



**INDIRAGANDHINATIONALOPENUNIVERSITY
SCHOOL OF SOCIAL SCIENCES
FACULTY OF ECONOMICS**

**RELATIONSHIP BETWEEN HOUSEHOLD FOOD
SECURITY AND NUTRITIONAL STATUS OF CHILDREN
UNDER FIVE IN TIGRAI: THE CASE OF KLTEAWLAELO,
TIGRAI, ETHIOPIA**

**Project- Report
(MECP-001)**

By

**Aberash Tadelle Gebru
Enrolment No. 099120790
Study Centre: St. Mary's University College,
Addis Ababa, Ethiopia**

**Submitted to: Programme Coordinator
M.A. Economics Programme
Room no. 118, Block 'F'
School of Social Sciences
IndiraGandhiNationalOpenUniversity
MaidanGarhi
New Delhi-110 068**

**May 2014
Ethiopia**



THESIS

Candidate's Information Date: May 2014

Name: Aberash Tadelle Gebru

.Course Code: MECP - 001

Programme Code: MEC

Enrolment No.

0	9	9	1	2	0	7	9	0
---	---	---	---	---	---	---	---	---

Address: Mekelle Ethiopia

Regional Centre: Ethiopia

Study Centre Name: St. Mary's University College

Study Centre Code

8	1	0	5
---	---	---	---

Title of the Project: RELATIONSHIP BETWEEN HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS OF CHILDREN UNDER FIVE IN TIGRAI: THE CASE OF KLTE AWLAELO, TIGRAI, ETHIOPIA

Project work submitted to the Indira Gandhi National Open University in partial fulfillment of the requirements for the award of the Degree-Master of Arts (Economics). I hereby declare that this work has been done by me and has not been submitted elsewhere.

Signature of the Candidate: -----

Name of the Candidate: **Aberash Tadelle Gebru**

CERTIFICATE

I hereby certify that the Project entitled “Relationship between Households Food Security and Nutritional Status of Children under Five in Tigrai: The Case of Klte awlaelo, Tigrai, Ethiopia” by Aberash Tadelle Gebru has been done under my supervision. It is recommended that this project be placed before the examiner for evaluation.

(Signature of the Supervisor)

Name: NEGUSSIE SEMIE

Designation: Assistant Professor (Ph.D)

Address: Addis Ababa, Ethiopia

E-mail: nsemie@yahoo.com

DEDICATION

To my family: for their abundant support, for their patience and understanding, and for their love.

STATEMENT OF AUTHOR

This thesis is the result of my independent investigation. Where my work is indebted to the work of others, I have made appropriate acknowledgements. I declare that this study has not already been accepted for any other degree nor is it currently being submitted in candidature for any other degree. Therefore, I affirm that this thesis is my work and that all sources of materials used for this thesis have been duly acknowledged. Hence, this thesis is submitting in partial fulfillment of the requirements for my M.A degree at the Indira Gandhi National Open University (IGNOU).

Name:	Date	Signature
Aberash Tadelle Gebru	_____	_____
Place: Mekelle, Ethiopia	Date of submission: _____	

BRIEF BIOGRAPHY

The researcher Aberash Tadelle, was born in Mekelle on August 8, 1979. She attended her primary and secondary school in Kasatie Brhan Primary School and Atse Yohhanes Secondary School respectively. She got her Bachelor Degree in Economic from Mekelle University in March 2002. After her graduation, she joined Women's Association of Tigray as planning and programming expert. Then, she worked in different organizations such as Tigray Food Security Coordination Office, as monitoring and evaluation officer, and in Millennium Cities Initiative (MCI): The Earth Institute at Columbia University, as Social Sector Specialist. While she works in MCI, she joined School of Graduate Studies at IGNOU, Department of Economics on June 2010.

ACKNOWLEDGEMENTS

Designing and implementing this project presented a number of challenges. This project has also helped me to grow professionally and got knowledge of different soft wares. I also have the privilege to work and interact with treasured individuals; without whom this project would never have been accomplished successfully. I would like to express my sincere appreciation to everyone who helped me in various ways.

Special thanks to my advisor Nugussie Semie: Assistance Professor (Ph.D) for his guidance and encouragement. I would also like to express gratitude to the district Food Security Project Office and Health Office. Their input and positive criticisms were pivotal to the success of this thesis.

My special thanks and heart-felt appreciations go to my family for their support through out my study. Finally yet importantly, I am very grateful to my husband for his encouragement and editing the final draft.

ACRONOMY

CDD:	Community Driven Development
FAO:	Food and Agriculture of the United Nations
LBW:	Low Birth Weight
MDGs:	Millennium Development Goals
MUAC:	Mid Upper Arm Circumference
NCHS:	National Center for Health Statistical
SSA:	Sub-Saharan Africa

TABLE OF CONTENT

	Page
1. INTRODUCTION	1
1.1 General background.....	1
1.2 Statement of the Problem.....	3
1.3 Objectives of the Study.....	5
1.4 Research Questions.....	5
1.5 Significant of the Study	5
1.6 Scope and Limitation of the Study	6
1.7 Organization of the Thesis.....	6
2. LITERATURE REVIEW	8
2.1 Definition of Nutrition	8
2.2 Relationship of Food Security and Nutrition	8
2.3 An Economic Frame Work for Considering the Consequences of Malnutrition	11
2.3.1 Human Capital Theory	11
2.3.2 Initial Human Capital Endowments	14
2.3.3 The Role of Education in Human Capital Formulation	15
2.3.4 Nutrition as Human Capital and Household Production Inputs	17
2.3.5 Women’s Education and Child Nutrition	19
2.3.6 Women’s Employment and Child Nutrition	21
2.3.7 Prevalence of Malnutrition in Tigray	21
2.3.8 Conceptual Framework	24
3. THE STUDY AREA & RESEARCH METHODOLOY.....	29
3.1 Description of the Study Area.....	29
3.2 Research Methodology.....	33
3.2.1 Sample and Sampling Techniques	33
3.2.2 Methods of Data Collection and Sources of Data.....	33
3.2.3 Methods of Data Analysis	34

4. RESULTS AND DISCUSSIONS	35
4.1 Nutritional Status of Children	36
4.2 Prevalence of Malnutrition in Food Secured & Unsecured Household....	38
4.2.1 Malnutrition and Food Secured Households.....	38
4.2.2 Malnutrition and Food Unsecured Households	42
4.3 Level of Knowledge of Mothers in Food Secured Households	48
4.3.1 Educational Background of Mothers	48
4.3.2 Awareness Raising Trainings and Mothers	52
4.4 Level of Knowledge of Mothers in Food Unsecured Households.....	53
4.4.1 Educational Background of Mothers	53
4.4.2 Awareness Raising Trainings and Mothers.....	55
5. CONCLUSION AND RECOMMENDATIONS	58
5.1 Conclusion	58
5.2 Recommendations	62

The Reference Materials and Appendices

1. REFFERENCES
2. APPENDIX A & B

LIST OF TABLES AND FIGURES

	Page
Table 1: Summary table on wasting, stunting and under weight for food secured households.....	48
Figure 1: Stunting, wasting and underweight among children under five years by mother’s education.....	20
Figure 2: Nutritional Indices of Ethiopian children 3-59 months of age, both sexes...	23
Figure 3: Stunting and wasting among children under five years by region, Ethiopia.....	24
Figure 4: Conceptual frameworks of the determinants of Child nutritional status.....	26
Figure 5: Prevalence of acute malnutrition based on weight-for-height z-scores (and /or oedema) and by sex	39
Figure 6: Based on weight for height	40
Figure 7: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema	40
Figure 8: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex	41
Figure 9: Total over view on wasting, stunting and under weight for food secured households	42
Figure 10: Prevalence of acute malnutrition based on weight-for-height z-scores (and /or oedema) and by sex	43
Figure 11: weight for height z-score	44
Figure 12: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema, 0% prevalence of oedema	44
Figure 13: Prevalence of acute malnutrition by age, based on MUAC cut off s &/or oedema	45
Figure 14: Prevalence of underweight by age, based on weight -for-age z –scores	46
Figure 15: Prevalence of stunting by age based on height -for-agezscores.....	47
Figure 16: Preparation of separate dish by education of mothers’.....	49
Figure 17: First milk by education of mothers’	50
Figure 18:knowledge on the consequences of nutrients by of mothers’ education.....	51
Figure 19: Time of baby breast-feeding by mothers’ education	52
Figure 20: Preparation of separate dish by education of mothers for food unsecured.....	53
Figure 21: First milk or colostrums by education of mothers’.....	54
Figure 22: knowledge on the consequences of nutrients and education of mothers’.....	55

Abstract

Nutrition is very essential for the development of our body that required to be considered in the national food security indicators. Good health can be preserved and promoted mostly by the right kind of food. One of the major constraints to the development of human capital and capacities is the impact of loss of human potential; both physical and mental, due to poor childhood nutrition. However, the most common types of assets owned such as household equipments, number of livestock, and the availability of cereals in kilograms and so on have been used as basic national food security indicators. These criteria should not exclusively use national food security indicators. In this regard UNCEF (2005) stated that “For every operation that WFP undertakes, it has to establish what type and quantity of food people need. It is not just a question of providing food, but also making sure what arrives is nutritionally appropriate to address the problem at hand”. The main purpose of this study was then to identify the causes of malnutrition under five children and the indicators that should be considered at national level to decide the well-being of the rural households. Further more, the study was designed to show the nutritional status of children shouldn't be measured only by the availability of food and other basic household possessions. To prove this, the researcher includes 120 households, which is 60 households per villages: 120 mothers were interviewed, and their under five (2-3) children were measured using Mid Upper Arm Circumference (MUAC) to check their nutritional status. Regarding data collection, both primary and secondary data gathering methods were used. The data obtained through these instruments was analyzed using the recent version of ENA soft ware and SPSS version 19. The findings using SPSS shows the existence of severe level malnutrition in both food secure and non-secure household. Mainly, the findings using MUAC shows 34.5% of the surveyed children have global malnutrition, 29.3 % have moderate malnutrition, and 5.2% have severe malnutrition in the food secured households. Similarly, using the same measurement MUAC for the food unsecured households, 35% of the sample populations have global malnutrition, 15.8% have severe malnutrition and 45.3% have moderate malnutrition. The study, therefore, shows that the national food security indicators should include the top determinants of nutritional status of children such as mothers' educational background, their level of knowledge on breast-feeding, their awareness on type of food nutrients, education of their children, and their participation on community education.

1. INTRODUCTION

1.1 General Background

Worldwide malnutrition is an underlying cause in the deaths of more than 3.5 million children under the age of 5 year. Some 13 million infant are born each year with low birth weight (LBW). Fifty-five million children are wasted, and of these 19 million are severely wasted. About 178 million children around the World are stunted. Of the estimated 178 million, 90 percent live in 36 countries, one of which is Ethiopia (Government of the Federal Democratic Republic of Ethiopia, National Nutrition Programme, 2013-2015). Ethiopia has witnessed encouraging in reducing malnutrition over the past decade. However, baseline level of malnutrition remains so high that the country must continue to make significant investment in nutrition.

Malnutrition is one of the biggest health problems that the world currently faces and is associated with more than 41% of the deaths that occur annually in children from 6 to 24 months of age in developing countries which total approximately 2.3 million. World Health Organization in 2001 reported that 54% of all childhood mortality was attributable, directly or indirectly, to malnutrition. Sub-Saharan Africa has a high prevalence of the different types of malnutrition, namely stunting, wasting and underweight (Quadri Jelili Akorede1 & Ojure Mujitaba Abiola, 2013)

Ethiopia is one of those developing countries with high prevalence of child malnutrition and enteric infections. Under-five mortality is among the highest in the World (ranking 16th) with a magnitude of 177/1000 Malnutrition affects millions of people around the World. A third of deaths in children under the age of 5 in developing countries are linked to under nutrition (Ethiopian Health and Nutrition Research Institute Addis Ababa, 1997).

Forty-seven percent of children under five are stunted and 24 percent are severely stunted. Eleven percent of children under five are wasted and two percent are severely wasted. The weight forage indicator shows that 38 percent

of children under- five are underweight and 11 percent are severely underweight (Central Statistical Agency Ethiopia and ORC Macro, 2006 Ethiopia Demographic and Health Survey 2005).

The most important documented form of malnutrition in Ethiopia is protein energy malnutrition and vitamin A, iodine, iron and zinc deficiencies. Child malnutrition in Ethiopia constitutes particularly daunting challenge as the country had a 17% under-five mortality rate in 2001 of which an estimated 57% was linked to severe and mild to moderate malnutrition. The most recent national data showed that 41% and 11.6% of the under five children were below -2 Z-scores for height for age, weight for age and weight for height, respectively (Afewerk Mulugeta, 2006)

Of the nearly 1.9 billion children in the developing World, 31% are stunted. Despite the continued progress in all the developing countries, it is still predicted that there will be 128-155 million underweight children by the 2020 with 35% of these children to be from Sub- Saharan Africa (Ibid).

However, adequate nutrition is critical to child development. The period from birth to two years of age is important for optimal growth, health and development, especially since it is during this period that children are particularly vulnerable to growth retardation, micronutrients deficiencies, and common childhood illnesses such as diarrhea and acute respiratory infections (Central Statistical Agency Ethiopia and ORC Macro. 2006, Ethiopia Demographic and Health Survey 2005).

Malnutrition gets worse as the children grow older. The energy and nutrient density of the complementary foods are low as the foods were prepared from a limited number of local staple cereals without the addition of sugar, fats/oil or animal products. More importantly, these foods are diluted with water to reduce their viscosity. This makes the quality and quantity of the foods insufficient to prevent stunting.

Nutritionists are increasingly aware that the condition is multifaceted and is not just a problem of food shortage. It is increasingly being realized that malnutrition is a result of more complex big social and behavioral determinants that affect child feeding and rearing. Malnutrition will continuous to be a problem of considerable magnitude in most of the developing countries of the World.

The relationship between stunting and wealth status is not uniform though children in the highest wealth quintile are least likely to be stunted compared with those in the low wealth quintiles.

For every operation that WFP undertakes, it has to establish what type and quantity of food people need. It is not just a question of providing food, but also making sure what arrives is nutritionally appropriate to address the problem at hand'' (A UNCEF REPORT, 2005).

This is therefore a thesis research proposal that intends to identify the factor that causes malnutrition at the household level and the indicators that should consider at national level to decide the status of well-being at household.

1.2 Statement of the Problem

Optimal nutritional status is the state where the body gets all the nutrients that provide good health and optimal utilization. Presence of problem like inadequate food intake, infectious and parasitic diseases, and adverse environmental factor often associated with poverty cause low nutritional status and therefore, prevent people from realizing their full growth.

Similarly, malnutrition is a state in which the physical functions of an individual is impaired to the point where she/he can no longer maintain an adequate level of performance at such things as physical work, resisting or recovering from effects of disease, maintaining an adequate level of growth or the process of pregnancy or lactation. Nutritional status is therefore a sensitive

indicators of health status and nourishment levels of a population (Toroitich-Ruto, 1998, Madise and Mpoma, 1997 and Matthews)

High quality (nutrient –dense) foods are crucial because of children’s growth demands and the small size of their stomach. It is not just a matter of important whether a family has food, but whether the family knows and is able to give a child food of sufficient nutritional quality. In recent years, the multi-factorial nature of malnutrition has recognized.

It is not just the result of energy and/or protein deficits but also a combination of vitamin and minerals deficiencies. While nutrition and food security have always addressed differently in the past, it is imperative that intervention measures takes into account the close links between the two issues in order that quality of life is improved.

The contradictions between the rich resources and the poor health and nutritional status of children under- five years of age are a concern to the government. Hence there is need to study to identify some of the underlying factors associated with child nutrition.

This research study is; therefore, to identify the factor that causes malnutrition at the household level and the indicators that should consider at national level to decide the well-being and welfare. In addition, the research tries to identifying the determinants of child nutritional status and its impact on their future physical and mental development of the children. Moreover, the study will examine the feeding habit of the population. It will finally come up with recommendations that are supposed to improve the nutritional status of children at household level and there by improve the impact of food security programs on nutrition.

1.3 Objectives of the Study

➤ General Objective

The general goal of the study is to identify the factor that causes malnutrition at the household level and the indicators that should consider at national level to decide the well-being and welfare at household level.

➤ Specific objective

- To identify the variables which causes malnutrition of under-five children at household level
- To evaluate the trends of the nutritional status of children under five, from the food security monitoring /impact indicators; and
- To see that household food security indicators shows the well-being of children at household level.

1.4 Research Question

- What are the determinants that affect the child nutrition at household level?
- Does the approach of food security program address the problem of child nutrition?

1.5 Significant of the Study

The existing food security indicators are the household possessions like livestock (number of oxen, cows, sheep, and goats), chairs, tables etc. However, the household possessions as food security did not show the nutritional status of children under five. This study will attempt to give answers to the question what are the determinants that affect the child nutrition at household level? Does the approach of food security program address the problem of child nutrition?.

The findings of this study will therefore have important role to understand the gap of the existing national food security indicators and there in helps the designer of the program to incorporate the factors that affect the nutritional status of children at the household level.

1.6 Scope and Limitation of the Study

Due to the financial constraint, the study cover one woreda, which is food security supported. But to minimize the information gap of taking small sample, the researcher include two *Tabia* (village) from the study areas. Namely: Negashi and Adiksanded. However, the study could be applicable for the other food security project supported woreda in Tigray.

1.7 Organization of the Thesis

The rest of the thesis is organized as follows: Chapter two concerned with review literature on definition of nutrition, relationship of food security and Nutrition, and an Economic Frame Work for Considering the Consequences of malnutrition to bring the reader in to the same level of understanding. Further more, this chapter give a brief about the human capital endowment and nutrition, women's employment and/or education and child nutrition to show their association with the nutritional status and educational background of children under five.

Chapter three emphasized on data collection methodologies, description of the study area, sampling size, type of data used, data analysis techniques. Chapter four presented the data presentation and analysis part. The explanations presents in the form of tables and figures were presented and the data presented under chapter four analyzed ENA recent soft ware and SPSS version 19.0 using cross tabulation. Finally chapter five is the final main body of the thesis which presented the conclusion and recommendation part. Under the conclusion, the researcher put the general summery in precise way. In the recommendation part the researcher presents factors need to be consider in the

national food security indicators such as mothers education, level of knowledge of mother on importance of breast feeding, importance of feeding different type of food, nutrition and educational background of child, community education , maternal employment etc ,

2. LITERATURE REVIEW

2.1 Definition of Nutrition

Nutrition is the provision of adequate energy and nutrients (in terms of amount, mix, and timelines) to the cell for them to perform their psychological function (of growth, reproduction, defense, repaired). Good nutrition can help prevent disease and promote health. There are six categories of nutrients that the body needs to acquire from food: protein, carbohydrate, fat, fiber, vitamins and minerals.

2.2 Relationship of Food Security and Nutrition

In the past, malnutrition thought to be a medical problem with a single cause of protein deficiency. The protein gap thought to be the most widespread nutritional problem and cured by high-protein foods. By the mid-seventies, energy intake became a key issue as the interaction between energy and protein was recognized. This raised social and economic issue around access to food by the poor, and malnutrition was no longer viewed just as a medical problem to be treated. Poverty and the condition associated with it were recognized as the overriding causes of malnutrition (EDPPC 2002).

Food insecurity and malnutrition are results in catastrophic amount of human suffering. The World Health Organization estimates that approximately 60 percent of all childhood deaths in the developing world are associated with chronic hunger and malnutrition. In developing countries, persistent malnutrition leaves children weak, vulnerable, and less able to fight such common childhood illnesses as diarrhea, acute respiratory infections, malaria and measles. Even children who are mildly to moderate malnourished are at greater risk of dying from these common diseases (Robinson et al. 2010)

Food insecurity may also result in severe social, psychological and behavioral consequences. Food insecurity individuals may manifest feelings of alienation,

powerlessness, stress and anxiety, and they may experience reduced productivity, reduced work and school performance, and reduce income earnings. Household dynamic may become disrupt because of a preoccupation with obtaining food, which may lead to anger, pessimism, and irritability. Adverse consequences for children include: higher levels of aggressive or destructive behavior, hyperactivity, anxiety, difficulty with social interactions (e.g. more withdrawal or socially disruptive), increased passivity, poorer overall school performance, increased school absence and a greater need for mental health care services (e.g. for depression or suicidal behaviors).

To understand the magnitude of food insecurity, hunger and malnutrition, one must consider both the continued rapid growth in World population and the number of individual below the poverty line. In 1999 the World population reached 6 billion. The United Nations estimates the World population will exceed 8 billion by 2025. In terms of poverty, the World Bank estimates that nearly 1.2 billion people live on less than one dollar a day, which is the international recognized standard for measuring poverty.

In addition to these progress-slowng conditions, the number of undernourished people is actually growing in most developing regions. A few large countries have made significant gains, making the global picture appear more promising than it really is. China, Indonesia, Vietnam, Thailand, Nigeria, Ghana, and Peru have all made important gains in reducing food insecurity and hunger. However, in nearly fifty other countries, the number of undernourished people increased by almost 100 million between 1993 and 2003. The absolute numbers continue to rise as a result of rapid population growth, even though the proportion of undernourished people in most developing countries is actually decreasing.

Food insecurity remains a significant international problem, with developing regions of the world enduring most of the burden. Food insecurity results in

considerable health, social, psychological, and behavioral consequences and is undeniably linked to poverty. Despite international commitment, the number of food insecure individuals remains unacceptably high (Glick, 2002).

The eventual impact of food insecurity, poor health and the wide choice of socioeconomic and cultural influences on a population can most efficiently monitor by observing changes in nutritional status. Nutrition provides an area of common interest for players in all sectors and the use of nutritional status as one of the most useful indicators of the welfare of the populations in countries experiencing crisis is likely to continue (Prendiville, 2003)

Researchers are finding that when children live in food insecure household, their health status can be impaired, making them less able to resist illness and more likely to be sick or hospitalized. Iron shortage anemia among very young children also has been coupled with household food insecurity. Children from food insecure households have problems with learning, resulting in lower grades and test scores. They also are more likely to be anxious and irritable in the classrooms, and more likely to be tardy, or absent from school. Adolescents from food insecure households appear to be more likely to have psychological problems (Parker, 2005).

Food insecurity results in poor nutritional status. However, food security does not necessary guarantee good nutritional status. In order to improve the nutritional status of food security and food insecure, multi-pronged approach should considered. Food security is especially important for children because their nutrition affects not only their current health but also their future health and well-being (Ssewanyana, 2003).

Individuals need adequate amount of a variety of quality, safe food to be healthy and well nourished. Under nutrition, can results from an insufficient intake or an improper balance of protein, energy, and micronutrients. Nutritional consequences of insufficient food or under nutrition include protein

energy malnutrition, anemia, vitamin A deficiency, iodine deficiency, and iron deficiency.

Malnutrition or undesirable physical or disease condition related to nutrition can be caused by eating too little, too much or unbalanced diet that does not contain all nutrients necessary for good nutritional status.

It is obvious that each person must eat an adequate amount of good-quality and safe food throughout the year to meet all nutritional needs for body maintenance, work and recreation, and for growth and development in children. Similarly, one must be able to digest, absorb and utilize the food and nutrients effectively. Poor diets and disease are often the result of insufficient household food security, inappropriate care and feeding practices and inadequate health care. It is now understood that good nutrition depends on adequate levels of all three of these factors.

The proper use of resources may be affected by economic, social, political, technical, ecological, cultural and other constraints. It may be affected by lack of tools or training to use them and by limited knowledge, skill and general ability to use the resources. The cultural context is of special importance for its influence, especially at the local level, on the use of resources and the establishment and maintenance of institutions.

2.3 An Economic Framework for Considering the Consequences Malnutrition

2.3.1 Human Capital Theory

The economic prosperity and functioning of a nation depend on its physical and human capital stock. Whereas the former has traditionally been the focus of economic research, factors affecting the enhancement of human skills and talent are increasingly figuring in the research of social and behavioral sciences. In general, terms, human capital represents the investment people

make in themselves that enhance their economic productivity. Human capital theory emphasizes how education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability, which is a product of innate abilities and investment in human beings (*European Journal of Scientific Research*, 2008).

The application of capital theory to decision on individual improvement and in particular improvement of earning capacity, has a framework for the understanding of many aspects of observed behavior regarding education, health, occupation choice, mobility, etc , as rational investment of present resources for the purpose of enjoying future returns (Yoram,2008).

The formulation by Friedman and Kuznets (1945) and the significant development of the theory by Becker (1962,1964) and Mincer (1958,1962) provided a novel view of the life cycle of earning by linking it to the time profile of investment in human capital. People make most of their investments in themselves when they are young and largely by foregoing current earnings (Ibid).

The provision of formal education is seen as a productive investment in human capital, which the proponents of the theory have considered as equally or even more equally worthwhile than that of physical capital (Olaniyan & Okemakinde, 2008).

Naturally, human capital can define as a mixture of individuals' own inherent talents and abilities, and the skills and learning they obtain via education and training; besides health is also normally counted among these. It is worth noting that the business World, which has eagerly embraced the idea of human capital, tends to define it more closely as workforce skills and talents directly relevant to the success of a company or specific industry (OECD, 2007).

Human capital is associated with a wide range of both economic and non-economic benefits. Indeed, some of the biggest benefits may be non-economic; these include improved health, longer life spans and a greater likelihood of involvement in community life (OECD, 2007:2).

The benefit of human capital can be in terms of the success, both the individual's level and national level. In some OECD countries such as Denmark and New Zealand earnings for workers with a university education are about a quarter higher than for those who only completed secondary school. In other countries, this differential is even apparent and rises to as much as 120%. Economically, as the investment on education increases the benefits of human capital increases at all level (OECD, 2007, Andolfatt, Ferrall,& Gomme,2000).

Human resources constitute the ultimate basis of wealth of nations. Capital and natural resources are passive factors of production, human beings are the active agencies who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development.

Human capital is a broad concept, which identifies human characteristics, which can be acquired and which increase income. It is common to include people's knowledge and skill acquired partly through education, but can also include their strength and vitality, which are dependent on their health and nutrition (Burchi, 2006, African Development Bank, 2010).

Under nutrition is a serious and pervasive problem, with long-term consequences for child development, and ultimately for adult productivity and national economic growth. Despite the existence of practical and inexpensive nutrition intervention that have proven effective in diverse country contexts, roughly 30 percent of children in the developing World remain malnourished,

and progress in alleviating under nutrition, although impressive in some countries, continues to be slow overall (Bassett,2008; Webb & Bhatia, 2005).

However, adequate nutrition, especially during fetal and child development, is a fundamental component of human development, and there, national economic development (Ibid).

One of the major constraints to the development of human capital and capacities is the impact of loss of human potential, both physical and mental, due to poor childhood nutrition. With limited natural resources, the development community must make wise decisions in the allocation of resources. Although agriculture's primary focus is the production of food, there exists a considerable disconnect between human nutrition and agriculture sciences in the development community (Davis, 2003).

Although challenges remain in meeting global energy needs, it is increasingly evident that dietary quality is one of the most current and pressing nutrition/health issues. Nevertheless, advances in food production, particularly in cereals, have made a major contribution by increasing the food supply (Ibid).

2.3.2 Initial Human Capital Endowments

Improved child health and nutrition are welfare enhancing in them selves. Better child health and nutrition, in addition, are widely thought to improve various dimensions of child school performance, and therefore subsequent post school productivity in a wide range of activities (Alderman et al, 1997).

Models of human resource investment predict that household demands for schooling investment reflect child health/nutrition if parents expect either that schooling makes a greater addition to the lifetime productivity of a healthy

child than to an unhealthy one or that better health of a child lowers the costs of obtaining a given level of schooling.

Thus, if a healthy child learns more in class than otherwise—a common pathway proposed in the literature on the impacts of health/nutrition on education—an improvement in the child's health/nutrition increases the effectiveness of a given time period of schooling and raises expected gross returns. Holding costs constant, the higher returns increase the demand for schooling. Similarly, if the expected increment to earnings from schooling is more than additive with the increment to earnings that comes from better post-schooling health/nutrition is based importantly on early child health/nutrition, household schooling investment depends on early child health/nutrition.

2.3.3 The Role of Education in Human Capital Formation

The potential for individuals and countries to benefit from this emerging knowledge economy depends largely on their education, skills, talents and abilities, that is, their human capital. People invest in their education and training to build up a stock of skills and abilities (a capital) that can bring a long-term return. This investment can also benefit national economies and help fuel economic growth (*OECD, 2007*).

Education is an economic good because it is not easily obtainable and thus needs to be apportioned. Education is as both a consumer and capital good because it offers utility to a consumer and serves as an input into the production of other goods and services. As a capital good, education can be used to develop the human resource necessary for economic and social transformation (Olaniyan & Okemakinde, 2008).

The focus on education as a capital good relates to the concept of human capital, which emphasizes that the development of skills is an important factor in production activities. It is widely accepted that education creates improved citizens and helps to upgrade the general standard of living in a society.

Therefore, positive social change is likely to be associated with the production of qualitative citizenry (Ibid).

Education is a source of economic growth and development only if it is anti-traditional to the extent that it liberates, stimulates and informs the individual and teaches him how and why to make demands upon himself. According to Burchi (2006) the first is the development of a general trend favorable to economic progress. The reference is to social mobility, a general increase in literacy necessary for improved communication.

The second capacity emphasis on the development of resources, are relatively plenty and substitutes for relatively scarce factors. That is, education people would be more adaptable to varying production needs. Third capacity underscores the durability of educational investment. He argues that education has greater durability than most forms of non-human reproductive capital, which implies that a given investment in education tends to be more productive, other things being equal, than some outlay on non-human capital.

High - quality university education can, of course, bring enormous benefits to national economies by speeding the creation and use of innovative technologies and also makes a significant contribution to the national stock of human capital (OECD, 2007, Andolfatt, Ferrall, & Gomme,2000).

Another way of modeling the role of education in the growth and development process is to view human capital as a critical input for innovations, research and development activities. From this perspective, education is considered as an intentional effort to increase the resources needed for creating new ideas, and thus any increase in education will directly accelerate technological progress. This modeling approach usually adopts the Schumpeter (1973) assumptions of imperfectly competitive product markets and competitive innovation, which permit the process of generating technological progress.

Education is seen as an input into the intentional and entrepreneurial efforts to create new technology and new products. Proponents of this view of education point out the close correlation between new product development and levels of education. The countries that are at the forefront of technology also have the most educated population (Olaniyan & Okemakinde, 2008).

Human capital can measure in terms of two variables: the percentage of workers with tertiary, secondary, or primary education, and the average years of schooling. Following, CHI and QIAN (2009) we use workers' educational attainment to measure human capital because it is a better measure of a province's human capital level than the widely used school enrollment data and it has fewer measurements errors. The average years of schooling are imputed based on the percentage of workers with different educational attainment (CHI and QIAN, 2009).

2.3.4. Nutrition as Human Capital and Household Production Input

Nutrition, like health, is itself an important form of human capital, and a critical input into household production of other forms of human capital such as good health, cognitive, psychological and physical development and growth, self-confidence, social skills, and school readiness. Nutritious food helps to promote healthy growth and development, or human capital formation, especially for children, which can use further as production input in their life.

Nutrition is related to educational performance in a number of ways. General health affects the returns to educate by 1: enabling the formation of human capital in the early years and throughout youth, which increase the efficiency of education; 2: raising skilled and unskilled labor efficiency; 3, promoting longevity, it self-influenced by early nutritional health, by lengthening the time during which education will yield returns. (Galor and Mayer 2002)

Weak health and poor nutrition among school-age children diminish their cognitive development either through physiological changes or by reducing their ability to participate in learning experiences, or both. Growth retardation is associated with a substantial reduction in mental capacity and adverse school performance, even in mild to moderate cases, and ultimately leads to reduced work productivity.

According to human capital theory, there is a direct causal effect running from schooling to wages and this causality is due to increase in productivity that education confers on the more schooled workers. It is also conclude that to achieve the greatest human capital investment, policies promoting education must be carefully complemented with policies that promote the satisfaction of basic needs and health (Galor and Mayer, 2002).

Malnutrition in children is evidently shows to lead to permanent effects and to result in diminished health capital as adults. Further, it may also be an intergenerational cycle of malnutrition as a worse health capital stock may be passed on from adults to their children. There is ample evidence at the macroeconomic as well as the microeconomics level. That is, health is positively associated with other dimensions of economic prosperity, and that causality goes both directions: people with higher income invest more in their human capital and become healthy while healthier workers tend to be more productive and receive higher earnings (James, 2009).

Improved nutritional status effects health and survival of household members, labor productivity, and household income-earning potential. Food factors influencing nutritional status include food availability, household access to adequate quantities and qualities of food, appropriate feeding practices (e.g. breastfeeding, complementary feeding), and distribution of food within the household. Health factors that affect the nutritional status of mothers and children include health status (i.e. prevalence and severity of illness),

immunization, personal and domestic hygiene, and availability of, access to, and quality of health services (FANTA, 2003).

Nutrition is the fundamental condition for human welfare. Recently, sufficient food and easy access to food have been considered basic human rights. Good nutrition represents an investment in human and social capital; the solid establishment of human capital is a key determinant of household and community well-being, which in turn forms a basis for development. Many others have proposed the differences in human capital input as a major source of output differences across countries (Lucas, 1998).

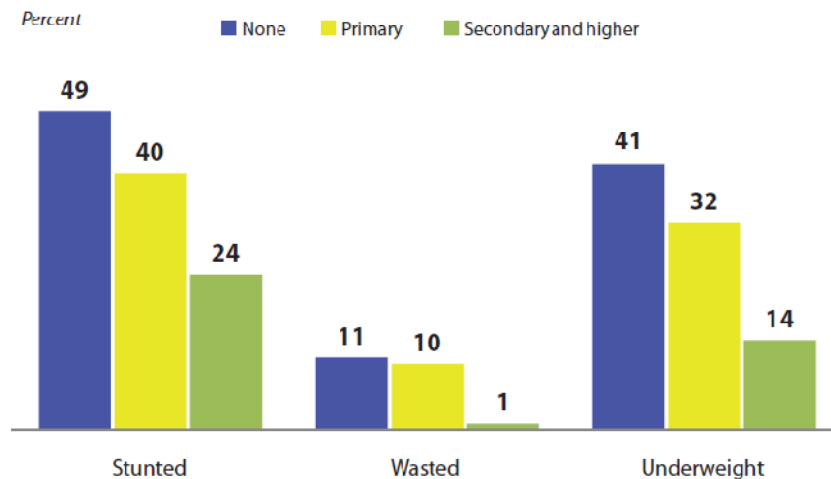
Income differences across workers are the differences in the market value of their human capital input and are largely determined by the differences in their human capital inputs. The difference in the human capital inputs could then be derived from the income differences by eliminating the part of the differences due to the factors other than human capital input (Byeongju, 2001 & Neidell, 2000).

2.3.5. Women's Education and Nutrition

Good childcare practices influenced by maternal education and household wealth. In Ethiopia, 79 percent of mothers of children under five years of age have never attended school, while 17 percent have some primary education and 4 percent have a secondary or higher education. Maternal education has an inverse relationship with stunting and wasting in Ethiopia. As the level of maternal education increases, the level of stunting, wasting, and underweight decreases. Stunting is twice as high, wasting is more than five times as high, and underweight is three times as high among children of mothers with no education as among children of mothers with secondary and higher level of education (Macro International, 2008).

Figure:1

Stunting, Wasting, and Underweight Among Children Under Five Years by Mother's Education



Sources: Macro International Inc. Calverton, Maryland, USA Nutrition of Young Children and Women in Ethiopia, sep, 2008:16).

High prevalence of under nutrition among under-fives highly suggests that there is a strong need for educating the mothers about timely weaning and weaning foods which are easily available in the local market, that too at low cost. Effect of other's education on prevalence of under nutrition clearly favors' the promotion of others' education.

Better nutritional profile of under-fives of educated mothers indicates that right to have education and to achieve 100% literacy will help in promoting the nutritional status of children as educated mothers are more aware of the health services available and also the acceptance to utilize is better among them (Mittal & Singh, 2008).

However, it is important to examine the role of maternal nutritional knowledge in child health further, we look at mothers' ability to rightly judge whether their child ren's growth status is normal or not as a proxy of maternal nutritional knowledge. Maternal diagnostic ability of child growth performance not only reflects a caregiver's nutritional knowledge in the abstract; a correct

diagnosis is also a prerequisite for corrective action and would thus be positively associated with the child's nutritional status.

A comparative study on maternal malnutrition in ten sub-Saharan African countries and a study in the SNNPR of Ethiopia showed that the higher the level of education, the lower the proportion of undernourished women (Seligman et al.1997, & Ethiopia Health and Nutrition Research Institute 2002).

2.3.6 Women's Employment and Nutrition

Women's employment increases household income, with consequent benefit to household nutrition in general and the woman's nutritional status in particular. Employment may increase women's status and power, and may bolster a woman's preference to spend her earnings on health and nutrition. Though employed, women without control over their income and decision making authority within the household are deprived of economic and social power and the ability to take actions that will benefit their own well-being. Studies in Africa have indicated that, at similar levels of income, households in which women have a greater control over their income are more likely to be food secure (Glick, 2002 & Kennedy, 1992).

2.3.7 Prevalence of Malnutrition in Tigray

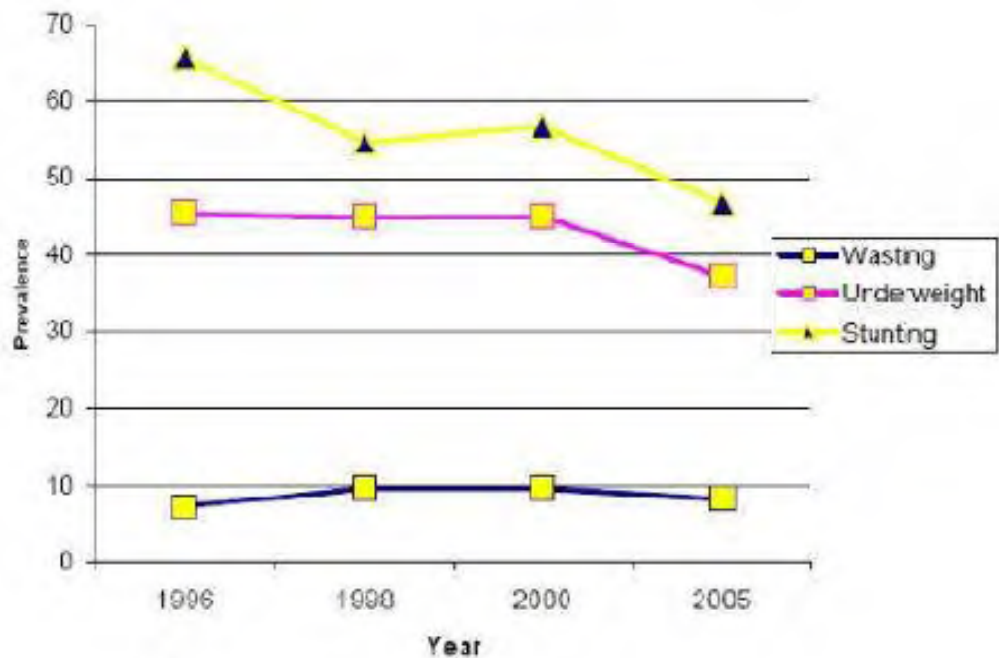
In 2011, Ethiopia's under-five mortality rate was 88 per 1000 live births¹, a decline of over 50% since 1990 when the rate was 210 per 1000 live births². According to the 2011 Ethiopia Demographic and Health Survey, 9.7% of children under the age of five in Ethiopia suffer from acute malnutrition (wasting), 28.7% are underweight, and 44.4% are chronically malnourished (stunted). In Tigray region, 10.3% of children under the age of five are wasted, 35.1% are underweight, and 51.4% are stunted (Tigray Regional Health Bureau, 2011).

In Ethiopia, Prevalence of Protein Energy Malnutrition (PEM) in Ethiopia Under-five children: Stunted: 51% (regional range: 27 to 57%) Underweight: 47% Wasted: 11%. A cross sectional study conducted in Aynalem village in Tigray region, the overall prevalence of stunting, underweight and wasting were 45.7%,43.1% and 7.1% ,respectively (Kebede et al. 2013).

According to the conducted by Department of Public Health, Mekelle University, Ethiopia, among the children surveyed, 46.9%, 33.0% and 11.6% were stunted, underweight and wasted, respectively. Older children were more likely to be undernourished. Stunting increases from 16% in the second half of the first year to 53% in children 24 months and older. Similarly, underweight increases from 10% in the first six months to 36.5% in children aged 24 months and older. A very high proportion of the mothers (80%) initiated feeding of newborns with pre-lacteal feeds primarily butter or water (Mulugeta & Hagos, 2010).

Similarly, according to other survey, there was, 47% of children under five are stunted and 24% are severely stunted, 11% of children under five are wasted and 2% are severely wasted. The weight for age indicator shows that 38% of children under five are underweight and 11% are severely underweight (Asrat, 2009).

Figure 2: Nutritional Indices of Ethiopian children 3-59 months of age, both sexes



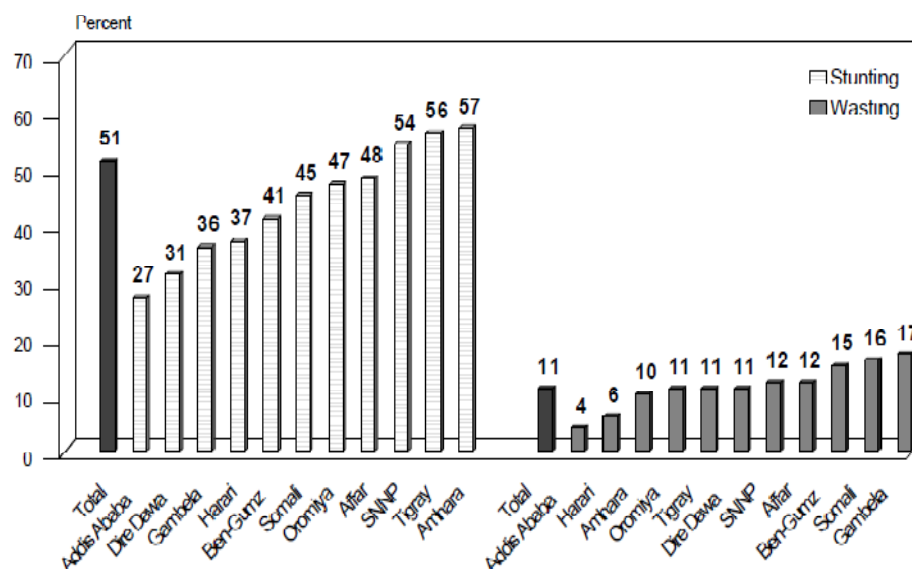
Sources: Asrat Wondimu, Associate Researcher Overview of Nutritional Status and Health Implication in Ethiopia, March 2009

All studies show that there is direct relationship between mothers education and tell us that investment in mother's education means achieving the development goals not only the project, development plan of ministry of health but the achievement of the missions and visions of one country as whole.

Educated mothers have great opportunity to grown up educated children than the uneducated mothers. The educated mothers have the ability to follow up of the status of their children's education in addition to the feeding habit and practicing than the illiterate mothers.

Figure:3

Stunting and Wasting among Children under Five Years by Region, Ethiopia



Source: ORC Macro Calverton, Maryland, U.S.A., NUTRITION OF YOUNG CHILDREN AND MOTHERS IN ETHIOPIA, May 2001).

The above figure show that stunting ranges from 27 to 57 percent among children in the 11 regions. The highest level of stunting (57 percent) reported in the Tigray region next to Amhara region. The lowest level of stunting (27 percent) reported in Addis Ababa. Wasting ranges from 4 to 17 percent among children in the 11 regions. The highest level found in the Gambela Region (17 percent), while the lowest level was found in Addis Ababa (4 percent) (Macro International Inc.(2001).

2.3.8 Conceptual Frame work of the Study

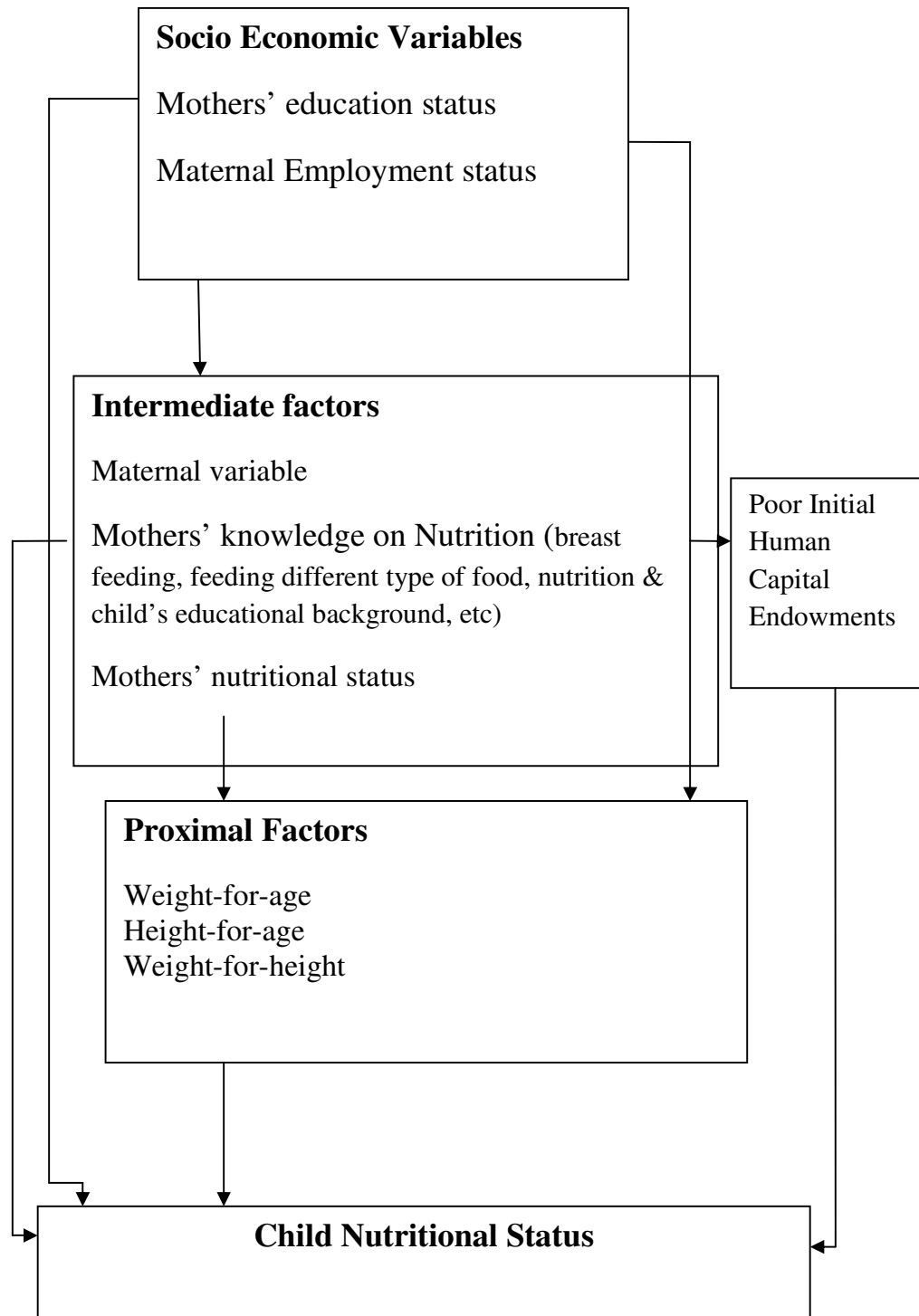
Causes of malnutrition in children are complex, ranging from biological and social to environmental factors (Wamani et al, 2005; Engle and Haddad, 1999; Mosley and Chen, 1984; Smith and Haddad, 2000).

To handle the complex hierarchical inter-relationships between these variables which are risk factors of ill health in children, particularly in less developed

countries, Victoria et al have proposed the use of frameworks and models for studying and predicting the risk factors of health outcomes (Victoria et al,1997). Based on the previous research about the causes of malnutrition, here constructed a conceptual hierarchical framework of the determinants of nutritional status.

Variables in this model (figure 4) can be divided into three groups: socio-economic variables (mother's education status, maternal employment status, community education etc), intermediate factors include maternal variables (mother's age at birth, mother's nutritional status, mother's knowledge on nutrition), and proximal factors which include weight at birth, birth order, weight-for-age, height-for-age and weight-for-height.

Figure 4: Conceptual frameworks of the determinants of Child nutritional status



According to the conceptual model, socioeconomic factors may affect directly or indirectly on all other groups of risk factors. These include environmental factors (such as type of house, house structure, type of latrine, sources of water), maternal factors (mother's age at birth, mother's nutritional status, mother's knowledge on nutrition, role of food habits and beliefs) and proximate factors (weight at birth, birth order, time of initiation of breastfeeding and duration of exclusive breast feeding, weight-for-age, height-for-age and weight-for-height). These variables, in turn, may affect the nutritional status of preschool children.

Becker (1965) has proven in illuminating the household determinants of nutrition. A 'nutrition production function' relates the child's nutritional status (measured in terms of height for age or weight for age) to a set of health 'inputs'. These include the child's nutrient intake, whether the child is breastfed and the duration of breastfeeding, preventive and curative medical care, and the quantity and quality of time of the mother or others in care-related activities. The quality of childcare time in turn is likely to be functions of education of mothers and maternal employment (Light 2005).

Greater income from mother's employment translates into higher consumption of market-purchased inputs such as food and medical care that raise nutritional status, but reductions in the level or the quality of time in health-related activities reduce nutritional status.

Anthropometric (body measure) parameters such as weight-for-age, height-for-age and weight-for-height are commonly used for assessing child nutritional status. In practical terms, anthropometric values need to be compared across individuals or populations in relation to an acceptable set of reference values.

A child's nutritional status reflects the combined effects of many factors, including nutrient intake, health, birth order, and behavioral factors governed by parental preferences (mothers' education, maternal employment etc). In recognition of the interrelated variables are expressed child's nutritional production function, they represented as

Child's Nutritional status = f (nutritional input, breast feed, mothers' education, maternal employment, childcare time, community education).

In this study, two areas of human capital represent the resources for care. The first aspect of human capital considered is quality, which takes into account variables concerning the education of the mother and her personal income.

The other aspect of human capital is its availability. For example, the size of the household and its cropping systems will influence the time a mother has to care for her child.

3. THE STUDY AREA & RESEARCH METHODOLOGY

3.1 Description of the Study Area

Tigray region is one of the federal states of Ethiopia situated in the northernmost part of the country. Its capital, Mekelle, is located at the distance of 777 km away from Addis Ababa, the capital of Ethiopia. According to the CSA projection for July 2008, the total population of the region is 4 million, of which about 50% are female

Kilte-awlaelo

Kilte-awlaelo woreda is purposively selected from the region for its proximity to Mekelle. Kilte-awlaelo woreda is one of the chronically food insecure woreda in Tigray region. It is situated in about 825 km away from Addis Ababa (capital of the country) and 48 km to the north of Mekelle (the capital of Tigray). The Woreda comprises 18 administrative peasant associations 'Tibias'. The total area coverage of the Woreda is estimated to be 987.83 sq.kilometer (CSA, 2008). According to (CSA, 2008), the total population of the woreda as projected for July 2008 (including wukro town) is 128,275 (of which 65,581 or 51% are female). According to the Woreda Office of Agriculture and Rural Development (WOARD), the number of households in the rural *Tabias* of the woreda is estimated to be 23,200 (of which 9280 are female headed). When projected the figures of the 1994 census by 2.23% rate of increase (set by CSA for the period of 1995-2000), Weina-dega (mid-land) is the dominant agro-ecology in the woreda with altitude ranging from 1850m-2560m.a.s.l. Its annual rainfall ranges 400mm-550mm (WOARD).

Feeding Habit of the Population in the Study Area

Most of the time, single dish prepared for all the family including the children at home regardless of their age and consumption in Ethiopia, which is the same to Tigray region. The Ethiopia mother prepare food for the family and feed their under five children with their hand while they feed themselves from the same dish. These aggravate the prevalence of the malnutrition under five. This type of feeding habit is practicing by most of the mothers who did not attend any school.

Even though the household have enough supply of food, the mothers prepare the same dish for all the family. However, those mothers who went to school try to prepare a separate dish though the varieties are not excellent as such. Most of the time, the mothers prepare a separate dish from cereals & beans due to the lack of understanding of the lack of nutrients. This type of feeding habit also is practicing in the study areas.

Participation of the Household in the Food Security Program

Food security strategy is the major component of the ADLI policy. The first version of the food security strategy was issued in 1996, and revised in 2002; highlighting the government's plan to address causality and effects of food insecurity in the country. The strategy envisages developing an agriculture-based economy by raising farm productivity and income. Furthermore, the food security measures aim to promote and strengthen micro- and small-scale enterprise development, improving the food marketing system, promoting and strengthening supplementary employment, income generating schemes, and credit services to address the demand side problems (Tagel, 2008).

Rural households was selected for the food security program based on the criteria of having food at home, number of cows, oxen, sheep, goats etc and then the household that have small number of cows , oxen , sheep , goat was beneficiary of the Community Driven Development (CDD) program.

The CDD approach increase empowerment, improves responsiveness to citizen demands and priorities, Accelerate service delivery, and improves the quality of life of poor and marginalized households. It gives decision-making & resource management responsibility to community groups. It is a way of organizing for poverty reduction that leverages the capacity of communities, in partnership with a range of institutional actors.

The process of proposal preparation by individual house holds starts from the general assembly meeting. The chairperson of the Kebele Development Committee together with his colleagues will organize a general assembly of his kebele. In the meeting the chairperson will deliver an orientation about the food security project, its objective and mode of implementation i.e. the project is there to help the community to extricate themselves from poverty and dependency on food aid, to this effect full participation of the community is the prime requisite.

With this introductory remark the amount of fund allocated for each kebele would be notified and discussion will be continued on the utilization of the fund. Since the community support grant is for both community asset building i.e. for intervention that benefit the community as a whole such as construction access road, potable water supply, development of irrigation scheme etc and individual asset building i.e. utilizing as a revolving loan to the poorest of the poor, discussion will be made which way to use the grant.

The regional government encourages the integration of community asset building with Productive Safety Net program and prefers utilization of the community grant as individual asset building. Taking this into account the kebele development committee together with the community will further discuss on how to use the revolving loan, who are the eligible people, how to set the criteria for targeting how to determine the interest rate and others. After series of discussion, the community will arrive at a consensus to implement the

project. Accordingly wealth-ranking criteria's will be set and people will be grouped as well off, medium, poor and very poor.

Those members of the community, who are very poor, are eligible for the revolving loan as long as they are willing to participate and are told to prepare proposal to involve in any intervention they need to undertake. These community members are also advised on what type of project they have to prepare by the kebele development agent and woreda facilitation team.

Once the eligible community members are identified, the kebele chair person will post their names and the tentative repayment period on his office. The kebele development committee will collect all the project proposals from the community, grouping them according to their requirement and transfer them to woreda development committee for approval.

In the woreda all, the projects are reviewed by the woreda facilitation team on technical issues such as, feasibility, gender sensitivity, and environmental issues especially with respect to generation of pollution. The woreda facilitation team, there fore wills transfers the project proposals to woreda development committee together with their comments.

The woreda development committees then approve the project proposals and order the woreda finance office to release the fund. Projects that do not meet the requirements will be modified or kept pending.

For the successful implementation of the project at grass root level, therefore, CDD is the principal approach that the project follows. The main aim of this approach is empowering vulnerable, food insecure households/communities, in drought prone areas, to increase their incomes and build their assets through real participation & involvement and final decision of the beneficiaries

themselves. In other words, the project provides funds and technical assistance to targeted communities to do things for themselves rather than having things done for them.

3.2 Research Methodology

3.2.1 Sample and Sampling Techniques

A *Tabia* (village) having relatively high number households, who are participants of food security package purposely selected from the woreda in order to obtain adequate sample. Population of the study areas approximately 19,636 distributed in 4,463 households. However, the sample calculated using the ENA software. Therefore, 120 households were included in the survey. That is 60 per *tabia*.

3.2.2 Methods of Data Collection and Sources of Data

Study population

Mothers of children under five years of age and their children constituted the study population.

Data collection

- List of families residing in the area was procured from data bank from the food security office at woreda level.
- Information was collected at household level by visiting each family. Age of child was confirmed by further interviewing the family members and scrutinizing the available records.
- Height/length and weight of the child was recorded using standard techniques and instruments, by experienced and trained field personnel.
- After ensuring the confidentiality and building a rapport, in dept interview of mothers of under five children for the following issues:-
 - Mothers education
 - Access to awareness raising trainings

-Feeding practices to their under five children including the breast feeding

-For each of the above variables of mothers status included in the study, several questions were framed with the help of social scientist. Reliability of these questions were checked and suitable modifications were made, before finally administering them to respondents.

3.2.3 Methods of Data Analysis

Recent Software ENA and SPSS 19.0 were used for data compilation and analysis.

- All variables included to record mother's status were categorized and coded.
- To assess child's nutritional status, proportion of underweight and stunting were calculated using National Center for Health Statistics (NCHS) standards.
- Each variables of mother's status was related independently with the nutritional status of children (proportion of underweight and stunting) to examine any association.
- This Combined mother's status was also related with nutritional status of children. Further data was analyzed using statistical software SPSS 19.0

4. RESULTS AND DISCUSSIONS

Ethiopia is a developing country, and one of its greatest problems is under nutrition among children. Like other developing nations, Ethiopia is facing challenges with this problem, and the most vulnerable being the youngest of the country. Similarly, Tigray region is one of the states of Ethiopia, which has a problem of under-nutrition.

Under-nutrition in childhood was and is one of the reasons behind the high child mortality rate observed in developing countries like Ethiopia. It is highly detrimental for the future of those children who survive. Chronic under-nutrition in childhood is relating to slower cognitive development and serious health impairments later in life that reduce the quality of life of individuals. Thus, Nutritional status is an important index of this quality. Improved child health and survival are considered as universal humanitarian goals. In this respect, understanding the nutritional status of children has far-reaching implications for the better development of future generations.

Child growth is universally used to assess adequate nutrition, health and development of individual children, and to estimate overall nutritional status and health of populations. Compared to other health assessment tools, measuring child growth is a relatively inexpensive, easy to perform and non-invasive process. During preschool age period, children have special nutritional needs because of their extensive growth and development. Under-nutrition among pre-school children is an important public health problem in rural Tigray. Anthropometric examination is an almost mandatory tool in any research on health and nutritional condition in childhood and the study of nutritional status is of great importance for the understanding of the social well-being in a population.

4.1 Nutritional Status of Children

In this survey, anthropometric data on height and weight including age, sex and MUAC were collected from all children aged between six and fifty nine months in the sample households to determine their nutritional status. Based on these measurements, the following three internationally accepted indices used to reflect the nutritional status of the children. These were:

- Weight-for-height
- Weight-for-age
- Height-for-age

Height-for age index, gives information on the nutritional situation in the past and indicates whether a child suffers from chronic malnutrition, and failure to care that is children may have stilted growth due to long-term inadequate care.

Weight-for-height used to indicate the problem of muscle wasting; it may have risen from recent and acute constraints such as serious food shortage and/or outbreak of infectious diseases. It indicates whether a child suffer from acute malnutrition (is 'wasted') or not.

The index of weight-for-age used to detect malnutrition that could occur due to both the current and past constraints of life. It mainly uses to monitor the growth of children. If a child is 'underweight' the causes cab be 'chronic 'or 'acute' malnutrition. Rapidly changing WFA can be assumed to be the result of changing WFH, while low WFA among older children is more likely to be the result of low HFA (Chiwaula, 2011).

Moreover, MUAC is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow (olecranon process and the acromium). In children, MUAC is useful for the assessment of nutritional status. It is good at predicting mortality and in some studies, MUAC alone or MUAC for age, predicted death in children better than any other

anthropometric indicator. This advantage of MUAC was greatest when the period of follow-up was short (Atukwase et al.2009).

Thus, the nutritional status of children is determine using the international reference as defined by the U.S National Center for Health Statistic (NCHS), recommended by WHO and the US center for Disease Control and prevention (CDC) classification were used.Based on this classification (Alemu, 2004).

Acute Malnutrition

For the children, acute malnutrition rates estimated from the weight for height (W/H) index values. The W/H indexes compared with NCHS references. W/H indexes expressed both in Z-score and in percentage of the median. The expression in Z-score has true statistical meaning and allows inter-study comparison. The percentage of the median on the other hand commonly used to identify children eligible for feeding programme are stated bellow(Ibid)

Acute malnutrition can be identify in the following way

	Z-score	% of the median
Sever	W/H < -3Sd &/or	W/H < 70% &/or bilateral Oedema
Moderate	-3 Sd ≤ W/H < -2Sd	70% < W/H<80%
Not wasted	W/H > -2Sd	W/H > 80%

The weight for height index is the most appropriate index to quantify wasting in the population in emergency where acute forms of malnutrition are the predominant pattern. In general, children who fall below -2 Z-score are considered malnourished.

Chronic Malnutrition

The height for age index indicates if a child of a given age is stunted (the child is too short for its age). This index reflects the nutritional history of a child

rather than the child's status. This mainly used to identify chronic malnutrition. The height-for-age index of a child from the studied population is expressed either as a Z-score (HAZ) or % of the median.

The following HAZ cut-off point are used

<u>Z-score</u>	<u>% of the median</u>
Sever H/A < -3 Sd	H/A < 80%
Moderate -3 Sd ≤ H/A < -2Sd	80% ≤ H/A < 90%
Not stunted H/A > -2 Sd	H/A > 90%

4.2 Prevalence of malnutrition in Food secured and unsecured households

4.2.1 Malnutrition and food secured households

As the explanations above the definitions of acute malnutrition should be given (for example, global acute malnutrition is defined as <-2 z scores weight-for-height and/or oedema, severe acute malnutrition is defined as <-3z scores weight-for-height and/or oedema). The anthropometric result is based on WHO standard 2006. The figure below shows, as there is still malnutrition in the food secured households according to the national food security indicators.

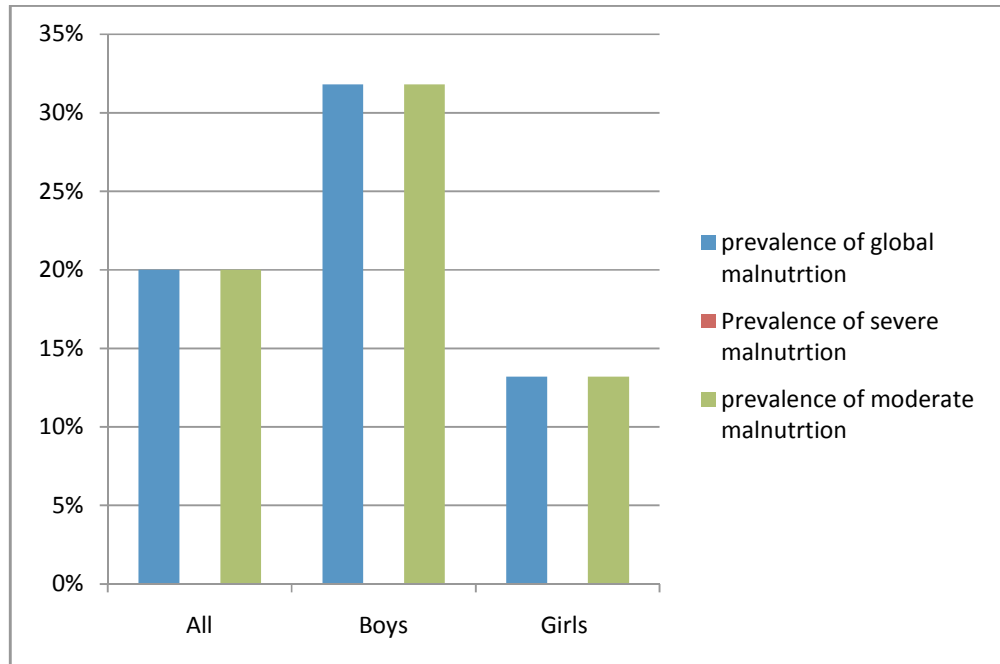


Figure 5: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

Of the total group 20% percent detect the prevalence of global malnutrition (<-2 z-score and/or edema) of which 31.8% boys. Similarly, 20% also detect prevalence of modern malnutrition (<-2 z-score and >=-3 z-score, no edema) and 0% prevalence of severe malnutrition (<-3 z-score and /or edema).

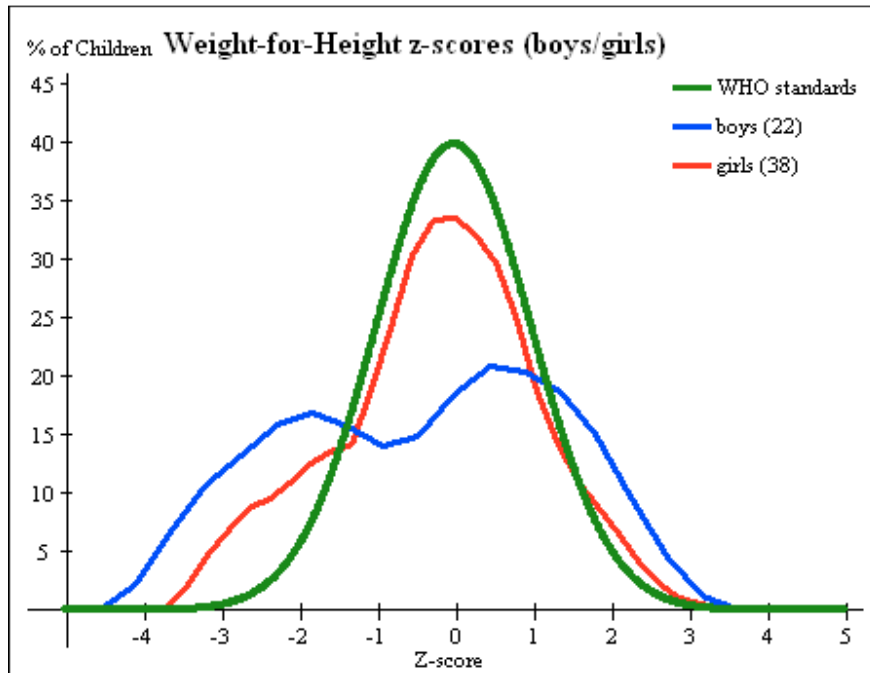
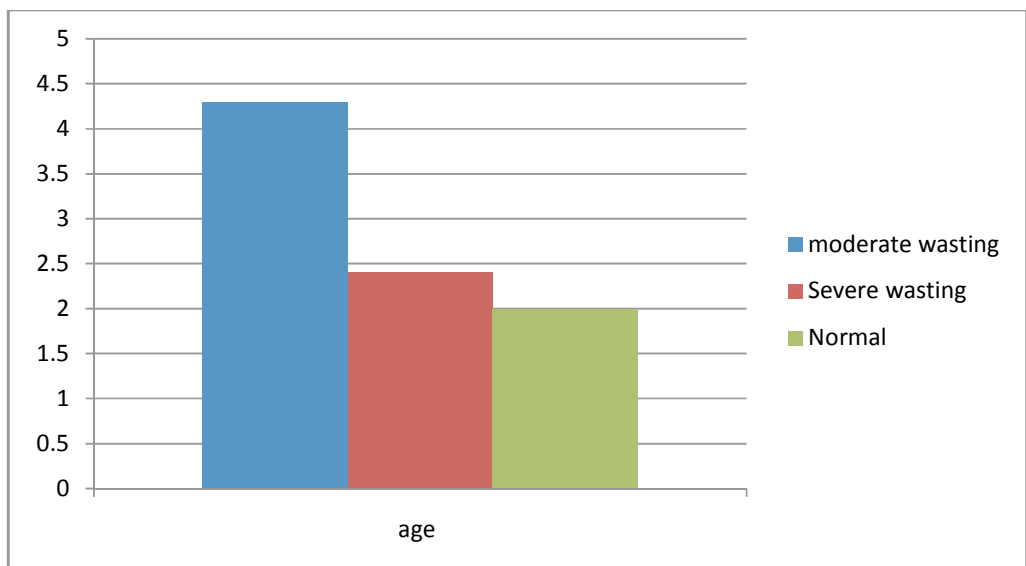


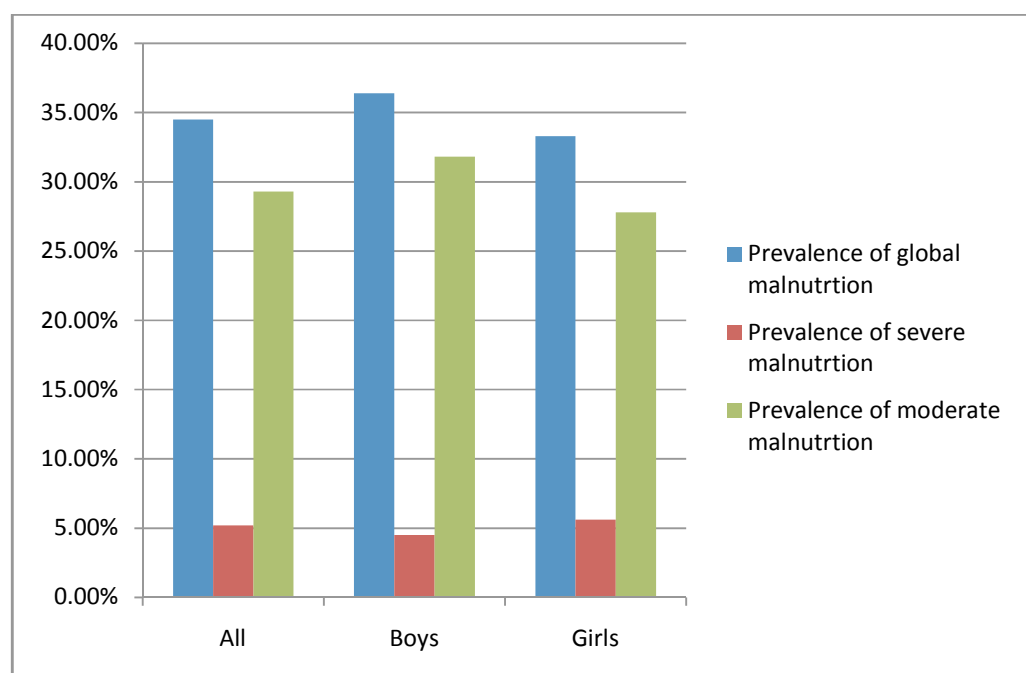
Figure:6 Based on weight for height

Figure 7: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema



According to the above figure (that is acute malnutrition by age weight for height z-score) though there is sever wasting (<-3 z-score) there is 20% of moderate wasting (≥-3 and <-2 z-score). However, due the government intervention though the different intervention 80% of the group are normal and there is zero percent edema.

Figure 8: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

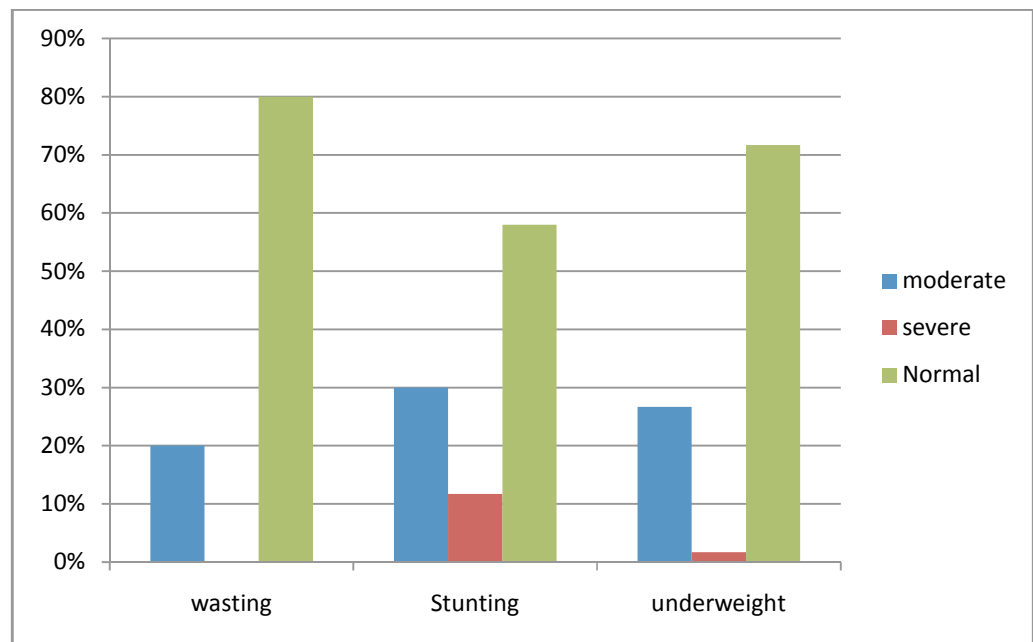


Similarly, the measurement of the Mid Upper Arm Circumference (MUAC), which is the most accurate measurement, also shows the same result. That is the prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex shows of the group 34.5% indicate the existence of global malnutrition. Of which 36.4% are boys and 33.3% are girls. Similarly, there is 29.3% of the prevalence of moderate malnutrition in the food secured household and 5.2% of the prevalence of severe malnutrition.

Moreover, according to the figure below, there is moderate wasting, stunting and under weight 20%, 30% and 26.7 respectively even within the food

secured households. Similarly, there is 0 percent, 11.7 percent and 1.7 percent of severe wasting, stunting and underweight respectively. However, the majority of the surveyed children 80%, 58% and 71.7% are free of wasting, stunting and have normal weight respectively.

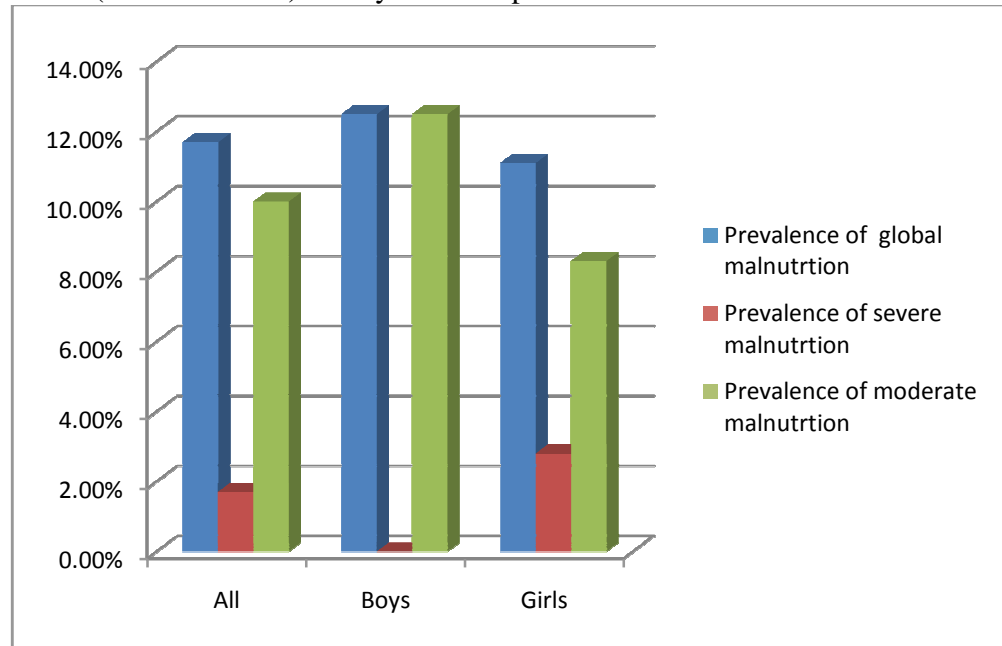
Figure 9: Total over view on wasting, stunting and under weight for food secured households



4.2.2 Malnutrition and unsecured households

The results below show that there is also malnutrition in the food unsecured household though it is obvious to exits. However, the main thing that the researcher want to explain supported by the analysis is there is still malnutrition in both the food secured and food unsecured households.

Figure 10: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex. The prevalence of oedema is 0.0 %



As the figure above, there is 11.7% global malnutrition, 1.7% severe malnutrition 9.8% moderate malnutrition among all the surveyed children. Though there is a difference and similarities in the percentage considering different reference, there is still malnutrition in both foods secured and unsecured households and there is a deviation from the WHO standard measurements according to the figure below.

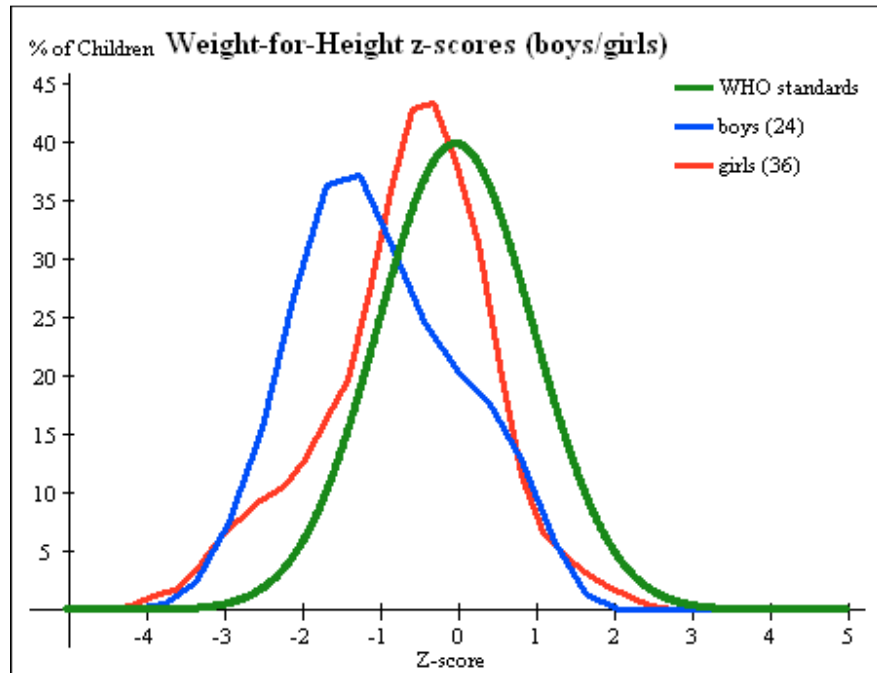
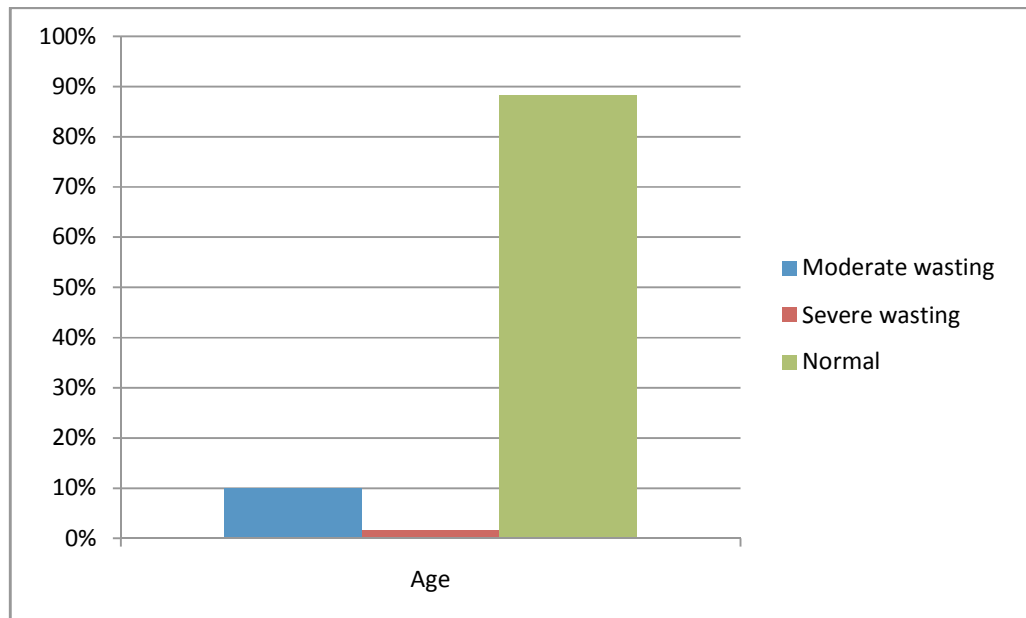


Figure 11: Weight for height z-score

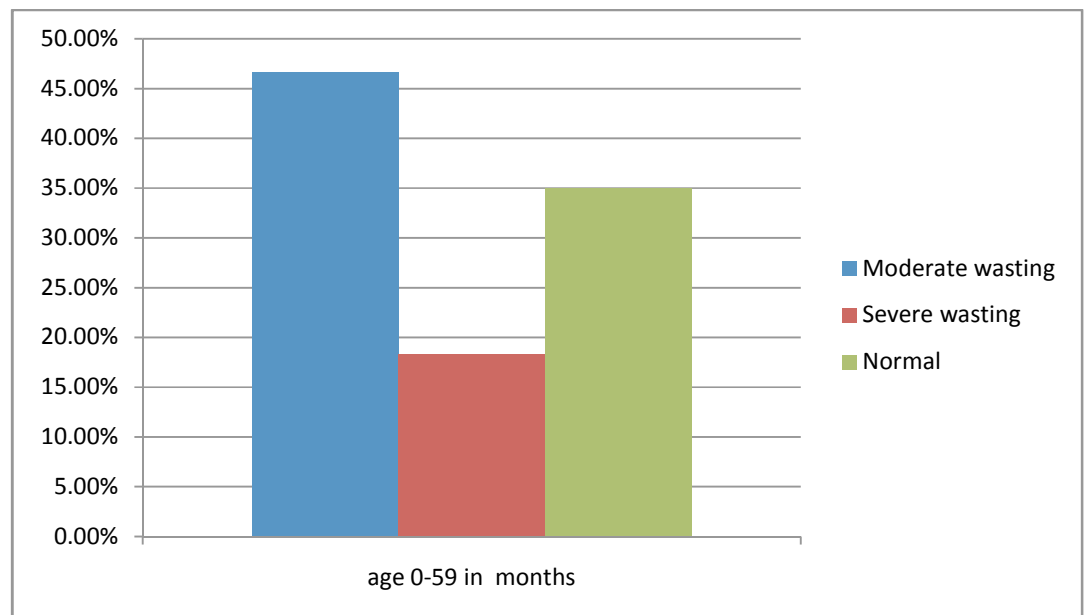
Figure 12: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema, 0% prevalence of oedema



Similarly, the prevalence of acute malnutrition by age, based on weight-for-height the above figure show that there is 1.7% severe wasting in the food

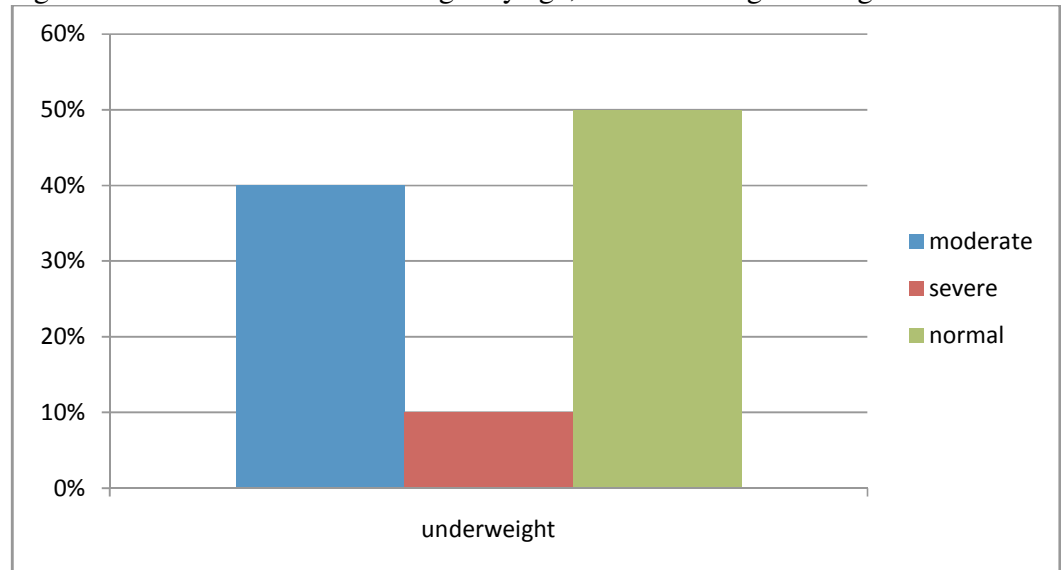
unsecured household. However, though there is no severe wasting there is moderate wasting for significant percent that is about 20% of the sample population in the food secured households.

Figure 13: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema



Similarly, figure 11 shows only 35% of the sample population are normal according to the MUAC cutoff and /or edema. MUAC is referring to the upper arm measurement. That is : (Severe wasting (< 115 mm), Moderate wasting (≥ 115 mm and < 125 mm) and Normal (≥ 125 mm). This measurement avoids the in accuracy that result from the people perception about the age of their children.

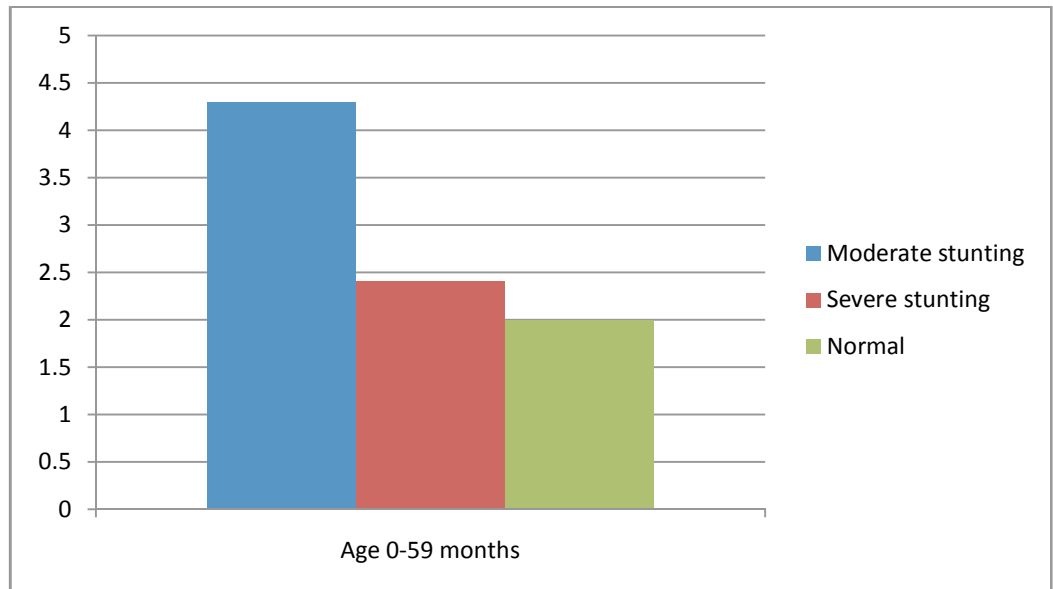
Figure 14: Prevalence of underweight by age, based on weight-for-age z-scores



According to the weight-for-age z-score figure above, 50 percent of the surveyed children from the food unsecured household have normal weight, 10 percent have severe under weight, and 40 percent have moderate under weight.

Similarly, according to the figure below, about 38.3%, of the children are normal, 31.7 percent and 30 percent of the surveyed children are also moderate and severe stunting respectively. However, there is prevalence of stunting in the food secured households. The study reveal that there is 30% and 11.7% of the surveyed children have moderate and sever stunting though 58% of children are normal.

Figure 15: Prevalence of stunting by age based on height-for-age z-scores



According to the summarized table below, there is wasting, stunting and under weight in the food unsecured households. Of the children who are considered for the study of the food unsecured households, 18.3%, 46.7% are severe wasting and moderate wasting respectively. and but 35% are normal means there upper are measurement is $\geq 125\text{mm}$.

Similarly, there is stunting, which is measured based on the height-for-age. Of the children under consideration, 30%, 31.7 and 38% are categorized as the children have severe stunting, moderate stunting and normal respectively. since the children are stunted, 10%, 40% and 50% of children are severely underweight, moderate underweight respectively and 50% have normal weight.

Table 1: Summarized table of wasting, stunting and underweigh for food unsecured households

Wasting (Weight for height)		
Severe wasting (< 115 mm)	Moderate wasting (>= 115 mm and < 125 mm)	Normal (> = 125 mm)
18.3 %	46.7 %	35 %
Stunting (Height for age z-score)		
Severe stunting (< -3 z-score)	Moderate stunting (>= -3 and < -2 z-score)	Normal (> = -2 z score)
30%	31.7%	38.3%
Underweight (weight for age z-score)		
Severe underweight (< -3 z-score)	Moderate underweight (>= -3 and < -2 z-score)	Normal (> = -2 z score)
10%	40%	50%

5.5 Mothers education and nutritional status of children under five in the food secured households

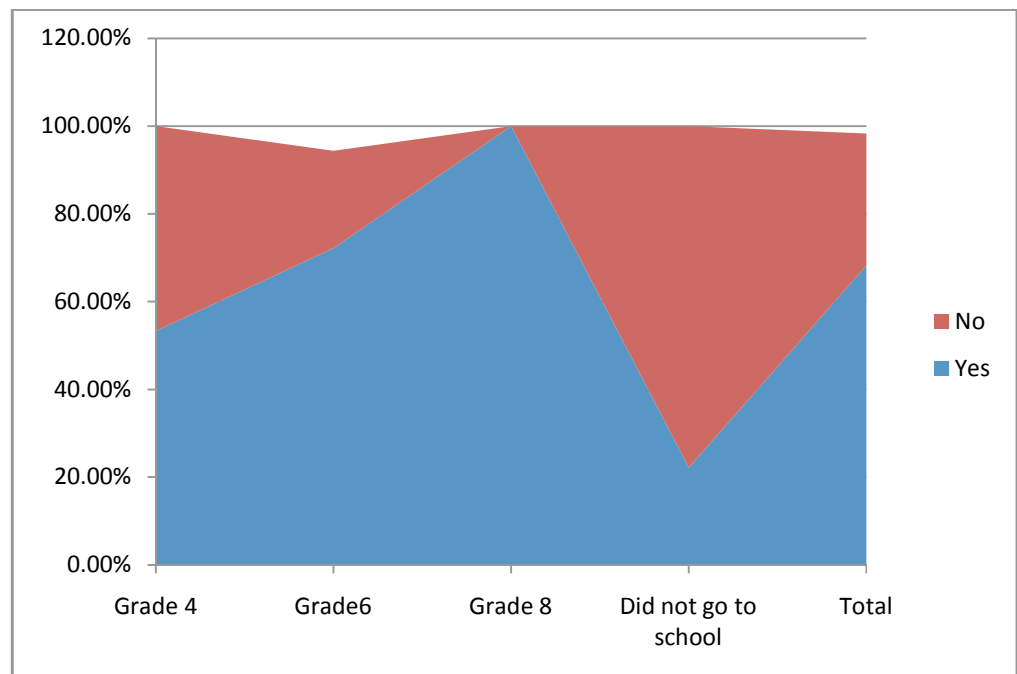
4.3. Level of Knowledge of Mothers in Food Secured Households

4.3.1. Educational back ground of mothers

Despite past policy interventions and supports, malnutrition remains one of the major problems confronting children in Sub-Sahara Africa (SSA). Though the educational background of the family as whole is good for the nutritional status of the children under five at home, the educational background of the mother is crucial for the nutritional status of children under five. Among the mother's responsibility at the household level is bearing the child in good way that is including nutrition. The researcher try to show this by assessing their knowledge at school and the knowledge if they have the chance of getting different type of education from different responsible bodies. The analysis of

the research show that mothers understanding increases with their educational background. That is, the mothers' understanding on the necessity of preparing a separate dish for their children is 53.3%, who are grade 4, 72.2% who are grade 6, 22.2% who didn't go to school at all and 100% who are grade 8 respectively according to, the figure below. The preparation of a separate dish for children under five increases as the educational background of mothers improved.

Figure 16: Preparation of a separate dish by educational background of the mothers

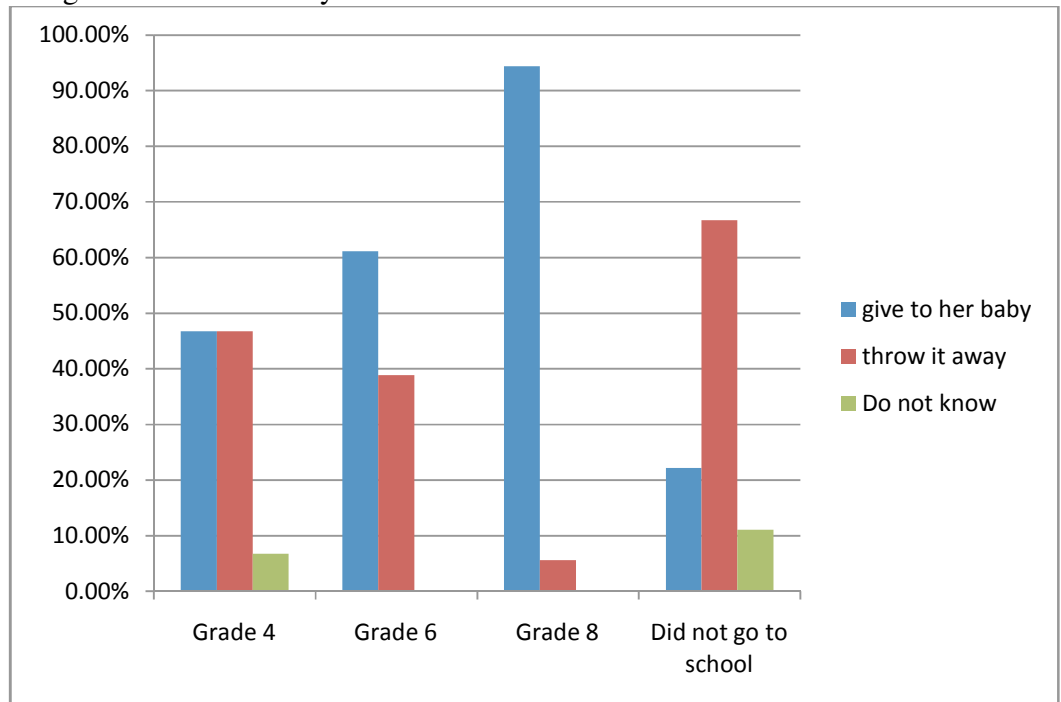


Moreover, the educated mothers have knowledge about the advantage of the first milk. According to the analysis 46.7%, who are grade 4, 38.9% who are grade 6, 5.6% who are grade 8 and 66.7% who didn't go to school throw the first milk based on their traditional believe as the table below.

Similarly, since the mother who went to school has the ability of understanding about what they thought by different government responsible bodies and easily cope up with new environment and technology, 94.4% of the grade 8, 61.1.%

of grade 6 and 46.7 % of grade 4 and 22.2% mother who didn't go to school give the first milk to their children.

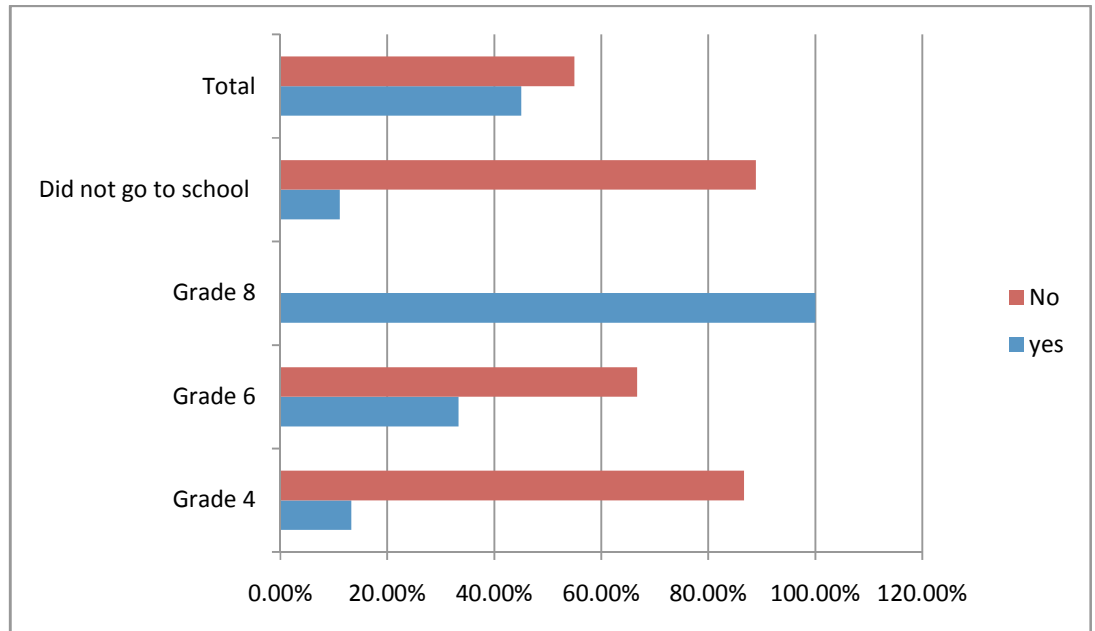
Figure 17: first milk by mothers' education



Furthermore, mothers who go to school have a good understanding of the lack of nutrients to the development of the children especially at the age of 0-59 months. Evidently, 100% of the grade 8, 33.3% of grade 6, 13.3% of grade 4 and 11.1% who didn't go to school know the consequences of lack of nutrients to the education of the children when they go to school.

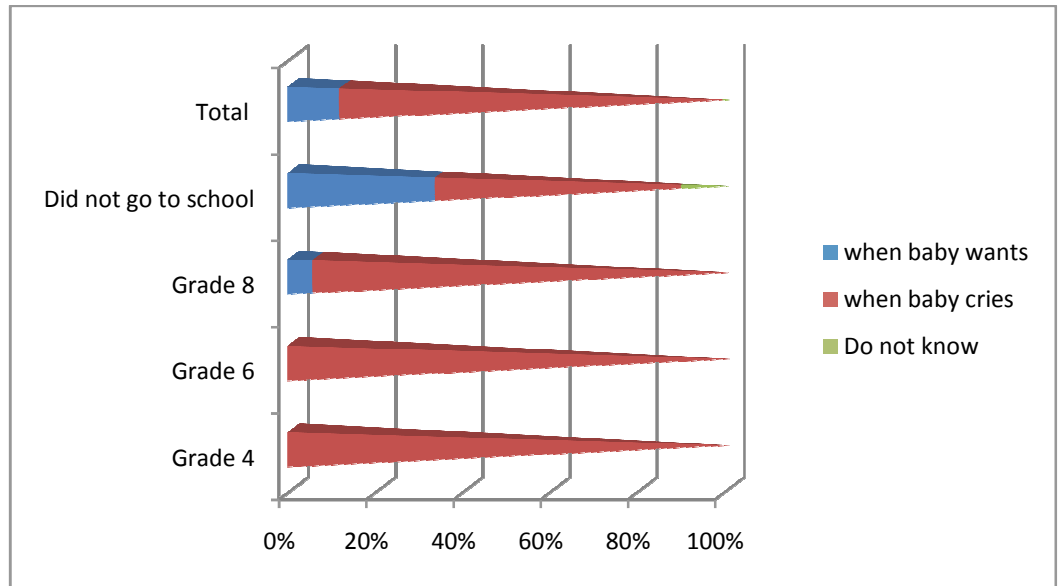
The level of understanding of the mother has a direct relationship with the level of education. 86.7% of the grade 4 respondent did not understand well the consequences of lack of nutrients on their children's mental and physical development. The mother did not get rid of the traditional thinking that the children are assets and may bring for their family good things for the future.

Figure 18: Knowledge on lack of nutrients by mothers' education



Almost all of the mother breastfeed their children when the baby cries and when the baby wants according to the figure below. This causes health problem for the baby. Mothers did not have enough information that the baby should get breastfeed every two hours. The rural mothers are busy with agricultural works at the farm and preparation of the food, etc at the household level. This reduces their attention to their baby at their back and start to feed when the baby cries.

Figure 19: Time to baby breast feeding by mothers' education



4.3.2 Awareness raising training and mother

Today, the government Ethiopia implements different type of awareness raising training to upgrade the well-being of the rural community in terms of economy and social aspects. One of the awareness raising training is on the health aspect that is concerning the nutritional status of children under five.

Among, the different mechanism, reducing poverty through the food security programs in collaborating different international NGOs and improving the health status of the rural community especially the mothers and children under five by providing awareness raising trainings and supplementary food for schoolchildren.

As a result, mothers who have awareness raising training on nutrition prepare a separate dish for their children. Evidently, 80% of mothers who have get the training and who are grade 8 able to prepare a separate dish for their children. But only 40% of mothers who have got the training and who are grade 6 able to prepare a separate dish for their children.

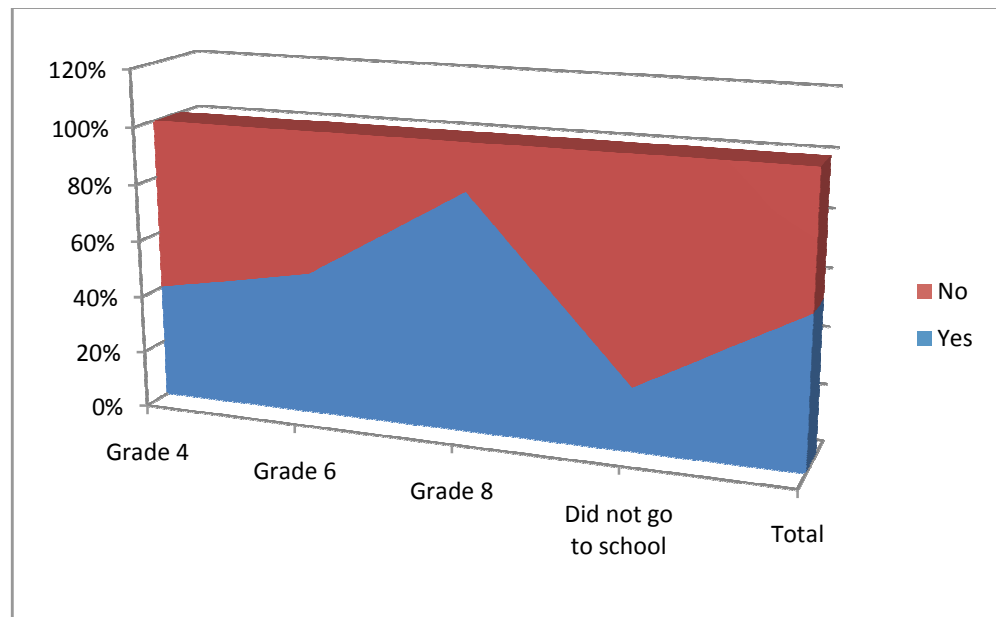
4.4. Level of Knowledge of Mother in food unsecured households

4.4.1 Educational back ground of mothers

Maternal education relates to knowledge of good childcare practices and to household wealth. Similar to the above analysis under the food secured households, the preparation of a separate dish by mothers increases as the educational level of the mothers improve from grade 4 to grade 8. That is 83.3% (18) of mother who are grade 8, 55.6% of mother who are grade 6 and 40 % of mother who are grade 4 prepare a separate dish for the children under five.

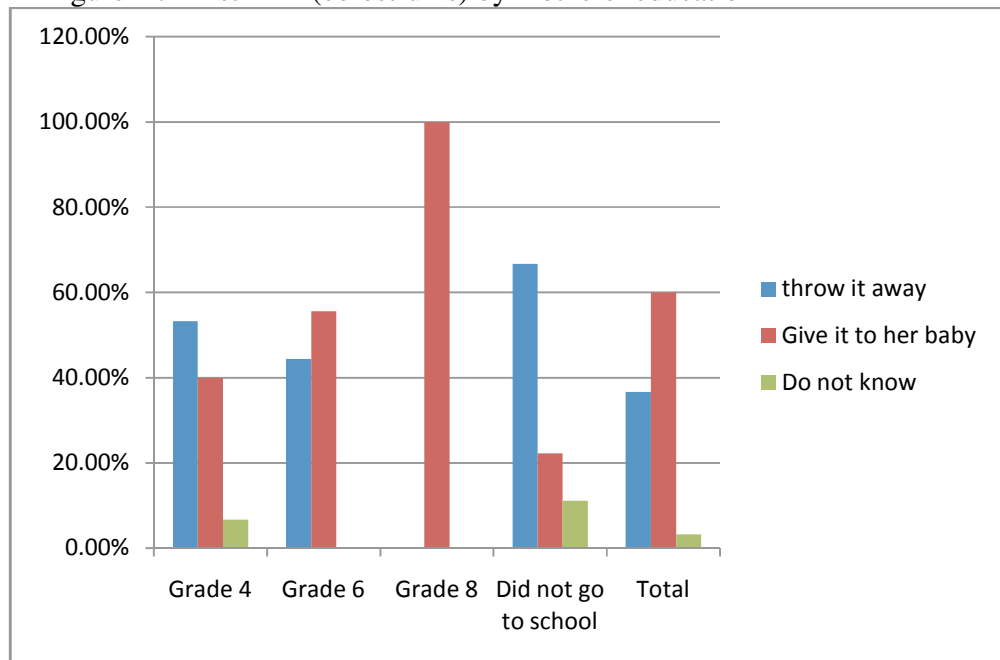
Though the mothers are from food unsecured household families, their educational background help them to understand the advantage of preparing a separate dish from which they have at home. A significant percents of the mother from grade 8 prepare a separate dish for their children under five according to the figure below.

Figure 20: Preparation of a separate dish by mothers' education



The knowledge on the necessity of the first milk depends on the educational background of the mother. Though cultural, believe of the society on the first milk is to throw it away, the educated mother can help them easily understand the advantage of the first milk. However, due to the low level of educational background, 53.3% and 44.4% of mothers who are grade 4 and grade 6 throw it away respectively while 0% of mothers who are grade 8 throw it away.

Figure21: First milk (colostrums) by mothers' education

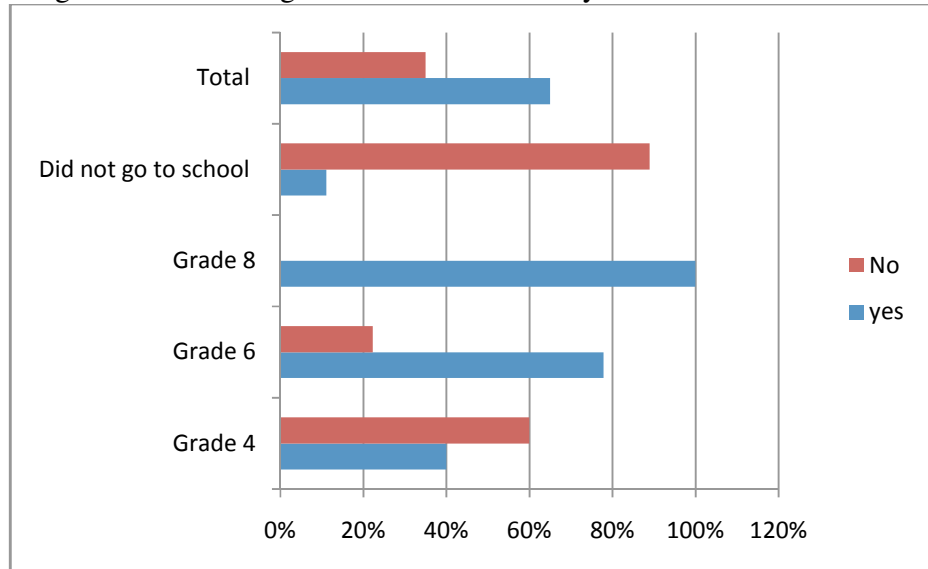


On the other hand, 100% of mother who are grade 8, 55.6 % of mothers who are grade 6 and 40% of mother who grade 4 have good understanding about the first milk and give it their children.

Moreover, mothers have different understanding about the lack of nutrients and its consequences to the educational background of children. The analysis shows that 100%, 77.8% and 40% of the mothers who are grade 8, grade 6 and grade 4 understand and/or know that there is direct relationship between education of the children and the lack of nutrients at early age of children respectively.

From the above analysis, any one can understand that education matters to the level of understand of mothers to their surroundings and their participation in the implementation of projects that focuses on nutrition and other development objectives at the grass root levels.

Figure 22: Knowledge on lack of nutrients by mothers' education



4.4.2 Awareness raising training and mothers

Since training is valuable to the life of the rural community, of the trained mothers 46.7% able to prepare a separate dish to their children under five. However, among the mother who did not get the training 55.5% of the mother did not prepare a separate dish for their children. Among the mothers who got the training only 9.1% of the mother, throw the first milk away. However, 30.6% of the mothers give to their baby.

The research shows that there is strong linkage between maternal education and children's health. Children born from educated women suffer less from malnutrition, which manifests as underweight, wasting and stunting in

children. This study shows maternal education has been associated with nutrition outcomes among children.

However, the mechanisms that link mother's education and child health in general are not still well recognized. Some studies highlights three links through which education may affect child health. First, formal education of mothers directly transfers health knowledge to future mothers. Second, the literacy and numeracy skills that women acquire in school enhance their ability to recognize illness and seek treatment for their children. Additionally, they are better able to read medical instruction for treatment of childhood illness and apply the treatment. Third, increased number of years in school makes women more receptive to modern medicine. Other studies have found a strong link between maternal education, socio economic status and child nutritional status. This is because educated women are more likely to get steadier, higher paying jobs; to get married to men with higher education and higher income; and to live in better neighborhoods, which have influence on child health and survival. Studies have also found an association between maternal education and maternal depression, while maternal depression has been associated with poor child health outcomes, including poor nutritional outcomes.

Education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development. Studies in the Philippines (Aguillion et al, 1982), Libya (Popkin and Bisgrove, 1988), Uganda (Statistics Department and Macro International Inc., 1996), and Ethiopia (Yimer, 2000; Genebo et al., 1999) show a decreased incidence of malnutrition among young children with an increase in the level of mothers' education.(Genbo, 2002)

The results reveal that, though there is a difference in the availability of food at household level, there is a similar result in terms of prevalence of malnutrition. Due to the other factors which can be achieved if mothers got enough access

education and able to be benefited and participate in any development activities being implemented around their surroundings.

5. CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The malnutrition of children under-five is a complex and multidimensional phenomenon whose depend on several factors (structural, socio-economic and cultural).The nutritional status of under five children is a sensitive indicator of a country's health status as well as economic condition. The nutritional status of under five children is one of the indicators of household wellbeing and one of the determinants of child survival. Poor nutrition leads to ill health and ill health causes further deterioration of nutritional status.

Acute malnutrition (wasting) puts an immediate threat on survival and sharply increases mortality. Chronic malnutrition has a more insidious and long-standing impact. By depressing the immune function, malnutrition increases the incidence of infectious diseases, the duration of illnesses and the case-fatality rate. Stunting reduces physical growth and adult height. Malnutrition reduces the growth of the brain and its proper functioning, leading to reduced academic performances, professional achievements and psychological resilience.

Maternal literacy has a significant relationship with the nutritional status of children. Therefore, there is the need to promote and encourage female/girl child education in the communities in order to empower them to know the right type of food and the right way to give it in the right quantity. This will help to prevent the occurrence of malnutrition among children, especially those under the age of 5 years. The findings of the analyses reveal those severe wasting (<115mm) is zero percent, moderate wasting (>115mm and <125mm) is 20% and normal (>125mm) of under five children is a quasi-permanent problem in the study sub district.

The analysis also reveal that the existence of stunting and underweight in the study areas. There is 11.7%, 30% and 58% , severe stunting (<-3z-score) moderate stunting (≥ -3 and < -2 z-score), and normal (≥ -2 z score) respectively. Similarly, there is severe under weight (< -3 z-score) 1.7%, moderate underweight (≥ -3 and < -2 z-score) is 26.7 and normal (≥ -2 z score) is 71.1% .

Similarly, in the food unsecured households, there is wasting (weight for height), stunting (height for age z-score) and under weight (weight for age z-score). The result also reveal that, there 18.3% severe wasting (< 115 mm), 46.7% moderate wasting (> 115 mm and < 125 mm) and 35% normal (> 125 mm). Similarly, 30%, 31.7% and 38.3%, are severe stunting, moderate stunting and normal. The status of underweight 10%, 40% and 50% are severe under weight, moderate underweight and normal respectively.

The study clearly indicated that the nutritional status of these under five children was serious with very high rates of under nutrition in both food secured and unsecured households. In addition, the result clearly shows that there existed distinct nutritional deprivation among the subjects regardless of the food supplementation administered by food security programs throughout Tigray and Ethiopia. The average prevalence rat of underweight of both food secured and unsecured households was also noticed 33.35%. Thus, it seems that there is scope for much improvement in the form of enhanced supplementary nutrition than what is being currently offered by the ICDS scheme in Tigray parallel with improve the educational background of mothers.

However, the existence of the wasting, stunting and underweight in both food secured and unsecured households show that there are factor rather than the supplying of the food. Among the socio-economic factors that can affect the nutritional status of children is the educational background of the mother and the opportunity of the rural mothers to access different type of training on nutrition and health aspects. The results of the research detect the existence of the direct relationship between the educational background of the mother and

access to the different type of training on nutrition and the formal education at school.

According to the research, the mothers in the food secured households and who went to school and get access to training can prepare a separate dish for their children under five. Those are 53.3%, who are grade 4, 72.2% who are grade 6, 22.2% who didn't go to school at all and 100 % who are grade 8 respectively. Similarly, mothers who are in the food unsecured households and who went to school able to prepare a separate dish for their children. That is, 83.3% of mother who are grade 8, 55.6% of mother who are grade 6 and 40 % of mother who are grade 4 prepare a separate dish for the children under five from which they have at home.

Furthermore, the mothers who went to school can easily understand the advantage of the first milk to the physical and mental development of their children. Hence, 94.4 % of the grade 8, 61.1.% of grade 6 and 46.7 % of grade 4 and 22.2% mother who didn't go to school give the first milk to their children. 46.7%, who are grade 4, 38.9% who are grade 6, 5.6% who are grade 8 and 66.7% who did not go to school throw the first milk based on their traditional believe. Similarly, in the food unsecured households, 53.3% and 44.4% of mothers who are grade 4 and grade 6 throw it away respectively while 0% of mothers who are grade 8 throw it away. On the other hand, 100% of mother who are grade 8, 55.6 % of mothers who are grade 6 and 40% of mother who grade 4 have good understanding about the first milk and give it their children.

From the above findings, one can understand that it is not only the availability of food at home, it the knowledge on how to consume it. Mothers who went to school can reduce the malnutrition by preparing a separate dish for their children under five form the available resources at home. Most of the time rural mothers went to the farm areas carrying their baby at their back without any additional food for their baby though they prepare a dish for their

husbands. This affects the baby, which depend on the breastfeeding. However, the mothers, who went to school and get access to health training able to prepare two dish for their baby at their back when the mother have duties at the farm.

High prevalence of under nutrition of both kinds among under-fives highly suggests that there is a strong need for educating the mothers about timely weaning and weaning foods which are easily available in the local market, that too at low cost. Effect of mother's education on prevalence of under nutrition clearly favors the promotion of mother education and training on health issues. Local leaders, NGOs with much more effectiveness, can handle the work in this field.

Better nutritional profile of under-fives of educated mothers indicates that right to have education and to achieve 100% literacy will help in promoting the nutritional status of children as educated mothers are more aware of the health services available and the acceptance to utilize the same is better among them.

Over all, mothers' education persists as a strong predictor of child's nutritional status in all settings, even after controlling for other factors. Women who receive even a minimal education are generally more aware than those who have no education of how to utilize available resources for the improvement of their own nutritional status and that of their families.

Education may enable women to make independent decisions, to get acceptance by other household members, and to have greater access to household resources that are important to nutritional status. Educated women can get employment; have independent income that they can manage, and can have further the opportunity to select their partner for marriage. This shows other determinants of the nutritional status of children under five are determinants that the women can reduce their effects if they got educated.

Moreover, the educated women can select the living condition, place where to live, etc. which is comfortable for her child and herself.

This further indicates that if the mothers are educated and get employed, mothers will have control over purchase of dietary items can take care of their children more effectively which is reflected in better nutritional status of their children. Whereas children of poor employed and low educational background, mothers will have no control over purchase of dietary items suffer nutritionally. Thus the study underlines the need of improving mothers' status educationally even in low economic set up which in turn will help in improving the nutritional status of their children

5.2. RECOMMENDATION

The analysis reveals that attainment of complete primary (Grade 1-8) education by the mothers significantly reduce the probability of stunting, wasting and underweight, which is recommended that to reduce malnutrition and achieve the Millennium Development Goals (MDGs) in Tigray. Institutional arrangements for catering for complete primary education of girls and ensuring consistency in child health programs must strengthened, among others.

Malnutrition may manifest itself as a health problem, and health professionals can provide some answers, but they alone cannot solve the problem of malnutrition. Agriculturalists, and often-agricultural professional, are required to ensure that enough food and the right kinds of food to produce. Educators, both formal and non-formal, are required to assist people, particularly mothers, in achieving and ensuring good nutrition. Tackling malnutrition often requires the contributions of professionals in economics, social development, politics, government, the labor movement and many other spheres (FAO Corporation, Human nutrition in developing World 2009).

In a situation of high prevalence of malnutrition, it is very important to educate mothers to respond appropriately to prevent malnutrition before it sets in. This will require strengthening the package of preventive education in the targeted nutrition program. The health workers and the community volunteers need to be train on this and provide with adequate health education materials. The areas, which need to be stressed are exclusive breastfeeding for six months and appropriate (in both quantity and quality) and timely introduction of complementary feeding. Base on the study the following should be consider as food security indicator.

Top Determinants of nutritional status of children

➤ Education of mothers

Based on the results of the study, education of the mother should be the considered as the food security indicators. The education can be formal and informal education. Women's education is an important factor in improving children's nutritional status. In the long term, improving girls' education and women literacy and job skills will raise household income.

This will not only empower them, help prevent the occurrence of malnutrition among children, especially the under fives, but will also enhance the attainment of other development objectives: MDGs and Vision.

➤ Level of knowledge on breast-feeding

Most of the mothers did not have enough knowledge or did not internalize the exclusive breast-feeding. Mothers are to give additional from 3-6 months. Still now, mothers are practicing on giving their baby water and fenugreek when the baby has stomachache hence to avoid the problem there is s need for mothers education about breast feeding.

➤ **Level of knowledge of mothers on important feeding different type of food**

Infant and child feeding practices are major determinants of the risks of malnutrition. The result reveals that there are mothers who prepare a separate dish from cereals and beans. Though there is a level of improvement towards preparing a separate dish for the children under five, most of the children food is prepared from cereal and beans.

➤ **Knowledge of mothers on association between nutrients and educational back ground of the children**

Mothers have a little knowledge on the consequences of lack of nutrients on the educational background of their children under five. Mothers simply check whether their child had their meals regardless of the time and contents and composition of meals.

➤ **Nutrition status as food security Indicators**

Since the government of Ethiopia recognizes malnutrition as one of the major public health problems, the government should consider nutrition as food security indicators and has advocated for nutrition education at the national and local levels to improve the health status of all citizens. However, nutrition education is still unavailable to the majority of Ethiopians since most people cannot read or do not have access to nutrition information though there is a good start.

➤ **Community Education**

This component needs to be strengthened through all available channels like health and nutrition education of mothers and community at all contacts through , Primary Healthy Care Centers, Hospitals , health post at sub-district level etc. and use of mass media to educate the community. Emphasis in community education must be on:

- Exclusive breastfeeding for 6 months, and to avoid early supplements bottles unclean water etc. It is frequently practicing in Tigray that giving some supplementary foods.
- Maintenance of breastfeeding along with complementary feeding when the child is sick and additional feeding for one week after child recovers.
- Complementary feeding: introduction of nutritious foods i.e. high caloric protein and micronutrient content for a low volume
- Add a little oil to the weaning food to increase the caloric value.
- Add new items, one at a time such as cereals, beans, egg, milk, teff, sorghums, etc not to depend on the cereals and beans for most of the time , which seen in Tigray.
- Give vegetables and fruits and
- Teach them that they babies have the right to have micronutrients

Generally, exclusive breastfeeding should be encouraged among the mothers so that the status of most children can be improved. There is a need for more nutrition education. An educated mother is most likely to provide better health care in term of good nutrition and better hygiene, which will in turn improve the status of the subjects. There is a need for more attention on feeding and hygienic practices and easy access to portable water, which intern the problem of malnutrition can be reduced to the minimum. Moreover, survey of this nature should be conducted at intervals of at most five years so as it will assist government in knowing the nutritional status of those they governs and how to plan for improvement. Finally, the researcher waned to recommend that the community should stop giving birth with out any preparation just simply by expecting of any return from a baby on which did not make any investment, which is the most traditional thinking.

REFERENCES

- Afework Mulugeta and Fitusm Hagos, et al. (2006) "Factor contributing to Child Malnutrition in Tigray, Northern Ethiopia". Mekelle University,
- African Development Bank) (2010) "Human and Physical Capital: The Effects of Human Capital on Economic Development". ADB
- Alderman, Harold et al. (1997) "Child Nutrition, Child Health and School Enrollment :A Longitudinal Analysis". The World Bank Policy Research Department: Poverty and Human Resources Division.
- Alderman, Harold, et al. (1997) "The World Bank Policy Research Department Poverty and Human Resources Division".
- Alemu Mekeonnen et al. (2004) "Tackling Child Malnutrition in Ethiopia: Do the sustainable Development Poverty Reduction Programme's underlying Policy assumptions reflect local realities?". Ethiopia.
- Andolfatto, David , Ferrall, Christopher and Gomme, Paul (2000) "Human Capital Theory and the Life-Cycle Pattern of Learning and Earning, Income and Wealth." Federal Reserve Bank of Cleveland
- Asrat Wondimu,(2009) "Overview of Nutritional Status and Health Implication" Ethiopia,
- Atukwase et al.(2009) "Guidelines on Nutrition Survey Methodology in Uganda". Part B: Operational Manual for conducting a nutrition survey in Uganda. Uganda.
- Barbara and MK et al. (2003) "Credit with Education Impact" review No 3 Children is nutritional Status.
- Bassett, Lucy (2008) "Can Conditional Cash Transfer Programs Play a Greater Role in Reducing Child Under-nutrition?" Sp discussion paper No.0835: The World Bank.
- Bleakley, Hoyt (2010) "Health Human Capital and Development. " Booth School of Business: University of Chicago. www.faq.org/nutrition/Erg-Foo/food-insecurity).
- Burchi, Francesco (2006) "Education, Human Development, and Food Security in Rural Areas: Assessing Causalities". University of Rome.
- Byeongju Jeong (2001) "Measurement of Human Capital input Across Countries: A Method Based on the Laborer's Income".
- Central Statistical Agency and ORC Macro Ethiopia (2005/6) "Demographic and Health Survey". Ethiopia.
- CHI, Wei and QIAN, Xiaoye (2009) "The Role of Education in Regional Innovation Activities and Economic Growth: Spatial Evidence from China". China.
- Chiwaula, Maggie P.(2011) "Critical Appraisal of the Management of Severe Acute Malnutrition in Malawi: A Case of Two Hospitals in Zambia". Unpublished MPH: University of Malawi.

- Christiaensen, Luc & Harold, Alderman (2001) “Child Malnutrition in Ethiopia: Can Maternal Knowledge Augment The Role of Income?”
<http://www.worldbank.org/afr/wps/inde>
- Deaton, A. (2009) “Nutrition in India: Facts and Interpretations.” *Economic and Political Weekly* 44 (7): 42–65.
- EDPPC (2002) “Early warning department Disaster Prevention and Preparedness Commission.
- European Journal of Scientific Research (2008) “Human Capital Theory: Implications for Educational Development”. Ethiopia.
- FAO Corporation (2009) “Human nutrition in Developing World”
- Food and Nutrition Technical Assistance Project (FANTA) (2003) “Food Access Indicator Review”
- Galor, O and Mayer-Foulkes, D. (2002), “ Food for Thought: Basic Needs and Persistent Educational Inequality”. Mimeo.
- Genebo, T, et al. (1999) “The Association of Children’s Nutritional Status to Maternal Education in Ziggaboto, Guragie Ethiopia”. *Ethiopian Journal of Health Development* 13(1): 55–61.
- Gideon and Kruseman et tal. (2009) , Nutritional Status of Adolescent Girls from Rural Communities of Tigray, Northern Ethiopia.
- Glick, Peter (2002) “Women’s Employment and Its Relation to Children’s Health and Schooling in Developing Countries: Conceptual Links, Empirical Evidence, and Policies Cornell University.” [www.faqs.org/nutrition/ Erg-Foo/food-insecurity](http://www.faqs.org/nutrition/Erg-Foo/food-insecurity)
- Headey, Derek & Ecker, Olivier (2012) “Improving the Measurement of Food Security”. International Food Policy Research Institute. fpri-copyright@cgiar.org.
- IFPRI (2012) (Improving Measurement of Food Security),
- James, Maditdi M. (2009)” Prevalence of Childhood Malnutrition among under five Children in Regae Villge in Greater Marble Hall Sub –district in Limpopo” Limpopo.
- Jayatilaka Deepthi (2010) Implementing Food Security Indicators, www.phsa.ca/PopulationHealth
- Kebede Mengistu, et al. (2013) ”Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District”. Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Ethiopia.
- Kennedy, E., & Peters, P. (1992) “Household food security and child nutrition: The interaction of income and gender of household head *World Development*.”
- Light sarah kaye (2005) “use of indices in modeling child nutritional status in mali”. Mali

- Lucas, Robert E., Jr(1998).” On the Mechanics of Development Planning” Journal of Monetary Economics.
- Macro International Inc. Calverton, Maryland, USA (2008) “Nutrition of Young Children and Women”. Ethiopia.
- Macro International Inc.(2008) Nutrition of Young Children and Women, Ethiopia. Calverton, Maryland, USA: Macro International Inc.
- Mittal A , Singh J , Ahluwalia SK (2008) ”Effect of maternal factors on nutritional status of 1-5-year-old children in urban slum population”. Government Medical College, Patiala (Punjab), India.
- Mulugeta A, et.al (2010). “Child malnutrition in Tigray”. Northern Ethiopia.
- Neidell, J.Matthew (2000) “Early Parental time Investments in Children’s Human Capital Development: Effect of time in the first year on cognitive and non-cognitive outcomes”. university of California
- Noreen, prediville (2003). FAO Somalia/Food Security Assessment Unit, Nutrition and Food Security Information Systems in Crisis-Prone Countries.
- OECD (2007) “Lifelong Learning and Human Capital”. Organization for Economic Co-operation and Development. www.oecd.org/bookshop.
- Olaniyan. D.A & Okemakinde. T. (2008) “Human Capital Theory: Implications for Educational Development”. Euro Journals Publishing: <http://www.eurojournals.com/ejsr.htm>
- ORC Macro (2001) “Nutrition of young children and mothers in Ethiopia” Calverton, Maryland, U.S.A
- Parker Lynn and The Food Research and Action Center (FRAC) (2005) “Obesity, Food Insecurity and the Federal Child Nutrition Programs”. United State
- Prediville, Noreen (2003) “Nutrition and Food Security Information System in Crisis – prone Countries”. Italy.
- Robinson, Sylvia et al. (2010)” Implementing Food Security Indicators” Canada.
- Samson Taffese, et al, (1997) “Malnutrition and Enteric Parasitoses among under-five Children in Aynalem Village, Tigray”. Health and Nutrition Research Institute: Addis Ababa.
- Samson Taffese et al.(1997) “ Malnutrition and Enteric Parasitoses among under-five Children in Aynalem Village , Tigray “.Ethiopia
- Schultz, Paul (2000?) “The Formation of Human Capital and the Economic Development of Africa: Returns to Health and Schooling investments.” (African Development Bank, Economic Research Papers no 37) Yale University
- Seligman, Barbara et al. (1997/2002) “Reproductive Health and Human Capital” Washington and Ethiopia Health and Nutrition Research Institute.
- Ssewanyana, Sarah (2003) “Food Security and Child nutrition Status among urban poor household in Uganda: Implications for poverty alleviation”. Uganda
- State of the World Children’s (2005) A UNICEF REPORT: Childhood under Threat.

Tagel Gebrehiwot (2008) "Rural Food Security in Tigray, Ethiopia: Policy Impact Evaluation". Ethiopia

Wadime, Robert (1999) "WHO Nutrition Essentials: A Guide for Health Manager Training materials". Makerere University: Uganda.

Webb, Patrick and Bhatia, Rita (2005) *A Manual: Measuring and Interpreting Malnutrition and Mortality*. Nutrition Service WFP, Rome.

WHO (2006) "WHO Child Growth Standards based on length/height, weight and age". Geneva: Switzerland

Yimer, G (2000) "Malnutrition among children in southern Ethiopia: Levels and risk factors". *Ethiopian Journal of Health Development* 14(3): 283-292.



**INDIRAGANDHINATIONALOPENUNIVERSITY
SCHOOL OF SOCIAL SCIENCES
FACULTY OF ECONOMICS**

APPENDIX:1 Interview Questions for Mothers (semi-structured interview)

The purpose of this interview is to collect data and conduct a study on the project work entitled “Relationship between Household Food Security and Nutritional Status of Children under Five in Tigray: The Case of Klteawlaelo, Tigray, Ethiopia”. Its success largely depends on your earnest and kind responses. You are therefore, kindly requested to respond my interview questions. All your responses will keep confidential and used only for the research purpose. Thank you in advance!

1. Say, first I am going to ask you some questions about you're under five children. Who is giving take care of you children at home including the under five children?
 1. Mother
 2. Father
 3. Sister
 4. Brother
 5. Relative who live together
- 2 Educational background of the head of the household
 1. Grade 4
 2. Grade 6
 3. Grade 8
 4. Didn't go to school
- 3 How many time did you feed your children per day
 1. Once a day
 2. Twice
 3. Three time a day
 4. Based on demand
4. Did you prepare separate dish for your children?
 1. Yes
 2. No

5. If the answer is yes, what type food mostly you prepare?
 1. Cereals & beans
 2. Cereals & Milk
 3. Cereals & meat
 4. One of them
6. How long after birth should a baby start breastfeeding?
 1. Immediately
 2. Less than 1 hours after delivery
 3. Some hours later but less than 24hrs
 4. one day later
 5. more than 1 day later
 6. Do not think baby should be breastfed
7. Do you know about colostrums?
 1. Yes
 2. No
8. If yes, which type of advantages of colostrums?
 1. To prevent from disease
 2. Has higher value of proteins and vitamins
 3. Others
 4. Don't know
9. What should a mother do with the "first milk" or colostrums?
 1. Throw it away and start breastfeeding
 2. Give it to her baby by breastfeeding
 3. Others
 4. Don't know
10. How often should a baby breastfeeding?
 1. Whenever baby wants
 2. When you see the baby is hungry
 3. When the baby cries
 4. Other
 5. Don't know
11. Did mothers know the consequences of lack of nutrients to the education of their child when they go to school?
 1. Yes
 2. No
12. If yes, which type of consequences?
 1. The baby may not clever.
 2. The baby may not have good physical growth.
 3. The baby may not have good mental growth.
13. At what age should a baby first start to receive foods in addition to breast milk?

- 1. Two months old 2. Four months old
- 3. 5 months old 4. Six months old

14. Did you know that children has a right to have enough food?

- 1 Yes 2. No

15. If you, know from where did you get the information?

- 1. from the health extension workers
- 2. from food security workers
- 3. from human right workers at tabia level

16. Did your child become sick this year?

- 1. Yes 2. No

17. If the answer is yes, do you take your child to clinic?

- 1. Yes 2. No

APPENDIX 2: Nutrition Assessment Format

NAME	ID	HH	SEX	BIRTHDAT	MONTHS	WEIGHT	HEIGHT	EDEMA	MUAC