. General objective

The main objective of the study was to assess nutritional status and to identify determinant factors among under five years children in four selected woredas of Yeka sub city, Addis Ababa, Ethiopia, 2019.

1.3.2. Specific objectives

The specific objectives of the study were to:

- Determine prevalence of stunting, wasting and underweight among children under the age five in the four selected woredas of Yeka sub city, Addis Ababa, Ethiopia.
- Identify the factors that affect the nutritional status of children under-five years of age in the four selected woredas of Yeka sub city, Addis Ababa, Ethiopia.

1.4 Research questions

Accordingly, the study answer the following basic questions which driven from the statement of the problems:

1. What is the prevalence of nutritional statuses (stunting, underweight and wasting) of children under-five years of age in the four selected woredas, Yeka sub city, Addis Ababa, Ethiopia?
2. What are the determinant factors of nutritional statuses of children under-five years of age in the four selected woredas, Yeka sub city, Addis Ababa, Ethiopia?

1.5. Significance of the study

The study has significance as it it examines the determining factors of child undernutrition among the under-five children in four selected woredas of Yeka sub city which can supplement or can be used as input for further similar studies in the area. Likewise, as child malnutrition is one of the major threats for a country's economic, political and social enhancement directly or indirectly, it is crucial to know what the prevalence and incidence looks like and what the main causes are in order to tackle its consequences or its problem in every specific area as much as possible for better planning and intervention. Generally, identifying the determinants and prevalence of under nutrition among children help out and create valuable input for formulation of relevant policy which target human development policies as well as programs to intervene.

1.6. Scope of the study

In order to make the study more manageable, it was delimited in concepts or issues, geography and time. Regarding the concepts, it was delimited to child malnutrition under five years of age with the consideration of the factors like socio-economic and demographic, child characteristics, child caring practices, maternal caring and characteristics and environmental health condition. In fact malnutrition problem can encompass with various factors. But, in this study the researcher give emphasis only on the above factors. Geographically the scope of this study was also delimited to the four selected Woredas of Yeka Sub City, Addis Ababa, Ethiopia. Concerning the time, as the study was cross sectional in design confined to child malnutrition under five years of age within the period of January 15, 2019 to February 15, 2019.

1.7. Limitation of the study

As the study is cross-sectional in design, some measurements may not be accurate due to subjective responses and since most of the information was questionnaire-based; so, questions that required a good memory were vulnerable to recall bias. Recall biases from answers based on the memories of the mothers and possible dilution effect of selecting one child from a household. In addition, resulting in under or over reporting and misreporting of events was likely. In addition, laboratorial and some other basic clinical tests were not included in this study to explore some associated factors and to triangulate the findings through the qualitative and qualitative studies; so, this may have a negative impact on the report.

1.8. Organization of the paper

This study was organized with five chapters. The first chapter deals with the introduction which comprises of the background of the study, the statement of the problem, basic research questions, objectives of the study, significance of the study, scope of the study, limitation of the study and organization of the paper. Chapter two deals with review of related literature to the study. It discusses about the theoretical, Empirical, and conceptual review of other litterateurs. Chapter three also deals with the method and materials of the study. Sources of data and variables, methods of data analysis and definition of key terms are described in this part. Chapter four discusses the results and analysis. Chapter five provides conclusions and recommendations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 The Basic Concept of Determinants

There are immediate, underlying and basic determinants of undernutrition among children. The most common immediate determinants of malnutrition are in adequate dietary intake which might be caused by an in adequate supply of food or by mothers having too little time to prepare food or to feed their children, and infectious disease which may result from the lack of or low utilization of health services, inadequate water supplies and sanitary facilities, poor food hygiene or inadequate child care (UNICEF, 1990).

While basic health services and a healthy environment; household food security; and maternal and child care are considered to be the underlying causes or determinants of undernutrition. Whereas, the basic or structural cause of malnutrition are unequal distribution of resources in a society (UNICEF, 1990). Again, according to UNICEF (2014) the immediate causes of under nutrition are inadequate dietary intake, food insecurity and a high burden of infectious diseases; and the underlying causes are poor access to clean water and sanitation, inadequate maternal and child care, inadequate health services and lack of access to health services. The main factors associated with under nutrition are environmental (natural or entropic causes), socio-cultural, economic (linked to poverty and inequality) and political-institutional (Rodrigo and Andrés, 2007), as sited by EFMoH (2012).

Similarly, according to Save the Children and Jhpiego (2013), the immediate causes of malnutrition which occurs when the body's nutrient requirement are not met happens as a consequence of consuming too little food and having infection; and it can be reflected at individual level. The underlying causes are the result of factors operating at household and community level such as those related to food security, those related to the social and care environment, and those related to public health such as children exposure to pathogenes and the use of preventative and curative health care). Further the basic causes of malnutrition are the result of resource available and the political ideology affecting how these resources are used which can be reflected at country level.

Accordingly, for the purpose of this study some of the determinant factors of undernutrition among children below the age of five such as socio-economic, demographic, child health and care and environmental factors were attempted to be identified in the study area.

2.2 Theoretical framework

The theoretical framework foundation of this research is governed by a well-known model in the tradition of Becker (1981) which a household maximizes a utility function defined over leisure, demographic, economic, social, child caring and character, family status and environmental factors. The production of nutrition depends on a set of inputs such as food or nutrients and the utilization of health services; a series of exogenous individual characteristics such as sex, health status and age of the child; and a vector of child caring characteristics including feeding, hygiene and immunization; maternal caring and characteristics like age, knowledge, antenatal practice. And finally environmental health condition such as access to and quality of household conditions, sanitation and water supply may also have direct effects on nutritional outcomes.

Solution of the household's optimization problem yields a reduced form demand equation for child nutritional status (H):

$H_i = f(X_{SED}, X_{CC}, X_{CP,} X_{MCC,} X_{EH,} \varepsilon)$

Where

- X_{SED} is socio, economic and demographic characteristics of the child of the households such as paternal and maternal education and occupation, and their religion.
- X_{CC} is the child caring practices such as feeding, hygiene, and immunization
- X_{CP} is community child care practice such as feeding practice, hygiene and immunization.
- X_{MCC} is maternal caring and characteristics such as age of the mother, nutritional awareness of the mother and antenatal care practice of the mother.
- X_{EH} is environmental health condition such as water source, sanitation and housing condition of the participants.

- ε is a random error or disturbance term representing the unobservable individual, household and community characteristics affecting the child's nutritional status which is assumed to be uncorrelated with the independent variables.

2.3. Empirical literature

This section briefly reviews the empirical literature on the determinants of children's nutritional status. Basically, there are a lot of factors that affect children nutritional status. According to UNICEF identification, those factors are classified in three levels. They are: *basic causes:* the factors around the structure and processes of societies; *underlying causes:* the factors influencing households and communities and *immediate causes:* the factors affecting operating at the individual level.

2.3.1. Measurement of child nutritional status

This empirical study typically uses anthropometric measures for the quantification of child nutrition status which is driven from measurements of the child's height, weight and age. The three indices of anthropometric indicators are weight-for-age, height-for-age, and weight-for-height. Low height-for-age (stunting) is an indicator of long-term poor nutritional status of the child while low weight-for-height (wasting) indicates short-term poor nutritional status. Low weight-for-age (underweight) reflects poor nutritional conditions in both long and short terms.

For this study, the nutritional status of children is calculated using new growth standards published by the World Health Organization (WHO) in 2006. These new growth standards are generated using data collected in the WHO Multicenter Growth Reference Study (WHO, 2006). The findings of the study, whose sample included 8,440 children in six countries such as Brazil, Ghana, India, Norway, Oman, and the United States, describe how children should grow under optimal conditions. Therefore, the WHO Child Growth Standards can be used to assess children all over the world, regardless of ethnicity, social or economic influences, and feeding practices.

In order to standardize the three measures of child malnutrition mentioned above, they are typically transformed into Z-scores referred to as height-for-age Z-scores, weight-for-height Z-scores and weight-for-age Z-scores. For instance, in the case of height-for-age indicator, if a

child whose height-for-age Z-score is below minus two standard deviations (−2 SD) from the median of the WHO reference population, the child is considered short for his/her age (stunted), or chronically malnourished whereas children who are below minus three standard deviations (−3 SD) are considered severely stunted.

Similarly, the weight-for-height index measures body mass in relation to body height or length; it describes current nutritional status. Children with Z-scores below minus two standard deviations (−2 SD) are considered thin (wasted) or acutely malnourished. In the other way round, children with a weight-for-height index below minus three standard deviations (−3 SD) are considered severely wasted.

Likewise, weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both chronic and acute malnutrition. A child can be underweight for his/her age because he or she is stunted, wasted, or both. Weight-for-age is an overall indicator of a population's nutritional health. Children with weight-for-age below minus two standard deviations (−2 SD) are classified as underweight. Children with weight-for-age below minus three standard deviations (−3 SD) are considered severely underweight.

2.3.2. Determinants of children's nutritional status

Malnutrition is a serious and complex problem especially in developing countries. Just as the educational level of a population should ideally be measured by its educational achievements and not by its exposure to, and use of educational inputs, so malnutrition should ideally be defined by its consequence, such as health status, rather than by nutrition intake. In practice, it is difficult to define objective indicators of consequences, and it is even more difficult to collect and interpret relevant data. The consequences of under nutrition are, 1st poor mental health, which, in turn, cause physical suffering and mental anguish, and 2nd, no productivity with effect being reflected in private and national levels of consumption and an accumulation of wealth (UN, 2004).

An individual's nutrient is determined by a number of factors acting directly or indirectly. These include food availability, purchasing power of the people, distribution of income, level

of nutritional knowledge, level of employment, illiteracy and ignorance, etc. Besides, factors like susceptibility to disease, particularly disease of the digestive system and to infestations as a result of unsafe drinking water, poor sanitation and unhygienic living conditions are equally important determinants contributing to what is called nutritional leakage. Human capital formation is affected by health and nutrition interventions. The nutritional status of infants is an important determinant of an individual's physical conditions, which, in turn, determines the effectiveness of further investment in human capital (Varma *et al*, 1996).

Various studies on nutrition have been undertaken and conclusions are reached by different scholars in the past regarding predictors of health and nutritional status. The detailed literature review presented below focuses on the socio-economic and demographic determinant like *household economic welfare* (including income of the household, shocks and employment status of care giver); *household or individual characteristics and education* (including the household structure, sex, and age, birth interval of the child, birth order and household educational statues especially maternal literacy); *environmental health condition* (like water, sanitation and hygiene); *maternal caring and characteristics*, *child caring and cultural practices* and *political instability*.

2.3.3. Household economic welfare

2.3.3.1. Income of the household

It is recognized that poverty is a key cause of hunger and malnutrition. When income of the household decreases the quality and quantity of food also decreases. Evidence shows that when unemployment and low wages are presenting factors, families eat cheaper food, which is less nutritious, leading to weight loss and malnutrition (UNICEF, 2009). As food products derived from animals are usually more expensive, children's intake of proteins and nutrients from these groups decreases with poverty (Christiansen, L and Alderman, H, 2001). Malnutrition, therefore, also develops when the food ingested does not meet the high protein and energy needs of the child (Piercecchi-Marti *et al.,* 2006).

In fact, malnutrition is associated with poverty in many communities. Increasing individual income and purchasing power is, therefore, regarded as an important prerequisite for improved nutritional status of the community. A study in Ghana points to the influence of income being

controlled by the woman of the households on the nutritional status of her children. The increased ability of the mother to provide snacks and other additional food to young children throughout the day has been suggested as the reason for this association. On the other hand, the relationship between the woman's income and the nutritional status of her children is not of practical importance for the families around Harar. Mothers who engage in the sale of milk or firewood often leave their children in the care of family members, which may account for the lack of association and the fact that the absence of the mother influences the nutritional status of the child (*E. Seyoum* et al., 1996).

2.3.3.2. Household or individual characteristics and education

Numerous studies recognize that the important role that household or individual characteristics and parental levels of education play an important role for child nutritional outcomes.

Household structure

Studies on the relationship between household structure and child nutrition show mixed results. Most studies illustrate that the nutritional status of children living with both married biological parents is higher compared with those living with single parents (Sobolewski J.M et al, 2007). Moreover, some studies that examine children's nutrition in extended family households indicate varying findings. Living in extended households is associated with better nutritional status of children in Niger and Nigeria (Gage *et al*., 1997). According to Desai (1992) findings, extended households have much more positive nutritional outcomes for children compared with single-parent households. In extended households, children obtain a better care since the boundary between reproduction, production, consumption, and child rearing functions is not limited to a household level. The relationship between household structure and child nutrition is mediated by socioeconomic and demographic factors.

***Household socio-economic status*:**

Households with high socio-economic status are positively associated with improved dietary diversity and food access which are extremely important to improve the nutritional status of children (Saaka and Osman, 2013).

***Sex of household head*:**

Children living in households headed by women are more likely to be undernourished since such households have limited access to resources and health services. Female headed households often face financial and time constraints as a result of absence of a partner either due to death or divorce; whereas in the case of the Ethiopian child nutrition status is not affected by the sex of the household head (Christiaensen, L and H Alderman, 2004).

Sex of child

Evidence suggests that boys are more likely to be stunted and underweight than girls, and in some countries, more likely to be wasted than girls (Shahabuddin A.K.M, *et al., 2000).* For instance, a number of studies in Africa suggest that rates of malnutrition among boys are consistently higher than among girls. The sequential DHS survey of Ethiopian result also shows that boys are more commonly affected than girls.

Age of child

Weaning/feeding practices care and exposure to infection may also affect children's nutritional status at specific ages. Studies in Ethiopia have shown that older children are associated with increased malnutrition (Yimer, 2000).

Household education

Various studies have concluded that parental education especially that of mothers is a key element in improving children's nutritional status. For example, according to the EDHS (2011) final report, children of mothers with more than secondary education are the least likely to be stunted, while children whose mothers have no education are the most likely to be stunted. Similarly, wasting, or acute malnutrition, is also serious in children whose mothers have no education than those who are educated. As well, the proportion of underweight children is eight times higher for those born to uneducated mothers than for those whose mothers have more than secondary educations.

Likewise, the impact of mothers' schooling on child nutrition has a significant effect on nutritional knowledge. A more educated mother is likely to have a higher income (which can directly affect her children's health and nutrition) and higher status and power in the household

as well as the community, putting her in a better position to make decisions about her children's needs (Moen, 1993).

2.3.4. Environmental health condition

Water and Sanitation

Malnutrition is a major health problem, especially in developing countries. Water supply, sanitation and hygiene, given direct impact on infectious disease, especially diarrhea, are important for preventing malnutrition. Both malnutrition and inadequate water supply and sanitation are linked to poverty. The impact of repeated or persistent diarrhea on nutrition-related poverty and the effect of malnutrition on susceptibility to infectious diarrhea are reinforcing elements of the same vicious circle, especially among children in developing countries (WHO, 2004).

Poverty, lack of drinking water and sanitation infrastructure, and lack of knowledge about hygiene are problems that frequently occur in the developing countries. According to the *African Development Fund, Ethiopian Rural Water Supply and Sanitation Programme Appraisal Report, (June 2005)*, lack of safe drinking water supply, sanitation, and hygiene contribute to a serious problem. The vast majority of the rural communities do not have these needs. The harms increase in the dry months, when most of the people and livestock depend primarily on traditional water sources such as rivers, streams and lakes, which are very often contaminated. The majority of households lack knowledge of personal hygienic practices as a result of which a large percentage (up to 70% in rural areas) of cases of morbidity and mortality are attributable to inadequate water supply and unhygienic waste (including excreta) management.

So, improved sanitation has a substantial effect on nutritional status and improvement in water supply enhances these effects. Comparably, water supply has a smaller effect on nutritional status than sanitation (Esrey, 1996).

2.3.5. Maternal caring and characteristics

Practically and historically mothers are trying their best to feed during hard time (seasonal food shortage) by reducing the number of meals from adults and from themselves or borrowing grains

and money from relatives or from money lenders. Despite of the care for their children/family, mothers should be aware and know the availability of health services (family planning, antenatal and postnatal care etc.) and utilize properly to limit the number of children.

Pregnancy complications are a major health problem among women in developing countries. Antenatal care is more beneficial in preventing adverse pregnancy outcomes when received early in the pregnancy and continued through delivery. Early detection of problems in pregnancy leads to more timely referrals for women in high-risk categories or with complications; this is particularly true in Ethiopia, where three-quarters of the population live in rural areas and where physical barriers pose a challenge to providing health care. Under normal circumstances, the World Health Organization (WHO) recommends that a woman without complications should have, at least, four antenatal care visits, the first of which should take place during the first trimester (EDHS, 2011).

In an another direction, improper treatment seeking behavior, frequent morbidity, lack of proper Knowledge, Attitude and Practice (KAP) of mothers about pregnancy, delivery, lactation and faulty feeding practices (non-exclusive breast feeding, faulty complementary feeding practice, prolonged breast feeding) – all these leave a dangerous impact on child growth and development. As the review indicates above, children at their early life fail to catch-up growth. Such trauma at the beginning of life has bad consequences in the long run.

As we know, proper medical attention and hygienic conditions during delivery can reduce the risk of complications and infections that may cause the death or serious illness of the mother and/or the newborn baby. An important component of efforts to reduce health risks to mothers and children is increasing the proportion of babies that are delivered in health facilities (EDHS, 2011).

Employment status of caregivers

In many developing countries, over-nutrition and under-nutrition in children are seen alongside the rise of middle class communities and increased participation of women in the workforce. As mothers are recognized as the primary caregivers for young children, it is widely assumed that

deprivation in maternal care when the mother works is associated with malnutrition in young children. Whilst previous studies have examined the relationship between maternal employment and child malnutrition, few of them have explored that relationship amongst the emerging middle class in developing countries. Indonesia provides an excellent setting for the study because of the emergence of a middle class in urban areas since the 1980s. As the country experience, when the proportion of middle class mothers who worked outside their houses increased, the evidence indicates that due to their double-burden and loose of care their children becomes under-nourished (Airin Roshita, 2011).

In contrast, for the identification of the relationships among women's employment, child care strategies, and nutritional status of children, 12-18 months of age, were examined in 80 Nicaraguan households, sampled by randomized block design in 10 low income urban communities. Multiple regression analyses showed that children of employed mothers (56%) fared better in weight/height than those whose mothers were not employed, with and without controlling for socioeconomic status and maternal education, paternal financial support, child care adequacy, and sex and age of the child. Children with inadequate alternate child care (care by a preteen or care at the work place) had lower height for age, even controlling for the same variables and for maternal employment (Jessica F. et al, 2000).

2.3.6. Child caring practices

Care essentially refers to behaviors and practices. That is how resources (particularly food and health resources) are actually used within the household. Its practices are conditioned by cultural factors, beliefs and capacity factors such as resources like time and knowledge (World Bank, 1999).

Feeding practices are the most important caring factors with respect to nutrition. The fundamental means of preventing malnutrition among infants and young children is to ensure optimal home-based feeding.

Breastfeeding

Breastfeeding is the most important nutritional measure that can be taken to ensure the adequate growth and development of the newborn child. Breastfeeding should be the foremost concern for

about the first six months of a child's life, after which time semi-solids should be progressively introduced to the diet to complement the continued breastfeeding. If the child is less than six months old, it is important to know if she/he is being exclusively breastfed.

The gift of nature is that a malnourished mother can even is able to provide enough good quality milk for the normal growth of her child, as indicated by growth pattern of exclusively breastfed infants. Breastfeeding also affects mothers by physiologically suppressing the return to fertility, thereby affecting the length of interval between pregnancies. UNICEF and WHO recommend that children be exclusively breastfed for the first six months of life and that children be given solid or semisolid complementary foods beginning with the seventh month of life. The standard indicator of exclusive breastfeeding is the percentage of children less than six months of age who are mainly breastfed. The standard indicator of timely complementary feeding is the percentage of children age 6-9 months who are breastfeeding and receiving complementary foods. The WHO recommends that breastfeeding be continued through the second year of life (UNICEF report, 2009).

In another way direction, a study of child nutrition in Nigeria revealed that, during infancy, recent episodes of diarrhea and/or shorter breastfeeding duration increased wasting. For infants, immunization, too, reduced stunting. But longer duration of breastfeeding, also bears a higher parity in child increased stunting. During childhood, higher birth weight and immunization reduced stunting and wasting. Recent episodes revealed that fever during childhood increased wasting (Ukwuani and Suchindran, 2003).

Access to health services

Access to health services has impacts on nutritional status. Children without access to such services are more likely to be malnourished or exhibit weight loss due to untreated diarrhea and other infectious diseases. Some studies suggest that the impact of access to healthcare (alternative by the distance) on child nutrition to be either insignificant or give result in the counter-intuitive direction. For instance, communities with better access to public health facilities are having a higher incidence of child wasting, stunting and underweight. The basic reason is service quality, availability of drugs and affordability of health services has a greater impact on a child's nutritional status than distance to health services. In other words, distance to

a public health clinic ensures the expected negative and significant association with weight-for-height in rural areas. This conclusion is, however, the opposite for urban areas, which are not expected to face the dilemma (Alemu Mekonnen et al., 2005).

In Ethiopia, access to adequate health care is a prerequisite for ensuring that households are productive enough to secure sufficient food and, thereby, adequate nutritional status of all its members. However, even if health services are available, the child needs to be brought to the health services as and when required, which takes us back to the central role of caring capacity to ascertain food, health and environmental security for the small child. And also there are communication and education efforts made although they are inadequate. Opportunities to develop community capacity to educate and inform their own community about health services are substantially missed. Health education and information messages are not transmitted on regular basis and, are not consistent. Up until the recent initiative taken in Health Extension Package, information and communication were deficient and irregular, especially at lower levels, such as at Woreda and grassroots level. In general, community and partners/allies involvement in the health service is weak. Communication is a strong means of raising the community demand for health services and improving the service coverage (FMoH, 2006).

More elaborately, as Christiansen and Alderman (2004) found out that, after controlling for a number of other determinants of child malnutrition, distance to the nearest health center is not significant. They note that the lack of explanatory power of the distance variable could be potentially explained by the fact that the proxy for access to health center does not capture the quality of healthcare – a consideration which is as important as distance. Another possibility is that households may be unable to pay. So, the availability of health services may not increase usage.

2.4. Conceptual framework

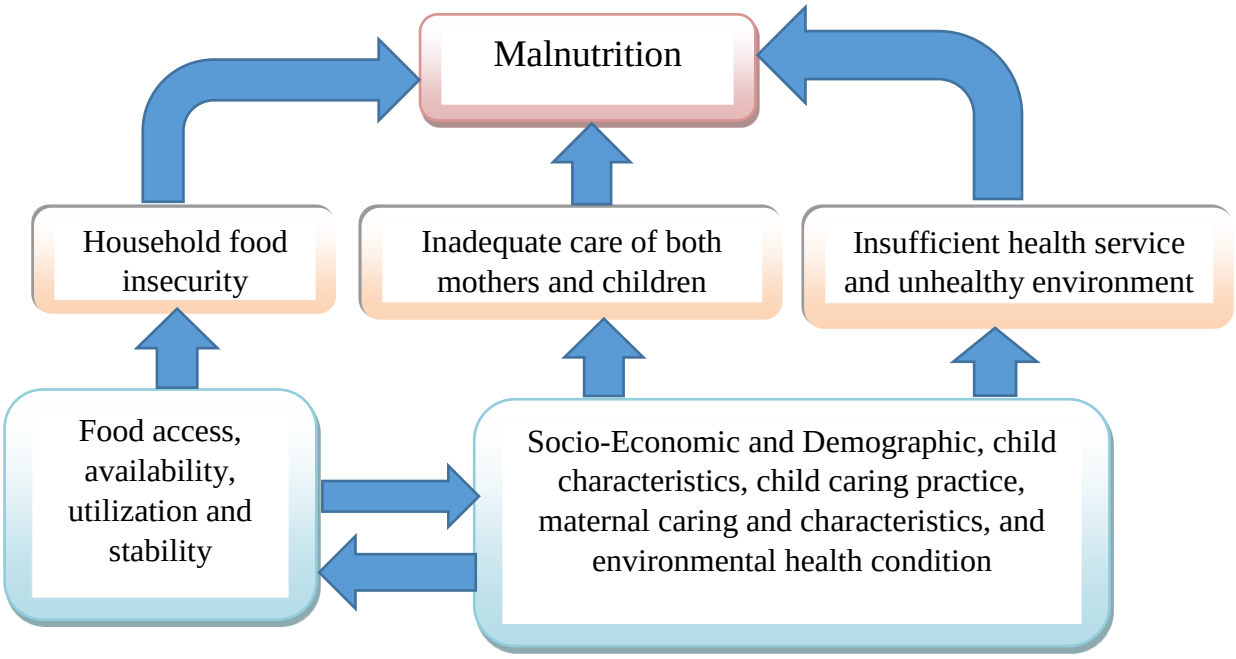
The framework below depicts the determinants associated with child nutritional status and the levels of these determinants act to influence nutritional status of children. Child nutritional status is the dependent (outcome) variable. The independent variables are the perceived causal factors that influence the child nutritional status.

The outcome of determinants of child nutrition (nutritional status) is defined in terms of child survival, growth and development. In developing countries, infectious diseases such as diarrheal diseases and ARIs are responsible for most nutrition related health problems. These primary causes of malnutrition are influenced by food availability, access, utilization and stability, healthcare, water and sanitation, and the way a child is cared for (caregiver-child interactions). Underlying all of these primary and intermediate causes of malnutrition are socio-economic factors such as demographic factors and day care institutions which are basic causes that contribute to malnutrition. Socio-economic status of urban households is likely to influence food accessibility and nutritional status of children because household's main source of food is through purchase. The determining factors of nutrition status of children in this model can be divided in to four groups such as socio-economic and demographic, child care practice, child characteristics, maternal caring and characteristics and environmental health conditional factors. Out of these, variables maternal education, paternal education, and occupation were among the socio-economic and demographic characteristics or factors which can influence the nutritional status of children. Under the child characteristics factor age of the child, sex of the child, and the health status of the child were considered. Within the child caring practices concern factors like feeding habit, hygiene, and immunization system of the child had been evaluated. Maternal caring and characteristics include factors such as age of the mother, awareness level of the mother, and ANC practice of the mother were considered. And finally within the environmental factor condition variable, factors like water supply, sanitation and housing condition of the respondent would be evaluated.

Children below the age of five are more susceptible to malnutrition than older children. Because it is the age at which physical and mental growth and development is very fast; and relatively needs more emphasis and attention in every aspect including provision of nutritious food for better physical and mental development. So, if not well managed it might lead to malnutrition. Similarly, as indicated in the framework, out of child health and sanitation factors such as diarrhea episode can diminish the essential micronutrients from the children body, which can in turn expose the child to different infectious diseases and also lose appetite; and hence increase the chance of the affected children to be nutritionally affected (stunted, undernourished or wasted). Caring practices are dependent on the economic resources available and nurturing of the

child by the caregiver and they influence how the physical, mental and social needs of the growing child are met. These are a broad set of factors that affect the utilization of the potential available resources and how they are translated into food and nutrition security influencing child nutritional status. This could be due to the fact that households having better economic status can expend more on food and health of the family which is directly contributes to the enhancement of child nutritional status in that household.

Figure 2.1: Conceptual Framework of the study



Source: World Bank/ UNICEF, Situational Analysis and modified by the researcher.

CHAPTER THREE

RESEARCH METHODS AND MATERIALS

3.1. Description of the study area

The study was conducted in Yeka sub city. Yeka sub city is one of the 10 sub cities in Addis Ababa city administration. The sub city has a total population of 108500. Yeka sub-city is located in the North east Part of Addis Ababa city. The total area of the sub-city is 85.98 km square and 4,284.9 people live in one kilometer square. It borders with Oromia in the north and in the east, Gulele, Arada and Kirkose sub city in the West and Bole sub city in the South East. Among the total population of the sub city, about 7.2% of the population comprises those under the age of 5 years (CSA, 2007a).

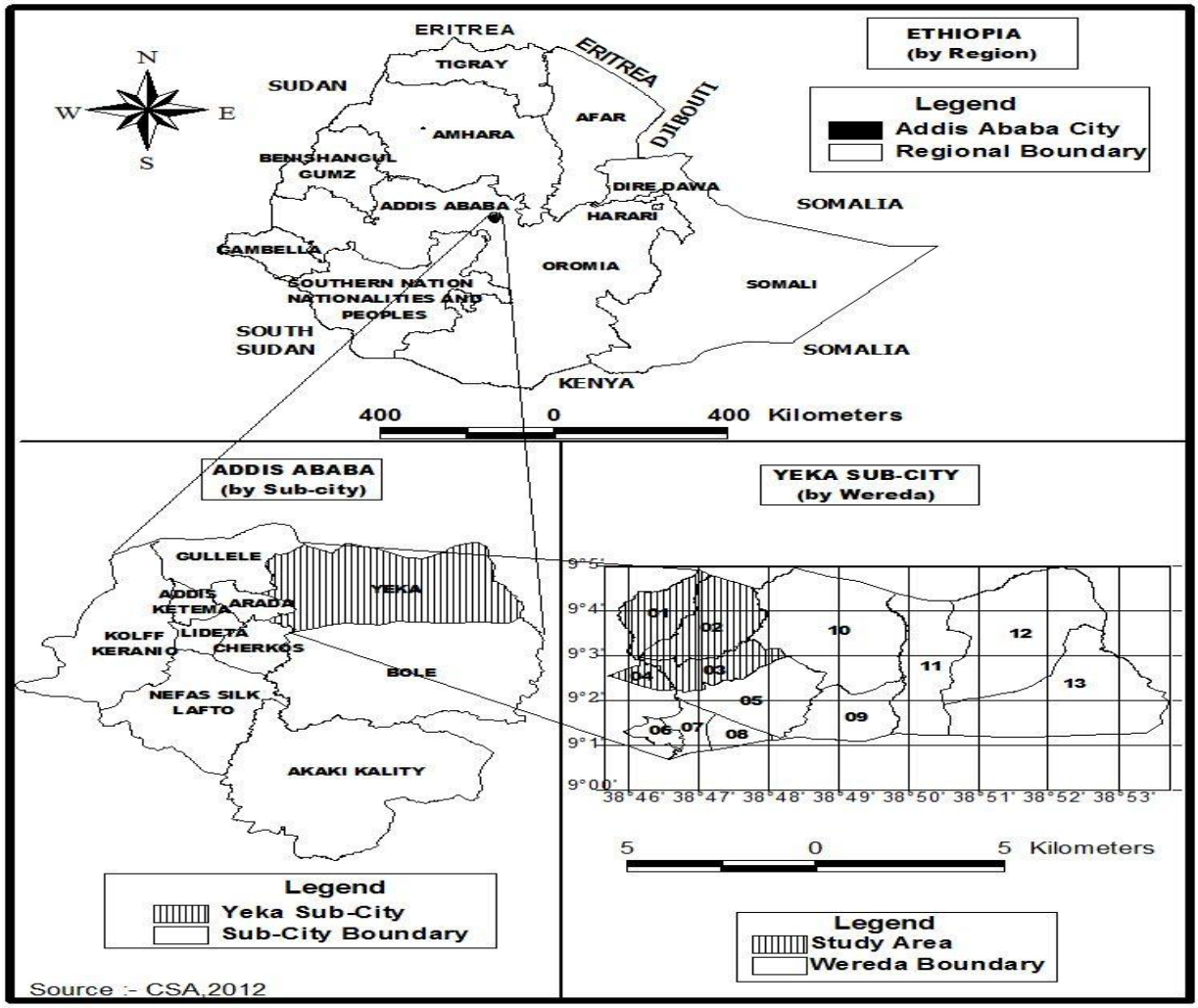


Figure 3.2: Map of Yeka sub city
Source: CSA, 2007a.

3.2. Study design and period

In order to assess nutritional status and identify determinant factors among under five years children, cross sectional, descriptive research design is applied. Such kind of research design is used because the researcher has no control over the variables, only a report of what has happened in the area where the research is conducted is taken. Furthermore, it describes the characteristics associated with the subject population. According to Kothari (2004), descriptive research design deals with answering the following questions: where, who, when, what and how related with a certain research problem. Descriptive studies are used to acquire information regarding the present status of the phenomena and to describe what exists with regards to variables in a scenario.

The research was also cross sectional in design; since, it is one measurement time and gathers the data from a relatively large number of cases at a particular time. This was then determined a shorter interaction time, which in turn is aimed at attracting a wider sample group. In addition, research strategies help researchers to provide data that can answer the research questions or achieve the research objectives. All in all, in order to achieve the objective of this research a descriptive explanatory method followed by cross sectional studies were used. The study period was from February 15 to March 15, 2019.

3.2.1. Research approach

In order to achieve the objectives of this study and thereby to give answer for its problems, quantitative research approach was used by the researcher. There are compelling reasons why the researcher opts to use quantitative method. For instance, the adoption of positivist paradigm entails that measurement remains an essential element since its basic assumption in social and economic phenomenon can be measured. This helps to deeper insights on the issue, to significantly strengthen the analyses and thus enhance confidence in the conclusions.

3.3. Source of the population, study population and study unit

All under-five children living in Yeka Sub City, Addis Ababa, were considered to be the source population. The study population is those children below the age five who live in the selected four woredas of Yeka sub city. All houses selected out of the selected woredas by random

sampling method, and then those under-five children who lived in these household were considered as study unit.

3.4. Inclusion and exclusion criteria

All children under five years old who live with their mothers or care givers in the study areas have been included in the study population. Whereas, the child's mother or care giver was not present in the house at the time of data collection, the child was excluded from the study. Similarly, when the child was absent at the time of the survey, he/she was again, not included.

3.5. Study variables

3.5.1. Dependent variables

Under the consideration of logistic regression techniques,

- The measure of the magnitude of *wasting* children usually uses weight-for-height as dependent variable; after the value reverted in dichotomous (yes or no) manner based on the WHO median cutoff point.
- The magnitude measurement of *stunting* uses height-for-age as a dependent variable; after the value reverted in dichotomous (yes or no) manner based on the WHO median cutoff point.
- The measure of magnitude of *underweight* uses weight-for-age index a dependent variable; after the value reverted in dichotomous (yes or no) manner based on the WHO median cutoff point.

3.5.2. Independent variables

Five categories of factors were assessed as independent variables;

1. Socio-economic and demographic variables; type of family, family size, Maternal/paternal education and occupation.
2. Child characteristics; Age, Sex, and morbidly status.
3. Child caring practices; feeding, hygiene, health care seeking and immunization
4. Maternal Caring and characteristics; age, nutrition awareness, ANC visits,
5. Environmental Health condition; Water supply, sanitation and housing conditions.

3.6. Sample size determination and sampling techniques

3.6.1. Sample size determination

There are a lot of techniques for the determination of sample size. However, this study applies Kothari's (2004) formula. The sample size was calculated by using a multi stage population proportion determination formula:

$$n = K\left(\frac{Z^2_{\alpha/2} pq}{\varepsilon^2}\right)$$

Where:

n = sample size required

$z_{\alpha/2}$ = a standardized normal test with the consideration of α level of significant. Usually, it is equivalent with 1.96 with the standard error of 5% (corresponding to 95% confidence interval)

p = expected prevalence of malnutrition in the population. It can be expressed either as percentages or as fractions. In nutrition surveys in EDHS (2016), the prevalence of stunting is usually 15% (CSA and ICF International, 2016).

ε = relative precision required. It can be calculated using into two forms, one based on the estimated malnutrition precision level interim and the other by direct estimation of the relative precision. In this case, therefore, the relative precision level can be taken as 5%.

k = design factor, which is a measuring of the clustering of the characteristic being measures (k=1 when you are undertaking a simple random survey or systematic survey, but k=2 when you are undertaking a cluster survey as there are two stages in the sample design). Therefore, due to the selection criteria order of Woredas, this study took 2 stage clustering.

Taking all the above consideration into account, the size was:

$$n = \frac{2 * 1.96^2 * 0.15 * 0.85}{(0.05)^2}$$

$$n \cong 392$$

So, 392 children under the age of five were sampled for the present study. Considering non-response rate of 10 %, the adjusted sample size had been 431.

3.6.2. Sampling technique and procedures

This study employed random and purposive sampling techniques in order to select the required size. Primarily, due to the limited resource, the researcher purposively selected Yeka sub city from the other 9 sub cities. This selection was done based on the series problematic and observation report from the Woredas Health Bureaus. Because of its proximity to the researcher's place of residence, and hence has an adequate knowledge about the area and has a chance to communicate with the concerned government sectors to get appropriate information about the area. Both indicators show more slum areas were found in the selected Sub-Cities.

Then, by stratified sampling selected the Woredas; according to information obtained from the sub city officials, there are thirteen Woredas. Out of these thirteen Woredas, four of them were selected using simple random sampling method. The four Woredas were considered to be a representative sample, as Yeka sub city areas have relatively heterogeneous socio-economic characteristics.

To generate a sampling frame for each selected four Woredas, the calculated 431samples were allocated based on probability proportional to the population size of each eligible Woredas. List of households with qualified children in the given selected four Woredas were obtained from each Woredas health office. To select the given number from the list of households with qualified children random sampling technique was also applied. The representative sample size in each Woreda was allocated by proportion sample size technique as follows:

$$P_n = \frac{n}{N} * N_0$$

Where

P_n = Proportional allocation to size within each Woredas (n=1, 2, 3, 4)

N_0 =number of children with corresponding to each Woredas (2,402; 2,815; 1,362; 1,188)

N = Total number of children corresponding in the selected four Woredas (7,768)

n = The sampled mothers with children corresponding in the selected four Woredas (431)

So, the total sample size (431) distribution across the randomly selected four Woredas based on the probability proportionate to population size is presented in the table following:

Table 3.1: Proportionate to population sample size of each selected Woreda of yeka subcity, Addis Ababa, 2019.

Name of study area	Number of under-five children in each woreda	Proportion in percent	Sample size
Woreda 1	2402	30.92	133
Woreda 2	2815	36.24	156
Woreda 3	1362	17.55	76
Woreda 4	1188	15.29	66
Total	**7768**	**100**	**431**

Source: Woreda health offices, 2019

3.7. Sources of data

Primary and secondary sources were used to collect data throughout the research.

3.7.1. Primary sources

Primary sources of data are those obtained directly from mothers or caregivers and their children of the study areas. The aim is to obtain first-hand information about the prevalence of child malnutrition. The bulk of the primary data was obtained through anthropometric measurement and interview questionnaires designed via the use of information generated from secondary survey (desk survey) after taking; due cognizance of the purpose and objectives of the study.

3.7.2. Secondary sources of data

Secondary information was collected from past research works on a similar area of study. It was organize from different documents.

3.8. Data collection

In this research administered Questionnaire was used to collect data from mothers of children aged 0-5 years with the assistance of three field researchers. The main issues which the

questionnaire captured included information such as socio demographic and economic, health, food and water practices and anthropometric measurements. Anthropometric measurements were weight-for height, height-for-age and weight- for-age of the index child. Weight was taken and recorded using a weighing scale (Seca gmbin model). Height was taken and recorded using a portable wooden and calibrated scale. The children were in light clothing during anthropometric measurements taking for accurate measurements so as to assess their nutritional status. Age of the index child was obtained from mother/caretaker and whenever possible verified by means of birth certificate or immunization booklet.

3.9. Tools and techniques

The following tools and instruments were used to collect data; questionnaire was used to collect quantitative data from mothers/caretakers of the children. Weighing scale and height board were used to take the weight and height of the index child respectively. Pencils, pen, and note book were used to fill in the questionnaire.

3.9.1. Anthropometric measurements

Child weight was measured using calibrated child scales or sultan scale and recorded to the nearest 0.1kg. Child height had been also measured to the nearest 0.1cm using height boards made for the purpose. The weight-for-height (wasting), height-for-age (stunting) and weight-for-age (underweight) of the sampled children was compared with an international standard population criterion using the World Health Organization reference points. The anthropometric measurements were also interpreted by the WHO growth standard (WHO, 2006). The z-score or the standard deviation unit (SD) indicate how far the measurement from the median value. The cut-off values used was below -2 or -3 SD from the median value according to the WHO growth reference. Stunting was defined as length/height-for-age z-score below -2 SD and severely stunted as z-score below -3 SD from the median height of the reference population (WHO, 2006). Wasting was defined as weight-for-height z-score below -2 SD and severely wasted as z-score below -3 SD of reference population (WHO, 2006). Underweight was also defined as z-score below -2 SD and severely underweight as z-score below -3 SD of reference population (WHO, 2006). Each participant was weighed twice by using a weight scale to calculate Body Mass Index (BMI) in order to improve the accuracy and reliability of measurement; the mean

value to the nearest 0.1 kg, as recommended by the World Health Organization was recorded. Age was recorded by asking the mother/caregiver about the child's birth date. When it was possible, the child's birth date was crosschecked with the birth certificate. The age was taken to the nearest completed month. For example if a child was five months and 20 days, the age was recorded as six months.

In order to take the measurement of weight, the weighing scale was put on a suitable flat, even hard surface. Children who were less than 2 years old or unable to stand were weighed by tarred weighing. Prior to each weighing, the scale was adjusted to zero reading to enhance validity. Each participant was weighed twice by using a weight scale. First the mothers were weighed. After the weight of the mother recorded, the mother will be asked to remain standing on the scale. Then the scale was zeroed off, by pressing the tare button. When zero appeared in the display, the child was given to the mother and the weight of the child appeared in the display. Children above 2 years were measured alone standing on the scale. Both mothers and children were measured with limited clothing and without shoes.

In order to take the measurement of height, a standardized measuring board with a fixed foot rest and a moveable headpiece was used to determine height. Height of children in the age of over two measured standing on standing board. Whereas, children in the age of under two measured by lying them on the standardized measuring board. The yardstick was put against a flat and steady surface. The enumerator had to be sure that heals, buttocks, shoulder blades and head was pressed against the yardstick, and that the shoulders were level with both hands at the side. When the position was right, the headpiece was pushed down until it reached the head. The measurements have recorded to the nearest 0.1cm. Height was measured without shoes; the following standard procedures with the head in upright position and the body firmly stretched and resting on the board to the nearest 0.1 cm.

3.10. Data quality management

The quality was checked at different levels; due emphasis were given to questionnaire designing to capture the objectives of the study, logically sequenced, free of scientific terms and non-leading structured questionnaire and pre-test before data collection. The reliability and validity of

the data collection instrument was established during the pretest in the selected study area by checking the consistency of the responses given by respondents**.** There are seven topics that have used as guide on what to observe (See annex 2). That is demographic factors, child health and nutrition, 24 hour recalls dietary diversity intake, household dietary diversity, socio-economic factors, child feeding practices and role of mothers of index child. All the data collectors were a Degree holder and well trained thoroughly on the study procedures and how to carry out anthropometric measurements including how to maintain confidentiality/privacy of the study participants. The collected data was checked on daily basis for any incompleteness and/or consistency and timely action.

3.11. Data analysis

After the data was collected, data processing was carried out. The raw data was converted into suitable form for analysis and interpretation. This is achieved by following a number of procedures including editing, coding, entry, and tabulation. Their objective is to check the completeness, internal consistency and appropriateness of the answers to each of the questions. Statistical analysis was carried out using Excel and Statistical Package for Social Science (SPSS) software (v.20).

Descriptive statistic such as mean, percentages and frequency distributions, was prepared before a deeper analysis of data. And to determine the relationship among the variables, both the dependent and independent, and to evaluate the basic research questions both, binary and multiple logistic regression analysis was used.

3.12. Model specification

The multivariate analysis was done based on the theoretical framework presented in the second chapter. The logistic model is used when the dependent variable is dichotomous, i.e., it is taking the value 0 or 1, as was the case when look at stunted children versus those that were not stunted, underweight versus not underweight, and wasted versus not wasted. Maximum Likely-Hood Estimator (MLE) methodology had to be held for the minimization of error. So, their general mathematical model looks like:

$$\log\left(\frac{p_j}{1-p_j}\right) = \beta_0 + \sum_{i=1}^{n}\beta_{1i}x_{SEDi} + \sum_{i=1}^{n}\beta_{2i}x_{Chi} + \sum_{i=1}^{n}\beta_{3i}x_{CCi} + \sum_{i=1}^{n}\beta_{3i}x_{MCi} + \sum_{i=1}^{n}\beta_{3i}x_{EHi} + \varepsilon_j$$

Where

j=1, 2, 3 under the consideration of the three anthropometrics measurements

i = 1, 2… n (n is numbers of factors)

p =is the estimated probability of prevalence of malnutrition in the population which value's lying between 0 and 1

$\left(\frac{p_j}{1-p_j}\right)$ = odds of success

x_{SEDi} = Socio-economic and demographic variables such as maternal/paternal education and occupation

x_{Chi} = Child characteristics like Age, Sex, and health status

x_{CCi} = Child caring practices such as feeding, hygiene, and immunization

x_{MCi} = Maternal caring and characteristics like age, height, nutrition awareness, and ANC visits

x_{EHi} = Environmental Health condition such as water supply, sanitation and housing conditions

ε_j = random error or disturbance term based on the anthropometrics type.

Under the assumptions of:

i. The dependent variable non- linearly related with the independent variables;
ii. The dependent variable need not normally distribution (but does assume its distribution is within the range of exponentials family of distribution such as normal, poisons, binomial and gamma);
iii. The dependent variable need not be constant variance for each level of independent variables, which means there is no homogeneity of variance assumption; and
iv. Normally distributed error terms are not assumed.

3.13. Ethical consideration

Research ethics refers to the type of agreement that the researcher enters into with his or her research participants. Ethical considerations play a role in all research studies and all researchers must be aware of and attend to the ethical considerations related to their studies (Fouka and Mantzorou, 2011). Therefore, the researcher has got a support letter from Food Security dept. and communicated all health centers found in the selected Woredas legally and smoothly. The purpose of the study was clear and understandable for all participants. Any communication with the concerned bodies was accomplished at their voluntarily agreement without harming and threatening the personal and institutional wellbeing. The identity of the respondents was kept confidential.

3.14. Operational Definitions

Food security: **"**When all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (UNICEF, 2013).

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

Under nutrition refers the outcome of insufficient food intake and repeated infectious diseases. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted), and deficient in vitamins and minerals (micronutrient malnutrition) (UNICEF, 2006).

Nutritional status: is defined as the growth or micronutrient status of an individual (UNICEF, 2012). Nutritional status is the result of multifaceted interactions between food consumption and the overall status of health and health care practices (EDHS, 2011).

Anthropometry: A method used to assess either growth or change in the body. This method includes height/length, weight, skin-fold thickness, and head circumference etc., could detect the change of body composition to assess the nutritional status in specific population groups, including new-born, children under age of five and adults (NACS, 2016).

Underweight: Is a composite form of under nutrition that includes elements of stunting and wasting. It is defined as the percentage of children aged 0 to 59 months whose weight for age is below minus two standard deviations (moderate and severe underweight) and minus three standard deviations (severe underweight) from the median of the WHO Child Growth Standards (WHO, 2006).

Stunting is Stunting is low height for age and is determined by use of Height for Age Z-Score (HAZ). If the Height for Age Z-Scores is below -2SD, the reference population would be considered as stunting. Reflects chronic under nutrition during the most critical periods of growth and development in early life. It is defined as the percentage of children aged 0 to 59 months whose height for age is below minus two standard deviations (moderate and severe stunting) and minus three standard deviations (severe stunting) from the median of the WHO Child Growth Standards (WHO, 2006). .

Wasting is low weight for length/ height. Weight-for-height can be used as part of the assessment of acute malnutrition in infants less than 6 months. Visible wasting and bilateral oedema are clinical signs of acute malnutrition in this age group. Wasting is low weight for height (WFH). Usually, wasted children are below -2SD of the reference weight for height. It is an acute nutritional disorder (WHO, 2006).

Socio-economic factors: Socio economic factors are usually measured by determining education, income and occupation or a composite of these dimensions. The economic status of a household is an indicator of access to adequate food supplies, use of health services, availability of improved water sources, and sanitation facilities, which are prime determinants of child and maternal nutritional status (UNICEF, 1990).

CHAPTER FOUR

RESULT

The data which is presented in the preceding chapter gathered from primary source from 15 February to 15 March, 2019. A total of 422 children under five years of age were participated in this study. In terms of organization, this chapter is divided into two broad parts. The first part discussed with the descriptive analysis to describe the socio demographic characteristic, child care and feeding practice, child health and sanitation and maternal characteristics. The second part is about statistical model analysis to show the association between the dependent variables (stunting and underweight), and the independent variables.

4.1. Demographic characteristics of respondents

Table 4.1: Household information in four selected woredas of Yeka sub city, Addis Ababa N=422, 2019.

Variables		No.	Percent
Marital status of the mothers	Unmarried	61	14.45
	Married	337	79.86
	Widowed	3	0.71
	Divorced	9	2.13
	Separated	12	2.84
Main occupation of the husband	Wage worker	64	15.2
	Daily laborer	214	50.7
	Business/ traders	80	19.0
	Self-employer	64	15.2
Educational background of the mother	Capable to read and write	305	72.3
	Capable to read but not write	15	3.6
	Cannot read and write	102	24.2
The HH head has other additional work	No	278	65.9
	Yes	144	34.1
Mother main occupation	Daily laborer	16	3.8
	Wage worker	117	27.2
	Business/ traders	159	37.7
	Housewife	130	30.8
Working at	Home	275	65.2
	Away from home	120	28.4
	Both	27	6.4
Mothers job outside home per week	<3 days	368	87.2
	3-5 days	43	10.2
	>5 days	11	2.6
There is someone who take care of the index child when the mother working outside	No	385	1.2
	Yes	37	8.8

Source: from survey, 2019.

Accordingly, the finding of this study, the majority of the study participant mothers or caregivers, 337 (79.86%), are married; while, the remaining are single; i.e., unmarried, divorced, and widowed. This indicated that more than half of the study participants lived with their couple.

Regarding the paternal occupational statues of the respondents, majority, 214 (50.7%), of them are daily laborer followed with traders, 80 (19.0%); whereas, 64 (15.2%) fathers are wage workers; likewise, similar amount of study participants are self-employers. This implies that the larger study participant children fathers were coming from the lower income households. In terms of the educational level of the child mother, the largest participants, 305 (72.3%), capable to read and write. But, the other 102 (24.2%) respondents were neither read nor write, i.e., they are illiterate. Of course this illustrated that most of the mothers or care givers are educated.

In other way round, the researcher asked for the respondents whether their partner had additional work or not; as the result the majority of the study participants, 278 (65.9%), confirmed their husbands did not have additional income source other than what they worked. When they suggest their main income source, 159 (37.7%) were traders followed with 130 (30.8%) housewife. Majority of the mothers, 275 (65.2%) are working in their home; whereas, the other 120 (28.4%) confirmed that they are working away from their home. If that is so, the study want to know how many day are they working outside their home. As 368 (87.2%) respondents respond they spend less than 3 days per week outside home. Therefore, who treat the index child when they were outside their home; accordingly, 385 (91.2%) of the respondents said there is no anyone who treat the index child during there are working outside home (Table 4.1).

4.2. Socio-economic characteristics of respondents

The following table shows the household socio economic characteristics of the study population. The researcher included questions about the house where the HH lives, use electricity, other kind of electric power, fuel for cooking, main floor material of HH, main exterior material, roof material for the respondents and their response illustrated in the table below (Table 4.2).

Table 4.2: Household socioeconomic status in four selected woredas of Yeka ub city, Addis Ababa, N=422, 2019.

Variables		Number	Percent
The house where the HH lives	Owned house	41	9.7
	Rented house	381	90.3
Use electricity			
	No	10	2.4
	Yes	412	97.6
Other kind of electric power			
	Solar	17	4.0
	Generator	3	0.7
	No other types	402	95.3
Fuel for cooking			
	Electricity	17	4.0
	Wood	331	78.4
	Kerosene	74	17.3
Main floor material of HH			
	Earth land	164	38.9
	Concrete	258	61.1
Main exterior material			
	Rudimentary wall	336	79.6
	Traditional wall	69	16.4
	Finished wall	17	4.0
Roof material			
	Rudimentary materials	338	80.1
	Finished roof	84	19.9

Source: from survey, 2019.

Of the entire respondents, 381 (90.3%) resided in rented houses; while, the remaining 41 (9.7%) study participants lived in their own houses. Regarding the housing floor condition 258 (61.1%) respondents house floor were concrete, whereas, the remaining 164 (38.9%) participants housing floor were earth land. Related with the exterior material, 336 (79.6%) households lived in the rudimentary wall which made from mud, card board, palm, bamboo, straw, leaves etc. house. Likewise, 69 (16.4%) of the study participants houses were made of traditional wall which made from stone. However, 17 (4.0%) respondents resided in the finished wall. In the case of their roof 338 (80.1%) residents house roof was made up of grass, palm leaves, straw, plastic sheet, card

board and bamboo. But, 84 (19.9%) respondents lived in the finished roof houses. This implies the vast majority of the study participants' house conditions were found below the quality, because the materials what the houses made are rudimentary. Wood/straw, kerosene and electricity, were the most popular sources of cooking fuel used by 331 (78.4%), 74 (17.3%) and 17 (4.0%) of the respondents respectively. This indicates larger amount residents use wood as the main source of household.

4.3. Child demographic characteristics

The following table shows the Child demographic characteristics of the study population. The researcher included questions about the sex of the child, age of the child (in months) and number of children under five respectively (Table 4.3).

Table 4.3: Child demographic characteristics in four selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables		**Number**	**Percent**
Sex of the child	Female	223	52.8
	Male	199	47.2
Age of the child (in months)	0-6	10	2.4
	6-24	207	9.1
	24-59	205	48.6
Number of children under five	1 child	372	88.2
	2 children	50	11.8

Source: from survey, 2019.

The majority of the child, 207 (49.1 %), had been found in the age between 6 and 24 months, while, the least, 10 (2.4 %) children had been found below 6 month years of age. This indicated that most of the study participant children required supplementary food in addition to breast milk. In the meantime, the study requested to the parents how many children under 5 years do found in their home. As the result indicated, in the 372 (88.2%) households there were only one child, while, with the remaining interviewed houses, 50 (11.8%), there were 2 under five year children during the survey. This indicates more than ¾ of the study participants' had at list one children whose age is below five (Table 4.3).

4.4. Work condition of mothers and child care arrangements

The study wants to investigate the roles, priorities and times that the mother or care givers gives for their children.

Table 4.4: Mothers working condition in four selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables		No.	Percent
Mother give breast milk along with home work	Yes, always	197	46.7
	Yes, sometimes	9	2.1
	No, never	216	51.2
Having enough time for take care of the child	Yes, always	294	69.7
	Yes, sometimes	31	7.3
	No, never	97	23.0
Having much working burden	Yes, always	97	23.0
	Yes, sometimes	35	8.3
	No, never	290	68.7
Feel a tension to finalize the work on time	Yes, always	29	6.9
	Yes, sometimes	21	5.0
	No, never	372	88.2

Source: from survey, 2019.

Most of the mothers, 216 (51.2%) are not giving breast milk for their index child along with their household work; whereas, 197 (46.7%) mothers gave their breast milk even they have to have much work burden. This implies at the time of highest work burden in the household, most of the children never get enough food with their mother. Moreover, 294 (51.2%) of the mothers convinced that they have enough time to take a care of their children; whereas, 97 (23.0%) respondents did not have enough time. Jointly, the study want to know whether the mothers have much work burden or not; as the result 290 (68.7%) respondents said no; while, 97 (23.0%) respondents confirmed that they have. This also illustrated that most of the mothers have enough time to take care of their children; i.e., their working time is never influence to treat their kids. Likewise, majority of the respondents, 372 (88.2%), never feel tension to finalize their work on

time. But, 29 (6.9%) always tensioned to finalize their work on time. This indicates more than ¾ of the study participants did not have complex working burden that can tension them (Table 4.4).

4.5. Child health and caring practice

The child health determined by various factors; one of the expected factor is health and child caring practice. The below table described about the child health and caring practice of mothers or care givers (Table 4.5). The issues included in this sections were about antenatal care, numbers of times the care was taken, the child depleting colostrum, child exclusive breast feeding, duration breast feeding, full immunized, number of days the mother leave child per week, leaving child in the last 24 hours, in the last 24 hours leave the mother without the index child and at the time of leaving, the child stayed at/with.

Table 4.5: Child health and Caring Practice in four selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables	**Number**		**Percent**
Antenatal care			
No	33		7.8
Yes	389		92.2
Numbers of times the care was taken			
Never taken	33		7.8
1-4	21		5.0
>=4	368		87.2
The child depleting colostrum			
No	8		1.9
Yes	414		98.1
Child exclusive breast feeding			
No	48		11.4
Yes	374		88.6
Duration breast feeding			
Did not took at all	11		2.6
<6 Month	361		85.5
>6 Month	61		14.5
Full immunized			
No	15		3.6
Yes	407		96.4
Number of days the mother leave child per week	Never leave	309	73..2
	<=5 days	81	19.2
	>5 days	32	7.6
Leaving child in the last 24 hours	Do not leave	307	72.7

	<=10 hours	79	18.7
	>10 hours	36	8.5
In the last 24 hours leave the mother without the index child	No	282	66.8
	Yes	140	33.2
At the time of leaving, the child stayed at/with	Home	336	79.6
	Neighbor	6	1.4
	Others	80	19.0
The child had got diarrhea within the past two weeks			
No	397	94.1	
Yes	25	5.9	
The child is ill within the past two weeks			
No	397	94.1	
Yes	25	5.9	

Source: from survey, 2019

As shown in the table above (Table 4.5), the study asked for the child mother or care giver whether the indexed child mother took antenatal care during her pregnancy or not. As the result, 389 (92.2%) respondents said yes the mother took the service; whereas, the remaining 33 (7.8%) mothers did not take the service at all. Of course, the vast majority of the mothers under the study visits and took the care service during their pregnant time. Jointly, except the respondents who never get a service, most of the others, 368 (87.2%), visit the antenatal care service more than 4 times. However, the remaining 21 (5.0%) respondents took between 1 and 4 times had visited the service. Regarding the intake of first breast milk, 414 (98.1%) mothers under this study convinced that their child depleting colostrum; while, 8 (1.9%) respondents said their child never taken. Even this result illustrated more than ¾ of the study participants took antenatal care service and the mothers provided colostrum for their child.

The transition from exclusive breastfeeding to family foods, referred to as complementary feeding, typically covers the period from 6 to 18-24 months of age, and is a very vulnerable period. Taking this consideration into account, the study asked for the respondents whether they quite to give a breast milk on time for their children or not. Accordingly, 374 (88.6%) mothers,

under considered in this study, exclude breast milk after 6 month; whereas, 48 (11.4%) respondents exclude their breast feed before the child reached 6 month. In other way direction, the study asked for the mothers if they never excluded how many months they gave their breast for their children. As the result, 361 (85.5%) respondents informed that they provided their breast above 6 month; while, 61 (14.5%) respondents said they gave their breast for their kid before the child reach 6 month. But, 11 (2.6%) study participants never gave at all. This simply shows that most of the study participants gave their breast for their children above 6 months. Jointly, the vast majority, 407 (96.4%), of the mothers fully immunized their children; whereas 15 (3.6%) did not. Of course as the result illustrated most of the mothers' participant in the study have a better knowledge about immunization.

Majority of the mothers or care givers, 306 (73.2%), never left their children out to move anywhere. However, 81 (19.2%) of the mothers left their child at list one days per week and went out; likewise, 32 (7.6%) study participants convinced that they leaved their child above 5 days in a week. Related with this concept the researcher asked for the respondents how many hours the child mother or care givers left their children out in home. According to the majority of the respondents response, 307 (72.7%), response they never leave them at all; whereas, 79 (18.7%), respondents convinced that they have to left their children lower than 10 hours per day. The remaining 36 (8.5%) mothers or care givers should leave out their children more than 10 hours per day. This indicated that most of the mothers keep their child by themselves. About 282 (66.8%) mothers or care givers never leave their index child within the past 24 hours before the data was collected; while, the rest 140 (33.2%) of the mother or care givers left out the child before 24 hours the survey was done. The researcher associatively asked the respondents, if the mothers or care givers leave out at home where the children stay. As the majority of the respondents, 336 (79.6%), response the kid was waiting at home. But, the other 80 (19.0%) respondents said the child leave in others members. The remaining 6 (1.4%) mothers left their child in their neighbor. This implies that more than ¾ of the mothers keep their children by themselves. Mothers caring practice of their children also evaluated by breast and supplementary feeding practice along with mothers work burden.

As the above table depicts, among the entire under-five children 397 (96.4%) of them had not got any kinds of illness, whereas 25 (5.9%) children affected by at least one kind diseases within the

past two weeks. Diarrhea is one of the morbidity in the study area. About 25 (5.9%) of children had got diarrhea. This implies that the prevalence of diarrhea was a bite higher among children under five in the study area.

4.6. Environmental factors and hygiene

Obviously, Hygienic environment kept the community healthy! That is, if the environment would be neat and clean, diseases like airborne and waterborne could be minimal. Therefore, taking this consideration into account, the study would like to evaluate the statues of the respondents' environment (Table 4.7).

Table 4.6: Environmental and hygiene in four selected woredas of Yeka sub city, Addis, Ababa, N=422, 2019.

Variables	Number	Percent
Main water source		
Pipe water	53	12.6
Public pipe water	345	81.8
Protected dug well	24	5.7
Toilet facility		
Pit latrine without slab	50	11.99
Flush or pour flush	13	3.12
Pit latrine with slab	345	81.53
Open defecation	14	3.36

Source: from survey, 2019.

Regarding the water source, majority of the respondents in the study area were using public tap 345 (81.8%); while, 53 (12.6%) others were using pipe water. The remaining 24 (5.7%) resident were using protected dug well. This shows, almost all of the respondents got water from protected sources.

On the subject of sanitation, the majority of the households, 345 (81.53%), in the study area used pit latrine with slab, whilst, 50 (11.99%) households used pit latrine without slab. The other 14 (3.36%) household members did not have any latrine at all, i.e., they defecate openly. In other

way direction 13 (3.12%) members of the study participants used flush or pour flush toilet. This indicated that the private pit latrine with slab was the commonest types of toilet usually the community utilized.

4.7. Nutritional Status of Under-five Children

To assess the nutritional status of children below 5 years in the selected four woredas of yeka sub city, anthropometric measurements were taken from a total of 422 children in the age group. The nutritional status was determined by either weight-for-age or weight-for-height; and a combination of all the methods. The anthropometric measurement was calculated using WHO Antro software according to the WHO (2011) international growth standards. This software produces sex and age specific estimates for the prevalence of under nutrition, mean and SD of the z-scores for each indicator. Indices are expressed as standard deviation from the median reference group. According to this standard the cut point to be stunted, wasted or underweight (<-2SD) while severely stunted, wasted or underweight (<-3SD) from the median of the reference population.

Table 4.7: The overall prevalence of stunting and underweight in four selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Indicators	%<-3SD	%<-2SD	Mean	SD
Length/height-for-age (Stunting)	10.4	26	-1.12	1.56
Weight-for-age (Underweight)	1.4	8.4	-0.44	1.13

Source**:** from survey, 2019.

As table 4.11 depicts that the average height-for-age (Stunting) was -1.12 (SD ± 1.56). The prevalence of stunting (<-2SD) was 26%; whereas 10.4% of the children were severely stunted in the study area (<-3SD). The average prevalence of Underweight (Weight-for-age) was -0.44 (SD ± 1.13). About 8.4% of the children were Underweight (<-2SD); whereas 1.4% of the children were severely underweight in the study area.

The result of the study indicated that magnitude of underweight and stunting in the study area was very high according to WHO (2006) cut off point; and also, when compared to the national and regional prevalence of stunting, and underweight.

Table 4.8: Prevalence of stunting by sex and age group in the selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Indicators		**%<-3SD**	**%<-2SD**	**Mean**	**SD**
Sex of child	**Total number**				
Male	199	14.8	34.7	-1.47	1.51
Female	223	6.4	18.3	-0.8	1.55
Total	422	10.6	26.5	-1.135	1.53
Age group in month					
< 6			1.2	-0.12	1.10
(6-11)			4.9	-0.85	2.01
(12-23)		12.2	31.9	-1.21	1.67
(24-35)		11.1	23	-1.17	1.45
(36-47)		6.1	24.2	-1.12	1.33
(48-59)		7.4	11.1	-0.65	1.51

Source: from survey, 2019.

As shown in the above table, the study result revealed that the prevalence of stunting among male under five children is higher than those of female children; as the number of male children under chronic malnutrition accounted to be 147 (34.7%) when compared to those of female children who are suffering from stunting which is 78 (18.3%) with mean value -1.47 and -0.8 respectively. However, the magnitude of male children who are severely stunted (14.8%) is greater than those of severely stunted female children (6.4%).

The prevalence of stunting was found higher in children age group from 12-23 months with 31.9%; whereas, lowest prevalence was recorded in at the age of lower than 6 months. About 12.2% of the children within the age of 12-23 months were severity stunting. Likewise high sever stunting problem recorded in the age between 24 and 35 months.

Table 4.9: Prevalence of underweight by Sex and age group for the selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Indicators		%<-3SD	%<-2SD	Mean	SD
Sex of child	**Total number**				
Male	199	1.5	11.7	-0.66	1.14
Female	223	1.4	5.4	-0.24	1.09
Total	422	1.45	8.55	-0.45	1.115
Age group in month					
< 6		-	-	-	-
(6-11)		14.3	42.9	-0.85	2.01
(12-23)		1.00	6.2	-0.12	1.1
(24-35)		0.80	8.0	-0.57	1.08
(36-47)		-	10.6	-0.89	1.01
(48-59)		7.40	11.1	-0.9	1.01

Source: from survey, 2019.

Underweight is a result of chronic malnutrition or/and acute malnutrition. The study result revealed that the prevalence of underweight in the study area were higher in male children 50 (11.7%) compared to than female children 23 (5.4%) with mean value -0.66 and -0.24 respectively. However, the magnitude of male children who are severely underweight (1.5%) is greater than those of severely underweight female children (1.4%).

Regarding the age group, the prevalence of underweight was found higher in children with the age group of 6-11 months with 42.9%; while, there is no prevalence with the age below 6 month and also the severity of underweight was highest in the age group of 6-11 months with 14.3percent.

4.8. Statistical analysis

To identify significant and independent determinants of child malnutrition, statistical analyses were carried at two stages. Firstly, bivariate logistic regression was performed to identify the variables that affect child malnutrition on bivariate level. Secondly, the most important variables that determine nutritional status of children below 5 years were estimated by employing multivariate logistic regression analysis. The predictors found associated with child malnutrition status in the bivariate analysis at 5% levels of significance were considered as candidate variables for the multivariate analysis.

Table 4.10: Multiple binary logistic regression analyses of the risk factors which significantly related to stunting, for the selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables	Stunting		COR (95%C.I)	AOR (95%C.I)
	Yes	No		
Child characteristics				
Age of the child				
24-59 Months	42 (38.5%)	163 (52.1%)	1*	1*
6-24 Months	65 (59.6%)	142 (45.4%)	0.563 (0.359, 0.882)**	0.597 (0.376, 0.947)**
0-6 Months	2 (1.83%)	8 (2.6%)	1.031 (0.211, 5.035)	1.034 (0.197, 5.444)
Sex of the child				
Male	68 (62.4%)	131 (41.9%)	1*	1*
Female	41 (37.6%)	182 (58.1%)	2.304 (1.472, 3.606)**	2.317 (1.467, 3.662)**
Maternal Characteristics				
Maternal education				
Capable to write and read	38 (34.9%)	64 (20.4%)	1*	1*
Read but not write	5 (4.6%)	10 (3.2%)	1.187 (0.377, 3.736)	1.106 (0.334, 3.670)
Couldn't read and write	66 (60.6%)	239 (76.4%)	2.150 (1.324, 3.493)**	2.140 (1.299, 3.527)**

Source: from the survey, 2019.

* represents the reference group
** represents a significant value with 0.05 level of significance

The prevalence of stunting 59.7% times higher in the children age between 24 and 59 months than those children age found 6-24 months, [(AOR=0.597, 95% C.I :(0.376, 0.947)]. This indicates stunting is higher in the elder children than the early infants. This study finding is in line with EDHS (2016); Kabubo-Mariara *et al*., (2006) and Lancet (2008). Under the consideration of child characteristics, sex of the children is also one of the important determinant factors that capable to affect the children nutritional status [(AOR=2.317, 95% C.I: (1.467, 3.662)]. After holding the other effect as a constant, males are 2.317 times more likely to be stunted than females. This study finding implies that the prevalence of stunting is larger in male children than female counterpart. Apparently, this study result share the idea of CSA (2011) and ICF International (2016) study findings.

The logistic regression result shows in the above table (Table 4.14), maternal education has positive relationship with stunting and significantly at 5% significance level. That is, illiterate mothers children were 2.140 times more likely to be stunted compared to mothers those are attending in the formal schools. This implies that, educated mothers kept their kids healthy, so

the prevalence of stunting was lower than the illiterate mothers. This study finding supported the argument of Moen (1993) study results.

Among the expected causal factors, paternal occupation and sex of the child are the only significantly associated with underweight ($p<0.05$). The below table illustrated more about the association between underweight and identified factors (Table 4.11).

Table 4.11: Multiple binary logistic regression analyses of the risk factors which significantly related to underweight, for the selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables	underweight		COR (95%C.I)	AOR (95%C.I)
	No	Yes		
Socio-Economic Factors				
Paternal occupation				
Self-employer	60 (15.0%)	4 (17.4%)	1*	1*
Business or trader	77 (19.3%)	3 (13.0%)	0.284 (0.085, 0.954)**	0.263 (0.077, 0.897)**
Daily laborer	201 (50.4%)	13 (56.5%)	0.349 (0.145, 0.840)**	0.355 (0.145, 0.866)**
Wage work	61 (15.3%)	3 (13.0%)	0.771 (0.283, 2.101)	0.708 (0.255, 1.969)
Child characteristics				
Sex of the child				
Male	176 (45.5%)	23 (65.7%)	1*	1*
Female	211 (54.5%)	12 (34.3%)	0.435 (0.211, 0.900)**	0.461 (0.220, 0.963)**

Source: from the survey, 2019

* represents the reference group
** represents a significant value with 0.05 level of significance

The result of logistic regression analysis shown in the above table (Table 4.15) that children whose father engaged in as self-employee are 35.5% times more risky of being underweight than those who working as a daily laborer [(AOR=0.355, 95% C.I :(0.145, 0.866)]. Likewise, self-employers fathers children 26.3% affected by the problem of underweight comparing with fathers working in business or traders [(AOR=0.263, 95% C.I :(0.077, 0.897)]. This indicated that the prevalence of underweight is larger in self-employee participants than daily laborer and traders. This study flinging is in line with FAO (2013) study investigation.

Regarding the child characteristic concern, the likelihood of being underweighted is found to be 0.461 times larger among male children compared to females [(AOR=0.461, 95% C.I :(0.220, 0.963)]. That is males are higher risk of being underweight than females. Most literatures like CSA (2011; 12); ICF International (2016); and E. Seyoum *et al*. (1996) shared the idea of this research finding.

4.9. Determinants of undernutrition among under-five children

This section has dealt with the result of regression analysis of the determinants of malnutrition among under-five children in four selected woredas of yeka sub city, Addis Ababa. Logistic regression model was used to regress stunting and underweight against set of variables gathered during survey from sampled respondents.

In order to identify relevant and significant determinant factors of malnutrition for sample children under study, two steps were followed. In the first step a bivariate regression analysis using a logit model was conducted to select potential predicators of child malnutrition that will be refined in the second step of multivariate logistic analysis. The possible variables that were gathered from cross-sectional survey has passed through bivariate logistic regression analysis and screened by their level of significance for the subsequent multivariate regression analysis.

Determinants of Stunting

Multivariate logistic regression outputs have depicted that Sex of child, Age of child, Mother's education, were significant predicators of child stunting for the study area.

Sex of child: This result revealed that age of child had a positive coefficient and significant at 5%. This implies that as age of the child increases the child has higher risk of being stunted. This result is similarity with previous studies of Bealu et al. (2017) and Beka et al. (2009) which revealed that the risk of being stunting to be increase as the age of a child increase. It might be because of stunting is a cumulative effect of long term food deficient, care and exposure to chronic diseases.

Sex of the child: the proportion of male and female respondents were 47.2% and 57.8% respectively. In this study male stunting (36.4%) which was higher than stunted females (9.8%). This study showed significant relationship between gender and nutritional status of children ($p<0.05$).

Maternal education: This study demonstrated that there is significant association between mother's education and stunting. The level of significance increased with level of education. Children whose mother's education level at read and write, primary and secondary had negatively associated with stunting at 5% significance level respectively. This finding is in line with study results obtained by Ramos et al. (2014) which were conducted in Brazil and the study undertaken by Gezae and Nigatu (2014) in Ethiopia.

Determinants of underweight

Sex of the child: the proportion of male and female respondents were 47.2% and 52.8% respectively. In this study male underweight (13.2%) higher than female underweight (6.8%). This study showed significant relationship between gender and nutritional status of children ($p<0.05$).

Paternal occupation: Regarding the paternal occupational statues of the respondents, majority, 214 (50.7%), of them are daily laborer followed with traders, 80 (19.0%); whereas, 64 (15.2%) fathers are wage workers; likewise, similar amount of study participants are self-employers. This implies that the larger study participant children fathers were coming from the lower income households. This study showed significant relationship between paternal occupation and nutritional status of children ($p<0.05$).

CHAPTER FIVE

DISCUSSION

The study has examined various causal factors which are assumed to have effect on malnutrition. In the bivariate analysis, it has tried to incorporate factors that socio-economic effects such as variables like maternal and paternal occupation. Similarly, the factor of child characteristics is integrated with age, sex, morbidity, and exclusive breast feeding of the child. It has also treated the relationship between malnutrition and child caring in the light of maternal characteristics such as maternal age, number of live children, maternal education, and religion of the mother. In the case of environmental health condition, the study has examined cases like water supply, sanitation, and house condition. To avoid an excessive number of variability and unstable estimates in the subsequent model, only variables that have reached a p-value less than 0.05 are taken into consideration in the subsequent analyses.

Discussions on determinants of child malnutrition has based on results obtained from both bivariate and multivariate logistic regression analysis.

The majority of the child, 207 (49.1 %), had been found in the age between 6 and 24 months, while, the least, 10 (2.4 %) children had been found below 6 month years of age. The prevalence of stunting was found higher in children age group from 12-23 months with 31.9%; whereas, no prevalence was recorded at the age of lower than 6 months. About 12.2% of the children within the age of 12-23 months were severity stunting. Likewise sever stunting problem recorded in the age between 24 and 35 months (23%).

This study also demonstrates that the gender based stunting prevalence results for boys were higher compared to girls. That is, 34.7% boys were affected by stunting problem and also 14.8% were severely stunted. Whereas, 18.3% of girls were stunted with their severe forms with 6.4%.

As the result finding shows, male are two folds underweight (11.7%) and severely underweight (1.5%) than female (5.4%) with their severe forms (1.45%), respectively. As like as stunting the prevalence of underweight is larger in boys than girls.

Regarding the age group, the prevalence of underweight was found higher in children with the age group of 6-11 months with 42.9%; while, there is no prevalence with the age below 6 month.

The severity of Underweight was highest in the age of 6-11 months with 14.3% followed by the age group 48-59 with 11.1% underweight with their sever forms 7.4%.

Accordingly, the finding of this study, the majority of the study participant mothers or caregivers, 337 (79.86%), are married; while, the remaining are single; i.e., unmarried, divorced, and widowed. This indicated that more than half of the study participants lived with their couple.

Regarding the paternal occupational statues of the respondents, majority, 214 (50.7%), of them are daily laborer followed with traders, 80 (19.0%); whereas, 64 (15.2%) fathers are wage workers; likewise, similar amount of study participants are self-employers. This implies that the larger study participant children fathers were coming from the lower income households.

It is also indicated that a there is high prevalence of stunting in children of illiterate mother than children of literate mothers. Maternal education has positive relationship with stunting and significantly at 5% significance level. That is, illiterate mothers children were 2.140 times more likely to be stunted compared to mothers those are attending in the formal schools. This implies that, educated mothers kept their kids healthy and education enables women to provide appropriate care for children.

Most of the mothers, 216 (51.2%) are not giving breast milk for their index child along with their household work; whereas, 197 (46.7%) mothers gave their breast milk even they have to have much work burden. This implies at the time of highest work burden in the household, most of the children never get enough food with their mother. This indicated that most of the study participant children required supplementary food in addition to breast milk.

As the result, 389 (92.2%) mother or care giver of the indexed child took antenatal care during her pregnancy; whereas, the remaining 33 (7.8%) mothers did not take the service at all. Of course as the result illustrated most of the mothers' participant in the study have a better knowledge about immunization.

The research result reaffirms that the role of other factors that have included in the analysis, e.g. basic amenities such as availability of safe drinking water and toilet, physical and environmental conditions in shaping the health and well-being of the children. Regarding the water source, majority of the respondents in the study area were using public tap 345 (81.8%); while, 53

(12.6%) others were using pipe water. The remaining 24 (5.7%) resident were using protected dug well. This shows, almost all of the respondents got water from protected sources. On the subject of sanitation, the majority of the households, 345 (81.53%), in the study area used pit latrine with slab, whilst, 50 (11.99%) households used pit latrine without slab. This indicated that the private pit latrine with slab was the commonest types of toilet usually the community utilized.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1. CONCLUSIONS

The finding of this study indicates that malnutrition is a glaring major public health problem among children under five years in in four selected woredas of Yeka sub city, Addis Ababa. High prevalence rate of malnutrition (stunting and underweight) among the under five children is observed, indicating that the nutrition situation in study area is still unresolved.

According to the study, socio-economic, child characteristics, environmental factor, and maternal characteristics are forefront factors for malnutrition in under five children. Though breast feeding is essential at an early age it should be supplemented with other food items as the child's age increases. Without supplementary food, the children become malnourished.

Stunting is high among children whose age is lying between 24 and 60 months than those ages between 6-24 months. In the early stage most mothers gave their breast for their youngest. So, until the complimentary feeding time reach, the mothers' breast is enough for them. Due to this reason, the probability of affected by malnutrition decline in that stage. However, when the children growing, they never get enough complimentary food; this leads the children being more stunted. Similarly female children are highly affected by stunting than the male equivalent. Likewise, children whose mother is illiterate are extremely affected by stunting. This indicated that the nutrition problem of the child mainly occurred due to the mothers' awareness level about foods.

Paternal education level and sex of the children are the other determinant factor for underweight. More male children are underweight. Likewise, illiterate fathers, usually, have more underweight children than educated parent. If either of the family members is educated, they got a better knowledge about food as well malnutrition. So, from the early stage they took a protective mechanism.

The aim of this study was to assess the nutritional status of children and identifying determinant factors. Based on the major findings derived from the study, the following conclusions were drawn. According to this study finding, in an independent analysis of selected variables; stunting was significantly associated with child characteristics such as age of the child, sex of the child and maternal education and also underweight was associated with socioeconomic characteristics such as paternal occupation and child characteristics such as sex of the child in both bivariate and multivariate analysis.

Both bivariate and multivariate analysis indicated that child characteristics such as age of the child, sex of the child and maternal characteristics such as maternal education were determinant of stunting. Also socioeconomic characteristics such as paternal occupation and child characteristics such as sex of the child were found significantly associated factors of underweight.

Generally prevalence of child malnutrition was high in the study area and it signifies chronic nutritional problem. In comparison to the EDHS 2016 report of the region, stunting, underweight and the respective sever forms is lower. The findings of this study was lower; stunted (26%) and sever form of stunting condition (10.4%), underweight of the children (8.4%) underweight and 1.4% severely underweight) in the study area were also lower than that of the regional (EDHS, 2016). As the proportion of these variables is significantly higher in the study area, they are more important determinants of stunting and underweight.

6.2. Recommendations

Based on the summarized result of the research, the study findings show a lot of problems that significantly associated with the prevalence of stunting and underweight. Based on these findings the study population may benefit from interventions targeted at following focus areas:

- ✓ Improvement of complementary feeding: Counseling mothers about safe and nutritious food as well as appropriate amounts of food intake for children in the various age groups should be taken in to account because the multivariate analyses of this study reveal that elder children are more likely to be undernourished than the younger children even after keeping other factors constant.

- ✓ Improvement of exclusive and prolonged breastfeeding practices: Even though we found no direct association between breastfeeding practices and malnutrition, we still recommend that exclusive breastfeeding should be promoted. We suggest counselling of mothers about breastfeeding, avocation against the aggressive marketing of formula milk and reassurance to mothers about the quality of their breast milk.
- ✓ Increase socio-economic status: Governmental support for female education and creation of employment opportunities. Study in the country indicated that enhanced female adult education would reduce the prevalence of child stunting by about 5 to 10% each with the effect of the latter intervention typically a little bit larger. Together, they would eliminate between 10 and 20% of Ethiopia's child stunting using the diagnostic capability of mothers as a proxy for their nutritional knowledge (Christiansen, L., 2001).
- ✓ Generally, Intervention initiatives should focus on improving HH food security; support income generation, nutrition education, promotion of education and status of women. All in all, the figures in these study areas illustrate, the problems cited still need a very serious consideration. Therefore, it is worth noting that planning and implementing preventive policies aimed at addressing child malnutrition in vulnerable urban areas remain to be prime factors.

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Appendices

Annex 1: Bivariate and multiple regression analysis outputs

Table. Annex 1.1. Bivariate regression analyses of the risk factors which significantly related to stunting, for the selected woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables	Stunting		COR (95%C.I)
	No	Yes	
Socio-Economic Factors			
Paternal occupation			
Wage work	21 (19.3%)	43 (13.7%)	0.638 (0.216, 1.884)
Daily laborer	47 (43.1%)	167 (53.4%)	1.409 (0.785, 2.531)
Business or trader	22 (20.2%)	58 (18.5%)	1.067 (0.633, 1.797)
Self-employer	19 (17.4%)	45 (14.4%)	1*
Maternal occupation			
Daily laborer	6 (5.5%)	10 (3.2%)	0.865 (0.409, 1.827)
Wage work	25 (22.9%)	92 (29.4%)	1.500 (0.802, 2.807)
Business or trader	42 (38.5%)	117 (37.4%)	1.113 (0.538, 2.303)
House wife	36 (33.0%)	94 (30.0%)	1*
Child characteristics			
Age of the child			
0-6 Months	2 (1.83%)	8 (2.6%)	1.031 (0.211, 5.035)
6-24 Months	65 (59.6%)	142 (45.4%)	0.563 (0.359, 0.882)**
24-60 Months	42 (38.5%)	163 (52.1%)	1*
Sex of the child			
Female	41 (37.6%)	182 (58.1%)	2.304 (1.472, 3.606)**
Male	68 (62.4%)	131 (41.9%)	1*
Exclusive breast feeding			
No	15 (13.8%)	33 (10.5%)	0.739 (0.384, 1.420)
Yes	94 (86.2%)	280 (89.5%)	1*
Morbidity			
No	101 (92.7%)	296 (94.6%)	1.379 (0.578, 3.292)
Yes	8 (7.3%)	17 (5.4%)	1*
Maternal Characteristics			
Maternal age			
15-25 Years	17 (15.6%)	51 (16.3%)	0.960 (0.365, 2.525)
25-35 Years	84 (77.1%)	237 (75.7%)	0.903 (0.392, 2.079)
35-49 Years	8 (7.3%)	25 (8.0%)	1*
Number of live children			
1 child	97 (89.0%)	275 (87.9%)	0.895 (0.449, 1.783)

2 children	12 (11.0%)	38 (12.1%)	1*
Maternal education			
Capable to write and read	66 (60.6%)	239 (76.4%)	2.150 (1.324, 3.493)**
Read but not write	5 (4.6%)	10 (3.2%)	1.187 (0.377, 3.736)
Couldn't read and write	38 (34.9%)	64 (20.4%)	1*
Religion of the mother			
Christian	99 (90.8%)	284 (90.7%)	0.989 (0.465, 2.103)
Muslim	10 (9.2%)	29 (9.3%)	1*
IDDS			
Low IDDS tercile	1 (0.90%)	5 (1.6%)	1.743 (0.201, 15.101)
Medium IDDS tercile	9 (8.3%)	24 (7.7%)	0.930 (0.418, 2.068)
High IDDS tercile	99 (90.8%)	284 (90.7%)	1*
Environmental health condition			
Water supply			
Pip water	9 (8.3%)	44 (14.1%)	2.933 (0.982, 8.760)
Protected dug well	91 (83.5%)	254 (81.2%)	1.675 (0.708, 3.959)
Protected spring	9 (8.3%)	15 (4.8%)	1*
Sanitation			
No	1 (0.9%)	5 (1.6%)	1.753 (0.203. 15.175)
Yes	108 (99.1%)	308 (98.4%)	1*
Condition of floor of the house			
Earth land	47 (43.1%)	117 (37.4%)	0.787 (0.506, 1.226)
Concrete	62 (56.9%)	196 (62.6%)	1*
Wall condition of house			
Rudimentary wall	94 (86.2%)	242 (77.3%)	0.552 (0.155, 1.963)
Traditional wall	12 (11.0%)	57 (18.2%)	1.018 (0.253, 4.102)
Finished wall	3 (2.8%)	14 (4.5%)	1*
Condition of roof			
Rudimentary roof	94 (86.2%)	244 (78.0%)	0.564 (0.308, 1.035)
Finished roof	15 (13.8%)	69 (22.0%)	1*

Source: from the survey

* represents the reference group

** represents a significant value with 0.05 level of significance

Table. Annex 1.2. Bivariate regression analyses of the risk factors which significantly related to underweight, for the selected Woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables	**underweight**		**COR (95%C.I)**
	No	**Yes**	
Socio-Economic Factors			
Paternal occupation			

Wage work	56 (14.5%)	8 (22.9%)	0.771 (0.283, 2.101)
Daily laborer	201 (51.9%)	13 (37.1%)	0.349 (0.145, 0.840)**
Business or trader	76 (19.6%)	4 (11.4%)	0.284 (0.085, 0.954)**
Self-employer	54 (14.0%)	10 (28.6%)	1*
Maternal occupation			
Daily laborer	112 (28.9%)	5 (14.3%)	1.405 (0.285, 6.931)
Wage work	14 (3.6%)	2 (5.7%)	0.439 (0.150, 1.286)
Business or trader	143 (37.0%)	16 (45.7)	1.100 (0.501, 2.417)
House wife	36 (33.0%)	94 (30.0%)	1*
Child characteristics			
Age of the child			
<25 Months	222 (55.6%)	11 (47.8%)	0.66. (0.329, 1.321)
>=25 Months	177 (44.4%)	12 (52.2%)	1*
Sex of the child			
Female	211 (54.5%)	12 (34.3%)	0.435 (0.211, 0.900)**
Male	176 (45.5%)	23 (65.7%)	1*
Exclusive breast feeding			
No	45 (11.6%)	3 (8.6%)	0.713 (0.210, 2.422)
Yes	342 (88.4%)	32 (91.4%)	1*
Morbidity			
No	364 (94.1%)	33 (94.3%)	1.043 (0.235, 4.618)
Yes	23 (5.9%)	2 (5.7%)	1*
Maternal Characteristics			
Maternal age			
15-25 Years	62 (16.0%)	6 (17.1%)	1.500 (0.286, 7.868)
25-35 Years	294 (76.0%)	27 (77.1%)	1.423 (0.323, 6.273)
35-49 Years	31 (8.0%)	2 (5.7%)	1*
Number of live children			
1 child	342 (88.4%)	30 (85.7%)	0.789 (0.291, 2.138)
2 children	45 (11.6%)	5 (14.3%)	1*
Maternal education			
Capable to write and read	284 (73.4%)	21 (60.0%)	0.506 (0.244, 1.052)
Read but not write	14 (3.6%)	1 (2.9%)	0.489 (0.059, 4.036)
Couldn't read and write	89 (23.0%)	13 (37.1%)	1*
Religion of the mother			
Christian	349 (90.2%)	34 (97.1%)	3.702 (0.493, 27.811)
Muslim	38 (9.8%)	1 (2.9%)	1*
IDDS			
Low IDDS tercile	1 (0.90%)	5 (1.6%)	2.353 (0.266, 20.801)
Medium IDDS tercile	9 (8.3%)	24 (7.7%)	1.623 (0.535, 4.924)
High IDDS tercile	99 (90.8%)	284 (90.7%)	1*
BMI			
<16.0 kg/m2 = severely	21 (5.4%)	1 (2.9%)	0.333 (0.028, 4.036)
16.0 -18.49 kg/m^2 = underweight	43 (11.1%)	5 (14.3%)	0.814 (0.142. 4.671)

18.5 - 24.9 kg/m2 = normal	267 (69.0%)	24 (68.6%)	0.629 (0.135, 2.933)
25 – 29.9 kg/m ^{2}= overweight	42 (10.9%)	3 (8.6%)	0.500 (0.076, 3.305)
>30 kg/m^2 = Obese	14 (3.6%)	2 (5.7%)	1*
Environmental health condition			
Water supply			
Pip water	52 (13.4%)	1 (2.9%)	0.442 (0.026, 7.383)
Protected dug well	312 (80.6%)	33 (94.3%)	2.433 (0318, 18.597)
Protected spring	23 (5.9%)	1 (2.9%)	1*
Sanitation			
No	5 (1.3%)	1 (2.9%)	2.247 (0.255, 19.789)
Yes	382 (98.7%)	34 (97.1%)	1*
Condition of floor of the house			
Earth land	146 (37.7%)	18 (51.4%)	1.748 (0873, 3.499)
Concrete	241 (62.3%)	17 (48.6%)	1*
Wall condition of house			
Rudimentary wall	94 (86.2%)	242 (77.3%)	0.552 (0.155, 1.963)
Traditional wall	12 (11.0%)	57 (18.2%)	1.018 (0.253, 4.102)
Finished wall	3 (2.8%)	14 (4.5%)	1*
Condition of roof			
Rudimentary roof	94 (86.2%)	244 (78.0%)	4.436 (1.043, 18.873)**
Finished roof	15 (13.8%)	69 (22.0%)	1*

Source: from the survey

* represents the reference group

** represents a significant value with 0.05 level of significance

Table. Annex 1.3. Bivariate regression analyses of the risk factors which significantly related to wasting, for the selected Woredas of Yeka sub city, Addis Ababa, N=422, 2019.

Variables	Wasting		COR (95%C.I)
	No	Yes	
Socio-Economic Factors			
Paternal occupation			
Wage work	61 (15.3%)	3 (13.0)	0.738 (0.158, 3.437)
Daily laborer	201 (50.4%)	13 (56.5%)	0.970 (0.305, 3.086)
Business or trader	77 (19.3%)	3 (13.0%)	0.584 (0.126, 2.711)
Self-employer	60 (15.0%)	4 (17.4%)	1*
Maternal occupation			
Daily laborer	16 (4.0%)	3 (13.0%)	3.844 (0.874, 16.895)
Wage work	111 (27.8%)	6 (26.1%)	1.108 (0.347, 3.536)

Business or trader	149 (37.3%)	8 (37.2%)	1.101 (0.372, 3.258)
House wife	123 (30.8%)	6 (26.1%)	1*
Child characteristics			
Age of the child			
<25 Months	222(55.6%)	11(47.8%)	0.731 (0.315, 1.696)
>=25 Months	177 (44.4%)	12 (52.2%)	1*
Sex of the child			
Female	214 (53.6%)	9 (39.1%)	0.556 (0.235, 1.314)
Male	185 (46.4%)	14 (60.9%)	1*
Exclusive breast feeding			
No	44 (11.0%)	4 (17.4%)	1.699 (0.533, 5.220)
Yes	355 (89.0%)	19 (82.6%)	1*
Morbidity			
No	376 (94.2%)	21 (91.3%)	0.642 (0.142, 2.908)
Yes	23 (5.8%)	2 (8.7%)	1*
Maternal Characteristics			
Maternal age			
15-25 Years	64 (16.0%)	4 (17.4%)	2.000 (0.215, 18.637)
25-35 Years	303 (75.9%)	18 (78.3%)	1.901 (0.246, 14.713)
35-49 Years	32 (8.0%)	1 (4.3%)	1*
Number of live children			
1 child	352 (88.2%)	20 (87.0%)	0.890 (0.255, 3.110)
2 children	47 (11.8%)	3 (13.0%)	1*
Maternal education			
Capable to write and read	286 (71.7%)	19 (82.6%)	2.192 (0.635, 7.568)
Read but not write	14 (3.5%)	1 (4.3%)	2.357 (0.229, 24.259)
Couldn't read and write	99 (24.8%)	3 (13.0%)	1*
Religion of the mother			
Christian	361 (90.5%)	22 (95.7%)	2.316 (0.304, 17.663)
Muslim	38 (9.5%)	1 (4.3%)	1*
IDDS			
Low IDDS tercile	5 (1.3%)	1 (4.3%)	4.056 (0.450, 36.549)
Medium IDDS tercile	29 (7.3%)	4 (17.4%)	2.797 (0.888, 8.811)
High IDDS tercile	365 (91.5%)	18 (78.3%)	1*
Environmental health condition			
Water supply			
Pip water	51 (12.8%)	2 (8.7%)	0.941 (0.081, 10.896)
Protected dug well	324 (81.2%)	20 (87.0%)	1.481 (0.191, 11.516)
Protected spring	24 (6.0%)	1 (4.3%)	1*
Sanitation			
No	5 (1.3%)	1 (4.3%)	3.582 (0.401, 31.990)

Yes	394 (98.7%)	22 (95.7%)	1*
Condition of floor of the house			
Earth land	153 (38.3%)	11 (47.8%)	1.474 (0.635, 3.423)
Concrete	246 (61.7%)	12 (52.2%)	1*
Wall condition of house			
Rudimentary wall	317 (79.4%)	29 (82.6%)	0.959 (0.121, 7.620)
Traditional wall	66 (16.5%)	3 (13.0%)	0.727 (0.071, 7.461)
Finished wall	16 (4.0%)	1 (4.3%)	1*
Condition of roof			
Rudimentary roof	318 (79.7%)	20 (87.0%)	1.698 (0.493, 5.855)
Finished roof	81 (20.3%)	3 (13.0%)	1*

Source: from the survey

* represents the reference group

** represents a significant value with 0.05 level of significance

Anex 2: Consent form

Hello,

My name is _____. I am a student at Addis Ababa University, Center for Food Security Studies and I am carrying out a study to assess factors associated with nutritional status of under five children in four selected Woredas of Yeka sub city, Addis Ababa, Ethiopia.

You will be required to answer questions during an interview that will last approximately 15minutes, and then your child measurements of height and weight will be taken. There are no direct benefits during this study. However, it is hoped that the information obtained will be used to advice on improvement of malnutrition in the country. All information provided will remain confidential and will only be reported as group data with no identifying information. All data, including questionnaires will be kept in a secure location and only those directly involved with the research will have access to them. After the research is completed, the questionnaires will be destroyed. Participation in this research study is voluntary. You have the right to withdraw at any time or refuse to participate entirely. Your co-operation will be highly appreciated.

Interviewer's signature: _____

Date: _____/_____/2019

Do you agree to proceed with the interview?

Yes, I agree /__/

No, I don't agree /__/

Annex 3: Questionnaires (English Translation)

PART I: Household demographic and socio-economic characteristics

101	Region: /___/___/	102. Sub city: /-----/-----/ 103. Woreda: /___/___/ 104. House no. /__/__/__/__/		
105	Respondent (Mother) To HH Questionnaire	Name		
106	Name of Head of Household	Name		
107	Number of Children Under Five	Number		
108	Name of The Index Child	Name: Sex 0 = female 1 = Male		
109	Age of the Index Child	Age [] [ ] Months		
110	Religion of the respondent's mother	Orthodox Christian……..……..…... 1 Protestant. ……..……..…..…2 Catholic……...……...…….3 Muslim……...……..……...4 Other (specify)…….……5 NA……..……..……98		
111	Date of interview	Day	Month	Year

Part II: HH socio economic status and characteristics

No	Questions	Code
601	Do you own the house you live in?	Owns house..... 1 Rents……..... 2 Free housing..... 3 Others (specify)..... 4
602	Do you have a garden where you grow vegetables and/or fruits?	Yes..... 1 No..... 0>>704
603	If yes, how do you use the produce?	Sell all of it..... 1 Sell part of it ..... 2 Use all for HH consumption……..... 3 Other, specify..... 4
604	Does your household have any electricity? (HYDRO ELECTRIC POWER)	Yes ..... 1 No..... 0
605	Do you have any other kind of electric power? If yes, which type?	Generator..... 1 Solar..... 2 No other type..... 3

606	What type of fuel does your household mainly use for cooking?	Electricity..... 1 LPG2..... 2 Natural gas..... 3 Biogas..... 4 Kerosene..... 5 Charcoal..... 6 Wood/straw..... 7 Animal dung..... 8 OTHER..... 9
607	Main floor material [OBSERVATION]	Natural (EARTH/SAND)…..... 1 Wood/Bamboo…….... 2 Concrete…….... 3 Finished (TILE/CERAMIC/MOSAI..…..... 4 OTHER…….... 5
608	Main exterior material [OBSERVATION]	No wall..... 1 Rudimentary wall (Mud, Cardboard, Palm, Bamboo, Straw, leaves..... 2 Traditional wall made from stones ..... 3 Finished wall (Concrete, Corrugated Wood) ..... 4 Other (specify) 5
609	Main roof material [OBSERVATION.]	No roof..... 1 Rudimentary (Grass, Palm, leaves, Straw, Plastic sheeting, cardboard, bamboo)..... 2 Finished roof (metal, wood, corrugated tin, Other metal, tile, cement)..... 3 Other (specify)…..... 4

Part III: Work condition and child care arrangements

No	Questions	Code
201	What is your marital status?	Single …..... 1 Married/Living together…….... 2 Widowed…..... 3 Divorced..... 4 Separated.....5 Married, more than one spouse.....6
202	What is your husband's main occupation? (Note: If multiple occupation, ask for the main occupation)	Farmer..... 1 Wage work permanent..... 2 Wage work occasional..... 3 Daily laborer..... 4 Handicraft..... 5 Business/Traders..... 6 Other Self-employment..... 7 Household Work..... 8 Student..... 9 Retired/Old age..... 10 Physically challenged ..... 11 Jobless..... 12 Other (specify)..... 13
203	Do you know how to read and	Yes, read and write..... 1

	write?	Yes, read..... 2 No, cannot read and write..... 3
204	At present, aside from your household chores, do you have another job?	Yes..... 1 No..... 0
205	What is your main occupation? (MAIN OCCUPATION)	Farmer or family farm work..... 1 Wage work Permanent…..... 2 Wage work occasional..... 3 Daily laborer..... 4 Handicraft..... 5 Business/Traders..... 6 Other Self-employment..... 7 Household Work /Housewife ..... 8 Student..... 9>>212 Retired/Old age ……..... 10 Physically challenged..... 11 Jobless..... 12>>212 Other (specify)..... 13
206	Do you do your work at home or outside the home? (main occupation) (refer to employment noted in 206)	Home……..……..……..1>> 218 Away from home ..... 2 Both..... 3
207	How many days a week do you work outside the home?	Days
208	When you work outside, do you take your youngest child (NAME) with you or do you have someone to take care of him/her? only ask this question if mother works outside of her home	Always brings with her..... 1 Always leaves with someone else..... 2 Both..... 3 NA……..……..…….. 98>>221
209	On average, how many days a week do you usually leave the youngest child with someone else to take care of him/her? [if less than once a week, ask number of days/month]	Days/Week_____ Days /MONTH_____
210	On average, for how long each time do you usually leave the youngest child with someone else?	Hours ----------
211	In the last 24 hours, did you go out of the house without taking [INDEX CHILD NAME]?	Yes..... 1 No..... 0 >> 225
212	For how long were you gone? (Enter the number of minutes or hours)	[ ] Minutes [ ] Hours
213	Where was the baby?	Home..... 1 Neighbor's house..... 2

		Others specify 3
Roles, priorities and time		
214	Is [INDEX CHILD NAME] with you when you are doing work inside the household?	Yes..... 1 >> 227 No 0
215	If no, who cares for [INDEX CHILD NAME] while you do household work?	Adult (>15 year) family member within Household..... 1 Adult (>15 year) family member outside household ..... 2 Child (<15 year) family member within household..... 3 Child (<15 year) family member outside household 4
216	Are you able to give [INDEX CHILD NAME] breast milk along with your household work?	Yes, always..... 1 Yes, sometimes..... 2 No, never..... 3
217	Are you able to give [INDEX CHILD NAME] family food along with your household work?	Yes, always..... 1 Yes, sometimes..... 2 No, never..... 3
218	Do you feel that you have enough time to take good care of the child along with the household work?	Yes, always..... 1 Yes, sometimes..... 2 No, never..... 3
219	Some mother's tell us that they have a lot of work to do in one day and so they cannot find a moment for themselves. Now tell me do you have work pressure like this?	Yes, always..... 1 Yes, sometimes..... 2 No, never..... 3
220	Do you feel tense about finishing all of the work that you must do in 1 day?	Yes, always..... 1 Yes, sometimes..... 2 No, never..... 3

Part IV: Child Health and caring practice

No	Question	Response
301	When you were pregnant (Name of child, did you have any antenatal care checkup? If yes, how many times?	1 = yes 0 = no / --------/
302	Is the child depleting colostrum? (the first yellow milk)	1 = yes 0 = no
303	Is the child exclusively breastfed for the first six months?	1 = yes 0 = no
304	Duration of breast feeding (in month)	/ --------/
305	Age of complementary feeding started (in month)	/ --------/
306	Is the child fully immunized? If possible verify with the available	1 = yes 0 = no

	document	
307	Has (name of child) had diarrhea in the last two weeks?	1 = yes 0 = no 99 = don't know
308	Has (name of child) been ill at any time in the last two weeks?	1 = yes 0 = no 99 = don't know
309	Has (name of child) been ill a cough in the last two weeks?	1 = yes 0 = no 99 = don't know

Part V: Environmental Factors and Hygiene

No	Questions	response
401	What is your main water source?	1= pipe water 2 = public tap 3 = protected dug well 4 = protected dug well 5 = protected spring 6 = unprotected spring 7 = surface water 8 = other, specify----------
402	What kind of toilet facility do the house usually use?	1 =flush or pour flush 2 = ventilated improved pit latrine (VIP) 3 = pit latrine with slap 4 = pit latrine without slap/open pit 5 = no facility or bush/field

Part VI: HH Dietary diversity

First ask if yesterday was a special day, like a celebration or feast day or a fast day where anyone in the HH ate special foods or where they ate more or less than usual or did not eat because they were fasting.

Yes .....1 ☐
No 2

Was **yesterday** a special day where special kinds of foods were eaten?

If yesterday was **not** a special day, then ask the respondent about the types of foods that they or anyone else in their household ate yesterday during the day and at night.

If yesterday **was** a special day, then ask the respondent to describe the foods (meals and snacks) consumed the day before yesterday (or the last normal day up to 7 days) during the day and night, whether at home or outside the home.

No.	Questions	Eaten by respondent (Index Child's Mother)	Eaten by Index Child
501	CEREALS? Rice, bread made of wheat, puffed rice, injera, pressed rice, noodles, or any other	Yes……. 1 No……... 0	Yes……. 1 No……... 0

	foods made with rice, wheat, maize/corn, or other locally available grains		
502	Vitamin a rich vegetables and tubers? Pumpkin, carrots, sweet potatoes that are orange and yellow inside	Yes……. 1 No……... 0	Yes…….. 1 No……... 0
503	White tubers and roots or other starchy foods? Potatoes, white yams, white sweet potato (not orange inside), potato crisps or other foods made from roots (not orange or yellow roots)	Yes……. 1 No……... 0	Yes……. 1 No……... 0
504	Dark green leafy vegetables? Dark green leafy vegetables, including spinach, kale, costa,	Yes……. 1 No……... 0	Yes……. 1 No…….0
505	OTHER VEGETABLES? Other vegetables (e.g., squash, eggplant, green papaya, cauliflower, cabbage, onion, (beans),	Yes……. 1 No……... 0	Yes……..1 No.……0
506	Vitamin a rich fruits? Ripe mangoes, ripe papaya/	Yes……. 1 No……... 0	Yes……..1 No ……..……..0
507	other fruits Other fruits (e.g. banana, apples, guava, oranges, other citrus fruits, pineapple, watermelon, olives, grapes, (grapefruit) berries, , plum	Yes……. 1 No……... 0	Yes……..…1 No……..…..0
508	Beef, goat, lamb, chicken, duck or other birds, liver, kidney, heart, or other organ meats?	Yes……. 1 No……... 0	Yes……..……1 No……...…..0
509	EGGS? Eggs of different birds – chicken, duck, turkey etc.; with yolk, without yolk	Yes……. 1 No……... 0	Yes…….…...1 No.…….……0
510	FISH? Big/small fresh or dried fish or shellfish	Yes……. 1 No……... 0	Yes……1 No…….0
511	Any foods made from beans, peas, or lentils? Beans, peas, lentils, other pulses, soybeans, peas	Yes……. 1 No……... 0	Yes……..……1 No……..,……..0
512	Milk and milk products? Milk, cheese, yogurt or	Yes……. 1 No……... 0	Yes……..……..1 No…….……0

	other milk products		
513	Oils and fats? oil, fats or butter added to food or used for cooking including ghee	Yes……. 1 No……... 0	Yes…….……...1 No.…….0
514	SWEETS? Sugar, molasses, honey, cold drinks, chocolates, candies, biscuits	Yes……. 1 No……... 0	Yes……1 No…….0
515	Spices, condiments, beverages? Spices (cumin, coriander, salt), condiments (pickles, chutney), coffee, tea, etc.	Yes……..……. 1 No……... 0	Yes……1 No…….0

Part VIII: Anthropometry measurement (height, weight, muac, etc.)

Respondent: Index child				weight, height of index child			
Member ID	Name	DATE OF BIRTH (DD MM YYYY)	AGE (Months)	WEIGHT (KG)	HEIGHT (CM)	MEASURED STANDING UP OR LYING DOWN Lying…..…1 Standing…..2	RESULT Measured..... 1 Absent..... 2 Refused…… 3 Other..... 4

CHILD'S MUAC	RESULT Measured..... 1 Absent..... 2 Refused…… 3 Other..... 4

Annex 4: Questionnaire (Amharic Translation)

ክፍል አንድ፡ የቤተሰብ መረጃ

ተ.ቁ	ጥያቄ			
101	ክልል /-----/ /-----/			
102	ክፍለከተማ /-----/ /-----/			
103	ወረዳ /-----/ /-----/			
104	የቤትቁጥር /----/---/-----/----/			
105	ለቤተሰብመጠይቅመላሽ/እናት/ ስም	ስም		
106	የቤተሰብሀላፊስም	ስም		
107	ከአምስትዓመትበታችየሆኑህፃናትብዛት	ብዛት፡		
108	የተመረጠውህፃንስም	ስም፡ ፆታ፡ 0 = ሴት 1 = ወንድ		
109	የተመረጠውህፃንእድሜ	እድሜ /------/ /-----/ ወር		
110	ሀይማኖት (ከአምስትዓመትበታችለሆኑመላሾችአይመለከትም)	ኦርቶዶክስክርስቲያን = 1 ፕሮቴስታንት = 2 ካቶሊክ = 3 ሙስሊም = 4 ሌላ (ይገለፅ)---------- = 5 አይመለከተውም---------- = 6		
iii	መረጃ የተሰጠበት ቀን	ቀን	ወር	ዓ.ም

ክፍል ሁለት፡ የስራ ሁኔታና የህፃናት እንክብካቤ

ተ.ቁ.	ጥያቄ	ኮድ
201	የትዳርሁኔታ?	ያገባ/ያገባች---------- = 1 ያላገባ/ያላገባች አብሮየሚኖር---------- = 2 ባለቤትየሞተባት/በት---------- = 3 የተፋታች/ታ---------- = 4 የተለየች/የ---------- = 5 ከአንድበላይየትዳርጓደኛያላት/ለው-------- = 6
202	የባለቤትዎዋናስራ?	ገበሬ---------- = 1 ቋሚተቀጣሪ---------- = 2 ጊዚያዊ---------- = 3 የጉልበትስራ---------- = 4 የሙያስራ---------- = 5 ነጋዴ---------- = 6 ሌላየግልስራ---------- = 7 የቤትውስጥስራ---------- = 8 ተማሪ---------- = 9 ጡረተኛ---------- = 10 አካልጉዳትኛ---------- = 11 ስራአጥ---------- = 12 ሌላይገለፅ---------- = 13

203	ማንበብና መፃፍ ይችላሉ?	አዎ ማንበብና መፃፍ---------- = 1 አዎ ማንበብ---------- = 2 ማንበብና መፃፍ አልችልም---------- = 3
204	በአሁኑ ወቅት ከቤት ውስጥ ስራ ውጪ የተለየ ሌላ ስራ አለዎት?	አዎ---------- = 1 የለም---------- = 2
205	የእርስዎ ዋና ስራ ምንድን ነው?	ገበሬ ወይም የቤተሰብ ግብርና ስራ---------- = 1 ቋሚ ተቀጣሪ---------- = 2 ጊዚያዊ ተቀጣሪ---------- = 3 የጉልበት ስራ---------- = 4 የሙያ ስራ---------- = 5 ነጋዴ---------- = 6 ሌላ የግል ስራ---------- = 7 የቤት ውስጥ ስራ/የቤት እመቤት---------- = 8 ተማሪ---------- = 9 ጡረተኛ---------- = 10 አካል ጉዳተኛ---------- = 11 ስራ አጥ---------- = 12 ሌላ የገለፅ---------- = 13
206	ስራዎን የሚሰሩት በቤትዎ ውስጥ ነው ወይንስ ከቤትዎ ውጪ?	እቤት---------- = 1 ከቤት ውጪ---------- = 2 ሁለቱም---------- = 3
207	በሳምንት ምን ያህል ቀን ከቤት ውጪ ይሰራሉ?	ቀናት----------
208	ከቤት ውጪ ሲሰሩ ህፃን (ስም) አብረው ይወስዳሉ ወይንስ ሌላ ሰው እንክብካቤን ይሰጣል?	ሁልጊዜ አብረው ይወስዳሉ---------- = 1 ሁልጊዜ ለሌላ ሰው ይሰጣሉ---------- = 2 ሁለቱም---------- = 3 አይመለከተውም---------- = 98
209	በዓማካኝ በሳምንት ስንት ቀን ልጅዎን ለሌላ ሰው ሰጥተው ይሄዳሉ?	ቀን በሳምንት---------- ቀን በወር----------
210	በአማካኝ በየጊዜው ለምን ያህል ሰዓት ነው ልጅዎን ለሌላ ሰው ሰጥተው የሚሄዱት?	ሰዓት----------
211	ላለፉት 24 ሰዓት ውስጥ ልጅዎን ሳይዙ ከቤት ወጥተው ነበር?	አዎ---------- = 1 የለም---------- = 2
212	ለምን ያህል ሰዓት ህፃኑን ትተውት ሄዱ?	ሰዓት፡--------- ደቂቃ፡--------
213	ህፃኑ የት ነበር?	እቤት---------- = 1 ጎረቤት---------- = 2 ሌላ የገለፅ---------- =3
214	በቤት ውስጥ ስራ በሚሰሩበት ጊዜ ልጅዎ ከእርሰዎ ጋር ነው?	አዎ---------- = 1 የለም---------- = 2
215	መልሰዎ አይደለም ከሆነ ህፃኑን ማን ይንከባከበዋል?	ከ15 ዓመት በላይ የሆነ የቤተሰብ አባል----------1 ከ15 ዓመት በላይ የሆነና የቤተሰብ አባል ያልሆነ----------2 ከ15 ዓመት በታች የሆነ የቤተሰብ አባል----------3 ከ15 ዓመት በታች የሆነና የቤተሰብ አባል ያልሆነ----------4
216	የቤት ስራዎን እየሰሩ የጡት ወተት ለተመረጠው ህፃን መስጠት ይችላሉ?	አዎ ሁልጊዜ---------- = 1 አዎ አንዳንዴ---------- = 2 የለም---------- = 3
217	የቤት ስራዎን እየሰሩ ህፃኑን ምግብ ለመመገብ በቂ ጊዜ እንዳለዎት ይሰማዎታል?	አዎ ሁል ጊዜ---------- = 1 አዎ አንዳንዴ---------- = 2 የለም---------- = 3
218	ለተመረጠው ህፃን ለመንከባከብ ከቤት ስራዎ ጋር በቂ ጊዜ እንዳለዎት ይሰማዎታል?	አዎ ሁል ጊዜ---------- = 1 አዎ አንዳንዴ---------- = 2 የለም---------- = 3
219	አንዳንድ እናቶች እንደሚነግሩን በቀን ውስጥ ብዙ ስራ መስራት ስላለብን ለራሳችን ጊዜ የለንም ይላሉ:: አሁን እርስዎ የሚነግሩን የስራ ጫና አለብዎት?	አዎ ሁልጊዜ---------- = 1 አዎ አንዳንዴ---------- = 2 የለም---------- = 3

220	በአንድ ቀን ውስጥ መሰራት ያለበትን ስራ ለማጠናቀቅ የመጨነቅ ስሜት ተሰምቶዎት ያውቃል?	አዎ ሁልጊዜ---------- = 1 አዎ አንዳንዴ---------- = 2 የለም---------- = 3

ክፍል ሦስት፡ የህፃኗ/ኑጤና ሁኔታ

ተ.ቁ	ጥያቄ	ኮድ
301	(የህፃን ስም) እርጉዝ በነበሩበት ወቅት የእርግዝና ክትትል አግኝተው ነበር? አዎ ከሆነ ስንት ጊዜ?	አዎ---------- = 1 የለም---------- = 0 ብዛት---------- አላውቅም---------- = 98
302	ለህፃኑ የመጀመሪያ የእናት ጡት ወተት (እንገር) ሰጥተውት ነበር?	አዎ---------- = 1 የለም---------- = 0
303	ለመጀመሪያ ስድስት ወር ህፃኑ ጡት በደንብ ጠብቷል?	አዎ---------- = 1 የለም---------- = 0
304	ህፃኑ ለምን የህል ጊዜ ጡት ጠብቷል?	/-------/
305	ለህፃኑ በስንተኛው ወር ነው ተጨማሪ ምግብ መስጠት የጀመሩት?	/----------/
306	(የህፃኑ ስም) ሁሉንም ክትባቶች ተከትቧል? ከተከተበ ካርዱን ሊያሳዩኝ ይችላሉ?	አዎ---------- = 1 የለም---------- = 0 ታይቱዋል---------- = 3 አልታየም---------- = 4
307	(ስም) ባለፉት 2 ሳምንት ውስጥ ተቅማጥ ይዞት ነበር?	አዎ---------- = 1 የለም---------- = 0 አላውቅም---------- = 99
308	(ስም) ባለፉት 2 ሳምንት ውስጥ በማንኛውም ጊዜ ታሞ ነበር?	አዎ---------- = 1 የለም---------- = 0 አላውቅም---------- = 99
309	(ስም) ባለፉት 2 ሳምንት ዉስጥ ሳል ይዞት ነበር?	አዎ---------- = 1 የለም---------- = 0 አላውቅም---------- = 99

ክፍል አራት፡ የቤተሰቡ ውሃ ማግኛ ቦታና ንፅህና

ተ.ቁ	ጥያቄ	ኮድ
401	ቤተሰቡ የሚጠጣው ውሃ ዋና ምንጭ ከየት ነው?	ከቤት ውስጥ ቧንቧ---------- = 1 ግቢ ውስጥ ካለ ቧንቧ---------- = 2 ከግቢ ውጭ ካለ ቧንቧ/ቦኖ---------- = 3 የተጠበቀ የጉድጓድ ውሃ---------- = 4 የተጠበቀ ምንጭ---------- = 5 ያልተጠበቀ ጉድጓድ---------- = 6 ያልተጠበቀ ምንጭ---------- = 7 ወንዝ---------- = 8 ኩሬ---------- = 9 ከዝናብ ውሃ---------- = 10 ሌላ ካለ ይገለፅ---------- = 11
402	ቤተሰቡ ምን ዓይነት ሽንት ቤት ነው የሚጠቀመው?	በውሃ የሚወርድ ሽንት ቤት---------- = 1 የተሸለ ማስተንፈሻ ያለው ደረቅ ሽንት ቤት---------- = 2 ደረቅ ሽንት ቤት---------- = 3 ክዳን ያለው ሽንት ቤት---------- = 4 የለም በሜዳ ላይ ወይም በጫካ---------- = 5

ክፍል አምስት፡ የቤተሰብ አመጋገብ

በመጀመሪያ ቀኑ ልዩ ቀን መሆኑን ጠይቅ ማለት ለየት ያለ ክብር በዓል፤ የአፅዋማት ቀን መሆኑን፤ ከተለመደው የአመጋገብ ሁኔታ ያነሰ ወይም የበለጠ የተመገቡ መሆኑን ወይም ይህ ሊሆን የቻለው እየፆሙ መሆኑን ጠይቅ፡፡

501፡ ትናንት ምርጥ ማዕድ ቀርቦ የሚበላበት ቀን ነበር?

አዎ = 1

የለም = 0

የትናንትና ምርጥ ማዕድ ቀርቦ የሚበላበት ቀን ካልሆነ የቀረው የቤተሰብ አባላት በትናንትናው ቀን እና ማታ የተመገቡትን ጠይቅ?

የትናንትና ቀን ለየት ያለ ቀን ከሆነ ተጠያቂው ከትናንትና በፊት ወይም ላለፉት ሰባት ቀናት የተመገቡት ምግብ በቤት ውስጥም ሆነ ከቤት ውጪ እንደሆነ እንዲገልፁልህ/እንዲዘረዝሩልህ ጠይቅ?

ተ.ቁ	ጥያቄ	የተጠያቂው እናት የበሉት	የተመረጠው ህፃን የበላው
501	ጥራጥሬ? ሩዝ፤ስንዴ፤ ዳቦ፤ እንጀራ፤ ፓስታ፤ በቆሎ ወይም በአካባቢ የሚበቅል ጥራጥሬ	አዎ = 1 የለም = 0	አዎ = 0 የለም = 0
502	በቫይታሚን ኤ የበለፀጉ አትክልትና ድንች ዝርያ? ዱባ፤ ካሮት፤ ስኳር ድንች፤ ውስጣቸው ብርቱካናም ወይንም ቢጫ የሆነ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
503	ነጭ ድንች ዝርያ እና ስራስር ወይንም የእስታርች ምግቦች? ድንች፤ ነች ስኳር ድንች፤ (በውስጣቸው ብርቱካናማ የሌላቸው) የደረቁ ድንች ወይም ከሌሎች ብርቱካናማ ቢጫ ያልሆኑ ስራስሮች የተዘጋጁ ምግቦች	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
504	ጥቁር አረንጓዴ የሆኑ ቅጠላማ አትክልቶች እንደ ስፒናች (ቆስጣ አይነት)?	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
505	ሌሎች አትክልቶች? ሌሎች ቅጠላቅጠሎች (ምሳሌ ደበርጃን፤ አረንጓዴ ፓፓያ፤ አበባ ጎመን፤ ሽንኩርት)	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
506	በቫይታሚን ኤ የበለፀጉ ፍራፍሬዎች? የበሰለ ማንጎ፤ ፓፓያ፤ ፓውፓው	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
507	ሌሎች ፍራፍሬዎች? (ምሳሌ ሙዝ፤ አፕል፤ ብርቱካን፤ አናናስ፤ የወይራ ዘይት፡ ሱሰኒ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
508	ማንኛውም የበሬ ስጋ፤ የፍየል ስጋ፤ የዶሮ ስጋ፡ ዳክዬ ወይም የአእዋፍ ዘር ጉበት፤ ኩላሊት ወይም ሌላ የእንስሳ ሰውነት ክፍል?	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
509	እንቁላል? የተለያዩ የአዋፍ እንቁላል፤ የዶሮ፤ የዳክዬ፤ የተርኪ ዶሮ ወዘተ ከነአስኳሉ ወይም አስኳል የለለው	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
510	አሣ? ትንሽ/ትልቅ የሆነ ትኩስ፤ ደረቅ ወይም ከነቅርፊቱ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
511	ማንኛውም ከባቄላ፤ አተር ወይም ምስር፤ አደንጓሬ፤ ሌላ የቅባት አህል የሚሰራ ምግብ?	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
512	ወተት ወይም የወተት ተዋፅዖ?	አዎ = 1	አዎ = 1

	ወተት፤ ዓይብ፤ እርጎ ወይም ሌሎች የወተት ውጤቶች	የለም = 0	የለም = 0
513	ዘይትና ቅባት? ስብ ወይም ቅቤ የተጨመረበት ምግብ ወይም ለምግብ የሚሆን የበሰለ ቅቤ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
514	ጣፋጭ ነገሮች? ስኳር፤ ሞላሰስ፤ ማር፤ ለስላሳ መጠጦች፤ ቸኮሌት፤ ከረሜላ፤ ብስኩት	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0
515	ቅመማ ቅመም፤ ማጣፈጫ መጠጦች? ቅመሞች፡ ጨው ማጣፈጫ ቡና፤ ሻይ ወዘተ	አዎ = 1 የለም = 0	አዎ = 1 የለም = 0

ክፍል ስድስት፡ የቤተሰብ የኢኮኖሚ ሁኔታና ንብረት

ተ.ቁ	ጥያቄ	ኮድ
601	የምትኖሩበት ቤት ይዞታው የማን ነው?	የግል ቤት---------- = 1 የኪራይ ቤት---------- = 2 በነፃ የተገኘ ቤት---------- = 3 ሌላ ካለ የገለፅ---------- = 4
602	የጓሮ አትክልትና ፍራፍሬ ታበቅላላችሁ?	አዎ---------- = 1 የለም---------- = 2
603	መልሰዎ አዎ ከሆነ ምርቱን እንዴት ይጠቀሙበታል?	ሁሉንም እሸጠዋለሁ---------- = 1 በከፊል እሸጠዋለሁ---------- = 2 ሁሉንም ለቤት ውስጥ ጥቅም አውለዋለሁ-- =3 ሌላ ካለ ይገለፅ---------- = 4
604	ቤተሰቡ ኤሌትሪክ ኃይል ይጠቀማል?	አዎ---------- = 1 የለም---------- = 2
605	ሌላ አይነት የኤሌትሪክ አገልግሎት ያገኛሉ? መልሰዎ አዎ ከሆነ ምን አይነት ኤሌትሪክ?	ጀኔረተር---------- = 1 ሶላር/በፀሃይ የሚሰራ---------- = 2 ሌላ ካለ ይገለፅ---------- = 3
606	በአብዛኛው ቤተሰቡ ምግብ ለማብሰል ምን አይነት የሀይል ምንጭ ይጠቀማል?	ኤሌትሪክ---------- = 1 የሲሊንደር ቡታጋዝ---------- = 2 ከተፈጥሮ ጋዝ---------- = 3 ከባዮ ጋዝ---------- = 4 ነጭ ጋዝ---------- = 5 ከሰል---------- = 6 እንጨት---------- = 7 የከብት እዳሪ---------- = 8 ሌላ ካለ ይገለፅ---------- = 9
607	/ምልከታ/ የዋናው ቤት ወለል የተሰራበት ቁስ ምን ይመስላል?	አፈር---------- = 1 ቀርቀሃ ሳጠራ---------- = 2 ሲሚንቶ---------- = 3 ሽክላ ንጣፍ---------- = 4 ሌላ ካለ ይገለፅ---------- = 5
608	/ምልከታ/ የዋናው ቤት የውጭ ግድግዳ የተሰራበት ቁስ ምን ይመስላል?	ግድግዳ የለውም---------- = 1 ከጭቃና እንጨት /ሳር/ ቅጠል የተሰራ--- = 2 ባህላዊ ከድንጋይ የተሰራ---------- = 3 የድንጋይ፤ የእንጨት፤ የቆርቆሮ---------- = 4 ሌላ ካለ ይገለፅ---------- = 5
609	/ምልከታ/ የቤቱ ጣራ የተሰራበት ቁስ ምን አይነት ነው?	ጣራ የለውም---------- = 1 ሳር፤ ቅጠል፤ ላስቲክ፤ ቀርቀሃ---------- = 2

		ብረት፤ እንጨት፤ ቆርቆሮ፤ድንጋይ፤ ሲሚንቶ፤ አፈር---------- = 3 ሌላ ካለ ይገለፅ---------- = 4

ክፍል ሰባት፡ አጠቃላይ የተከለሰውነትልኬት (ክብደት፡ ቁመት፡ ክንድ፡ ወዘተ)

የተመረጠው ህፃን				የተመረጠው ህፃን ቁመትና ክብደት			
አባላትቁጥር	ስም	የተወለደበት ቀን (ቀንወርዓ.ም)	እድሜ (በወር)	ክብደት (ኪሎ)	ቁመት (ሴ.ሜ)	ቆመውወይምተኝተውየተለኩ ተኝተው…..…1 ቆመው…..2	ውጤት ተለክቷል.....= 1 አልተገኙም….= 2 አልፈለጉም.....= 3 ሌላካለይገለፅ…..= 4
	1ኛልኬት						
ተመሳሳይ	2ኛ ልኬት						
የህፃኑ የክንድ ልኬት (ሙዋአከ)				<u>ልኬት</u>			ውጤት ተለክቷል.....= 1 አልተገኙም….= 2 አልፈለጉም.....= 3 ሌላካለይገለፅ…..= 4