Explaining Child Malnutrition in Ethiopia: The Role of Socioeconomic Status and Maternal Health on Nutritional Condition of Children

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List of Acronyms

ANC	Antenatal Care
BMI	Body-Mass-Index
CSA	Central Statistical Agency
DHS	Demographic Health Survey
DW	Durbin – Watson Test
EDHS	Ethiopian Demographic Health Survey
HEP	Health Extension Program
EHNRI	Ethiopian Health and Nutrition Research Institute
EOS	Enhanced Outreach Strategy for Child Survival
ESHE	Essential Services for Health in Ethiopia
GDP	Gross Domestic Product
HAZ	Height-for-age Z score
HSDP	Health Sector Development Program
IUGR	Intra-Uterine Growth Restriction
LICs	Low Income Countries
MDGs	Millennium Development Goal
MH	Maternal Health
NGO's	Non-Governmental Organizations
NNS	National Nutrition Strategies
NNP	National Nutrition Program
FMOH	Federal Ministry of Health
OLS	Ordinary Least Square
PSNP	Productive Safety Net Program
QR	Quantile Regression
SD	Standard Deviations
SES	Socioeconomic Status
SNNP	Southern Nations and Nationalities People
TSFP	Targeted Supplementary Food Security Program
TSAM	Treatment of Severe Acute Malnutrition
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USA	United States of America
WAZ	Weight-for-age Z score
WB	World Bank
WFP	World Food Program
WHO	World Health Organization
WHZ	Weight-for-height Z score

Abstract

The present study examines the relationship of child under-nutrition with maternal health and socioeconomic status of households using the 2011 Ethiopian Demographic and Health Survey in the context of Ethiopia. The sample of the study consists of more than 9000 children who are less than five years of age, which can be considered as a larger country representation than the previous EDHS database. The study included a range of socio-demographic indicators with prior consideration on maternal health indicators, parental education, household wealth status and employment status and occupation of parents; which are sought to reduce the extent of the likely bias in a relatively large dataset.

Many biological and development evidences have addressed the wide spread negative consequences of malnutrition in early childhood. However, addressing its adverse impacts require to trace out the causes as well as their pathways. In this regard, many researchers have understood the close association between child nutritional status with maternal health as well as socioeconomic status (SES). This indicates that policies targeting maternal health, education and poverty should also embody the reduction of child malnutrition as one of their major objectives. So, addressing the problems associated with this health and development factors helps not only to improve the health of mothers and household socioeconomic status; but for reducing the intergenerational impact of malnutrition as well thereby improving the health of children and contributes to the reduction of mortality.

The results of this study confirm that maternal health, household income and maternal education have strong association with short and long-term child nutritional status. In addition, father's education and employment as well as occupation in most of the non-professional works have a significant association with the short-term child nutritional status at moderate level. The role of maternal employment on short-term child nutritional status shows that it has positive impact on children with low nutritional status and negative for those with higher nutritional status. Besides, mother's engagement on unskilled labour occupation was found to be a positive factor for the short-term child health. However, the association of parental employment and occupation type with long-term child nutritional status was found to be very weak or almost insignificant at all. Hence, the presence of significant relationships on maternal health and most of the SES factors in our quantified estimates depicts the role of socioeconomic status and maternal health on determining the distribution of child malnutrition, and contextually in Ethiopia.

Relevance to Development Studies

Emphasizing the role of proper nutrition on the overall development of a country, the current study rests on the two premises of maternal health and household socioeconomic status; which are both the cause and effect of remaining in poverty trap. Although, empirical studies on the role of maternal

health and on either one component of SES on child malnutrition is well documented, many country specific studies do not paid much attention to the extent of the role of father's employment and occupation of parents on child health. In this regard, the study included the employment status and occupation of both parents among the other socioeconomic factors; and calls for the need to emphasize on integrated interventions of different sectors for proper addressing of child malnutrition. So, the study is hoped to contribute to the empirical evidences on the aspects of child malnutrition, emphasizing that addressing malnutrition is not only limited to the health sector and with a focus on the underlying determinants of child malnutrition i.e. SES and maternal health.

Keywords

Child Malnutrition, Child Health Maternal Health, Socioeconomic status, parental employment status, Parental Education, HAZ, WHZ, BMI, OLS, Quantile regression, Ethiopia

Chapter 1 : Introduction

1.1 Background

Malnutrition and hunger manifest both the cause and result of a household's exposition to shocks, a prominent indicator of household food insecurity, poverty and a sign for the unmet of the basic wellbeing requirements of a society (Mazumdar 2012). The term malnutrition represents the abscence of balance between the acquired food nutrients of the body and what it actually requires. Under-nutrition and over-nutrition are the two forms of malnutrition; and under-nutrition refers to the uptake of insufficient nutrients and over-nutrition is the contrary (Müller and Jahn 2009: 287). Undernutrition has many life threatening impacts which can include higher risk of severe infections, chronic electrolyte imbalance and mortality (EHNRI 2010: 2).

The reduction of malnutrition (from under-nutrition) and poverty are the primary objectives of low and middle income countries which form part of the first lists in the Millennium Development Goals of United Nations (Block et al. 2012: 1699). Beyond solving the problem of hunger and undernourishment; improving nutrition is a form of investment on human capital which enhances productivity and contributes to long-term economic growth. Therefore, attaining development in economic and human wellbeing dimensions require to put nutritional issues as a priority in government development plans (Benson et al. 2005: III& 7). Otherwise, the opportunity costs of not investing on nutrition can reach up to 10% reduction of an individual's lifetime income which is attributable to his low productivity, and around 2–3 percent of GDP of a country (Acosta and Fanzo 2012: 10). Hence, considering these adverse consequences, nutritional aid for enhancing the global nutrition is presumed to be an efficient way of providing aid (Wojcicki and Heyman 2010: e1617).

Malnutrition may stay for short-term but prominently, it is long-term which starts in early years of life and continues to later ages with the negative consequence of damaging generation by transferring a suffering legacy (Rajkumar et al. 2012: XII). However, the exposure to malnutrition in the early years of life time can accrue to the vulnerability of a household and can further lengthen the situation of staying in the vicious cycle of poverty (Mazumdar 2012: 1). Hence, frequent and chronic attacks of malnutrition in early childhood have a potential negative impact on the physical and mental growth of children (EHNRI 2010: 2). Besides of these impacts, there is a possibility that malnutrition may expose children to chronic diseases which furthur exacerbates the high rate of child morbidity and mortality (Pathak and Singh 2011: 577). Indeed, these long-run adverse impacts of child malnutrition on the overall wellbeing and economic growth of the society manifests the decisiveness of the nutritional condition of children (Müller and Jahn 2009: 287).

In the developing world, reports on child health clearly depict the fact that more than 50% of child deaths are caused by minor malnutrition problems (Silva 2005: 2). As such, severe malnutrition has a negative impact in one out

of three under five children in the developing economies and eighty percent of these children are found in only 22 countries (Acosta and Fanzo 2012). In Sub-Saharan Africa, around 38% of under five years of age children are stunted; and wasting affects 9% of children who have not yet reached school entrance age (Fillol et al. 2009). Although the majority of malnourished children live in Asia and Sub-Saharan Africa, malnutrition is not necessarily a problem of politically unstable regions and those affected by acute disaster. Rather, it is mostly a silent emergency in stable societies (Müller and Jahn 2009: 291).

In Ethiopia, the perpetuating humanitarian costs of pain, poverty and misery for the numerous undernourished people are tremendous. The total costs of malnutrition compose a major obstacle on the efforts to enhance sustainable economic growth and wellbeing (Benson et al. 2005: III). Thus, indicators of child malnutrition in Ethiopia are witnessed to be among the worst in the globe, and the country is one of the 36 that make up about 90 percent of the globe's stunted children. Accordingly, approximately 270,000 children die every year due to malnutrition in the country (EHNRI 2010: 2). In spite of the prospective improvements, stunting in Ethiopia persists to be high by developing countries' standard with about half of Ethiopian children are stunted at the age of 2 with a height shortfall of 11 centimetres (Rajkumar et al. 2012).

The World Health Organization (WHO) database on the indicators of malnutrition in Ethiopia shows that more than half of the children who are less than five years of age were stunted in 2005 as can be seen in table 1-1. Compared to the prevalence rate of stunting among the other countries; the figure is the highest of all followed by Nepal and Bangladesh. It is also depicted in the table that Ethiopia has the fourth largest number of underweight children following Bangladesh, Nepal and Burkina Faso. Furthermore, wasting seems to be a less pronounced form of malnutrition in Ethiopia as well as in these countries under consideration, but in comparison with the others, its prevalence rate is the highest in Burkina Faso.[1]

[1] The Countries included in table 1 are classified as LICs by the World Bank (WB) and have higher per capital income than Ethiopia except the lower middle country of Lao People's Democratic Republic (World Bank 2013).

Table 1-1 Child Malnutrition Indicators in Low Income Countries (LICs)

Country	Year of survey	Percentage of stunted children	Percentage of underweight children	Percentage of wasted children
Bangladesh	2005	47.8	39.2	12.3
Nepal	2006	49.3	38.8	12.7
Central Africa	2006	45.1	28	12.2
Gambia	2006	27.6	15.8	7.4
Ethiopia	2005	50.7	34.6	12.3
Tanzania	2005	44.4	16.7	4.9
Burkina Faso	2006	42.4	37.6	24.4
Cambodia	2006	43.7	28.4	8.3
Lao People's Democratic Republic	2006	47.6	31.6	7.3

Source: Extracted from WHO (2013)

The causes of child malnutrition range from the immediate determinants of diet and infectious diseases to the underlying determinants of household food security, population boom, and health and education status of care givers, sanitation and health services and other related factors. These in turn are linked to the basic determinants of malnutrition that encompass the formal and informal social institutions, the structure of the economy, the political and ideological structures and the latent resources of the society (Acosta and Fanzo 2012: 10, Benson et al. 2005: 2-3). In light of this, the primary focus of the present study is on the underlying determinants of maternal health and socioeconomic status in the context of Ethiopia.

1.2 Problem Statement, Objectives and Research Questions

The level of physical body growth in the early ages of childhood is the most significant indicator of health and nutritional status. However, the interference of malnutrition in the early body growth process brings about one of the following: stunting, wasting and underweight or all the three (Wojcicki and Heyman 2010: e1617). Beyond its impact on physical development, undernutrition interferes in mental development and can cause lower school performance, lesser years of completed schooling, long-term cognitive deficits and subsequently leads to inability to attain crucial skills which constrain their future employment opportunities (Fentaw et al. 2013, Humphrey 2009: 1032). The aim of this study, however, is on the physical growth consequence of malnutrition on children under five years of age.

The growth failure caused by malnutrition during gestational period and two years after the birth of the child can not be reversed at later years of lifetime (Rajkumar et al. 2012: XXV). In the context of this lifetime period, the role of maternal health is decisive since since it dictates the fetal growth and its birth weight (Ramirez et al. 2012: 5). Hence, the probability for a mother who is not properly nourished to give birth to a low-birthweight baby who can be exposed to disease and death easily is also high (Müller and Jahn 2009: 287). Inspite of the persistence of this negative impact, around 30 million new malnourished babies continue to be born in the developing world every year due to inadequate nutrition during their fetal life cycle (Fentaw et al. 2013: 1). In the words of Allin and Stabile (2012) also, *"children whose mothers have poor*

health are more likely to experience poor health themselves because either they inherited predispositions to ill health or they grow up in a less nurturing or less healthy environment." Accordingly, beyond the negative consequence on the fetal stage children, poor maternal health leads to inadequate care to the child and nutrient-deficient lactation (Fentaw et al. 2013: 130, Black et al. 2008)

In addition to the role of maternal health; child malnutrition like the other health aspects is determined by social factors (Helga et al. 2011: 741-742). Indeed, these social factors are the underlying basis for most of the common causes of child morbidity and mortality, and also determine the distribution of risks (associated with health) and childhood illness in the society (Spencer 2010: 157). Socioeconomic factors are the main social determinants which strongly influence the distribution of wellbeing and health in the society. Hence, based on the socioeconomic factors of income, education, and employment; children living in lower social standards are most likely to be unhealthy than children in better living conditions (Helga et al. 2011: 741-742).

This study is aimed to examine the role of maternal health and socioeconomic status of parents on child nutritional status and to what extent these factors explain the level and distribution of child malnutrition in Ethiopia. Specifically, the study forwards three questions: The first is to examine the correlation of short and long-term maternal health conditions with child nutritional status. The second is to assess the role of household income and type of occupation on child health and the third is to examine the role of parental education on child nutritional status by focusing on the independent role of maternal and father's educational level.

In order to answer the above research questions, the study centres on the following three major objectives,

- To provide a discussion on the determinants of child malnutrition and the extent of the problem in the context of Ethiopia,
- To assess a logical and contexual framework of maternal health and socioeconomic (SES) factors of income, education and employment in light of the theory of household decision making, and
- Thirdly, the research attempts to provide a quantified estimate of the impact of maternal health and SES factors on nuritional status of children under the age of five, and review the programs and strategies designed to curb child health and malnutrition in Ethiopia.

1.3 Relevance and Justification

Due to the widespread negative consequences of child malnutrition, the topic has attracted many scholars in the development arena. Thus, numerous cross-country and country specific studies have been undertaken using cross-sectional as well as panel data. Similarly, several studies have been undertaken in Ethiopia with the aim of addressing the potential determinants of child malnutrition. To begin with, Girma and Genebo (2002) studied the determinants of child and maternal nutrition using the 2000 Ethiopian Demographic and Health Survey (EDHS) data and found that parental education, household wealth, age of the child, number of antenatal care (ANC) visits of the mother, birth order and birth interval are important determinants

of child malnutrition. Even though this study has covered a wide range of potential determinants of child malnutrition, it has not made any consideration on the likely role of father's employment and the differential impact of parental occupation. Secondly, the study of Christiaensen and Alderman (2004) had showed the role of income and maternal knowledge on child malnutrition using a pooled three years data of the mid 1990's. The results of this study depicted that food prices, education of parents and family wealth are the major factors of child malnutrition in Ethiopia (Christiaensen and Alderman 2004: 308). Although the study has included the household expenditure in the analysis; it is silent on the source of the expenditure i.e. it limits itself from accounting maternal and partner's employment as well as their occupation.

Similarly, another study by Silva (2005) analysed the likely impact of the environmental services of sanitation and water on malnourishment of children using the 2000 EDHS data. As such, the analysis indicates that maternal education, household wealth, height of the mother and age of the child significantly determine the nutritional condition of children (Silva 2005: 1). Here again, though the study provides a prominent insight on maternal health, no consideration for parents' employment status is made. Similarly, Seid (2013) studied the role of maternal characteristics of education and health on child health using the 2005 EDHS data and found that these characteristics, especially the long-term maternal health status have decisive role on the enhancement child health in Ethiopia. Despite his study provides good methodological guide to child health studies; it has not made any attempt to control for the role of father's employment and the occupation of both parents.

Unlike the previous studies in Ethiopia, the contribution of the present study its inclusion of the role of partner's employment as well as parental occupation along with maternal health and the other SES factors of parental education, household income and maternal employment status on the nutritional status of children. Hence, in view of the connectivity of maternal health and socioeconomic factors of child malnutrition with different sectors of the economy as identified in the literature, the study is sought to emphasize the need of coordinated action among different sectors of the economy on the on-going and future efforts of alleviating child malnutrition specifically, and poverty reduction generally. Moreover, the study employed the recent new data from the 2011 EDHS which covers larger number of children compared to the previous EDHS surveys. In fact, the usage of the new WHO growth standard measurement of children in the 2011 EDHS, which has a better reference category for children irrespective of their country of origin (CSA and ICF International 2012: 156) helps to have a better representative results. So, the empirical results extracted using the 2011 EDHS are less comparable to studies made using previous EDHS surveys. Furthermore, considering the severity of the problem in Ethiopia, the study may contribute to indicate the priority policy areas that need urgent response in the context of LICs. Above all, the study will add up to the existing literature on the empirical works of child malnutrition.

Chapter 2 : Review of Related Literature

2.1 Theoretical Framework and Conceptual Perspectives

2.1.1 The Household Health Capital Model

The theoretical framework that backups the present study is the household health capital model of Grossman's (1972). Grossman (1972) developed the model of health capital with the assumption of that individuals inherit an initial stock of health which depreciates over time but that can be accumulated through gross investments. These health capital investments are in turn produced by household production function using the direct inputs of consumer time and marketed goods of medical care, exercise, diet, housing and recreation. In addition to these inputs, the production function is also determined by some environmental variables like education and other socio-demographic factors. In this regard, education is viewed as the prominent environmental factor since it exerts significant influence on the efficiency of the production process. In view of this health capital model, the health of a person is endogenous, as it is partially determined by the level of investment outlays allotted for its production (Grossman 1972: 224-225). Strauss and Thomas (1998) extended the work of Grossman (1972) and formulated a household production equation for health outcomes which is a function of health inputs and labour supply. In this health production function, the dynamic nature of the technology as well as its variability with socio-demographic characteristics, parental health, family characteristics, community public health services and treatment practices and the prevalence of disease in the surrounding are considered in producing the health outcomes (Strauss and Thomas 1978: 776).

The demand for health emanates from its serving for the purposes of consumption and investment. First, as a consumption good, health forms part of the goods in the utility function since a person's sickness diminishes his utility. Secondly, as an investment commodity, it dictates the time allocation to nonmarket and market tasks (Grossman 1972: 225). Therefore, health is encompassed in the overall household utility function and household' utility depends on health outcomes, labour supply, consumption of purchased goods like foods and health inputs, observable characteristics (which includes schooling and family background measures) and unobserved characteristics of preferences and tastes. Hence, households maximize utility subject to budget, time and health constraints (Strauss and Thomas 1998: 777). Accordingly, the health capital model enables to study the impact of socio-demographic factors, household economic status, family health and other community services on health outcome. Hence, these factors can appear in the analysis of health outcome through their effect on health capital cost or improving efficiency of producing good health (Grossman 1972: 247). Similarly, the model can be used to study child health and nutritional outcomes as a function of health, family and environmental factors which is elaborated in the methodology section.

2.2 Determinants of Malnutrition and the Pathways

Malnutrition is determined by a number of multi-level factors which ranges from the immediate causes of infectious diseases to the overall aspect of the human, agro-ecological and technological setting of the society as can be seen in figure 1. The underlying determinants form the core linkage between the immediate and basic causes of malnutrition. Even though the immediate determinants are usually the main focus of many programmes and actions, the deeper underlying causes are very decisive for sustainable change while the basic determinants heavily rely on eradicating poverty and malnutrition from the roots using a good structure of governance and political readiness (Acosta and Fanzo 2012: 10-11). In this regard, the concerns of the present study: maternal health and socioeconomic factors are categorized in the underlying causes under the aspects of care giver and food security resources (figure 1).

2.2.1 Relationship between Maternal Health and Child Nutritional Status

The link between maternal health and child nutrition in the gestational period can be illustrated in two ways. To begin with, the intergenerational relation between child and mother's health dictates small mothers to have small children in the future and vice versa (Girma and Genebo 2002:3). The second is the health problems during pregnancy such as maternal under-nutrition; low weight gain or weight loss, hypertension, infection, alcohol consumption and the usage of drugs exacerbate the risk of malnutrition to fetal stage children (Ramirez et al. 2012: 5). In respect of this second way, abnormal Body-mass index (BMI) of the mother (lower or higher) has the implication of increasing delivery and pregnancy complications (Black et al. 2008: 244). The combination of the two results in higher risk of exposure to Intrauterine Growth Restriction (IUGR)[2], which then leads to low birth weight and height (Victora et al. 2008: 342).

Likewise, the association of maternal health on the early (up to three years) with child health also runs in two aspects. Firstly, the concentration of micronutrients in breast milk is partially associated with maternal health status though the effect on the volume of the milk is negligible unless in severe circumstances. Thus, if the mother has deficiency in these micronutrients; it causes decrease in the body size of infants (Black et al. 2008: 245). Secondly, mothers with poor nutritional and health status fail to provide higher quality care to their children (Smith et al. 2003). Consequently, the pre and after birth impacts of poor maternal health accompanied by inadequate nutrition in the first two years of life lead to linear growth failure (Ramirez et al. 2012: 5, Victora et al. 2008: 342). Besides, the adverse impacts of poor maternal health on children extends to later years of life since Intrauterine Growth Restriction (IUGR) contributes to short stature, which exposes girls to a complex delivery at child bearing age and consequently affects future generations (Müller and Jahn 2009: 292).

[2] IUGR is a state of deficient fetal development which is used to define the small birth weight of newborns for their gestational age with a common used threshold of less than 10 percent of predicted fetal weight (Vandenbosche and Jkirchner 1998).

2.2.2 Socioeconomic Status (SES) and Child Health

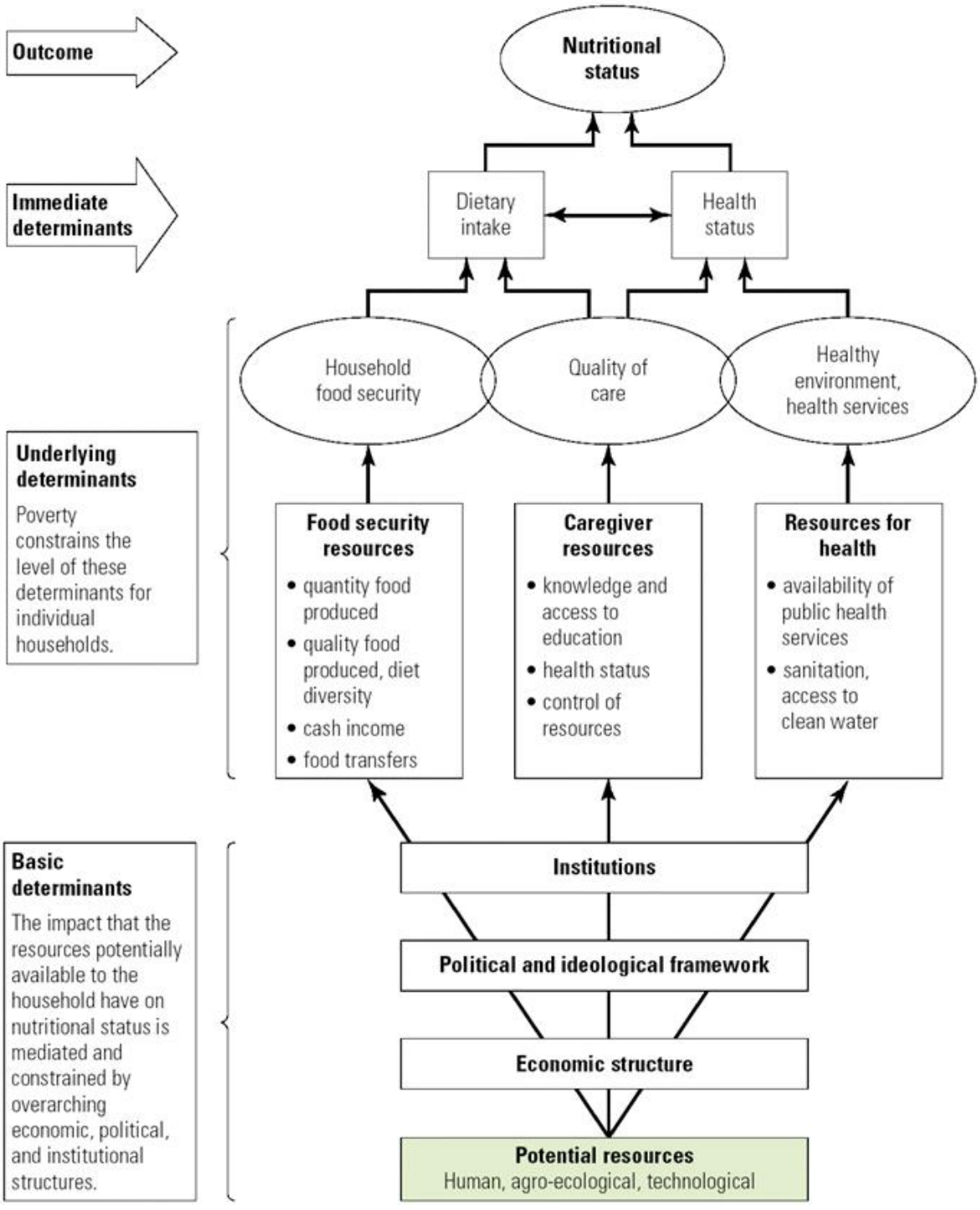
Social inequities in the health of children emanate due to the complex relationship between the more distal social elements like area deprivation, household income and education with the very proximal factors such as health behaviours. So, there is no direct causality between these social factors and child health outcomes; rather, their impacts work through mediating socially-related risk and preventive exposures like environmental conditions and health-related behaviours which group the society in different social classes. So, "*Socially patterned health outcomes are the biological expression of social determinants. In other words, the social translated into the biological.*" With regards to affecting child health, these social determinants of health begin their influence prior to pregnancy by affecting maternal health, which consequently leads to low birth weight and child malnutrition (Spencer 2010: 157-159).

As part of the social inequities, socioeconomic factors of education, income and employment provide a root for inequalities of health. In fact, it is indicated in various researches that the persistence of socioeconomic inequalities in health both across and within countries at any level of development retards the growth process towards the achievement of the Millennium Development Goals (MDGs); especially, maternal and child health and the first MDG of reducing hunger by half in 2015 (Pathak and Singh 2011: 742). To begin with the socioeconomic factor of income, the association of income with child health and nutrition is hypothesized in the economics literature in two mechanisms. The first pathway is related to the capacity of children to cope with health shocks. In this case, children from parents of different socioeconomic level may face similar kind of injuries or sickness; however, parents having higher level of income and education are in a better position to invest in their children's health and make better decisions about using health services that can help to withstand the impact of these shocks. In the second way, the arrival rate of health shocks like sickness, accident and others to children of families in poor socioeconomic set up is higher than those with advantaged parents, which may be linked to the living environment of the poor families (Allin and Stabile 2012: 228).

With regards to the socioeconomic aspect of parental education, the possible channels which are usually portrayed in the literature through which parental education impacts child malnutrition are various. Firstly, father's schooling equips them with knowledge of health which then impacts on the immunization of children. Secondly, schooling give mothers wider opportunity in the labour market, access to and usage of media and better health knowledge which subsequently enhances nutritional status of children. Thirdly, education has a decisive role for empowering women in their households which ultimately impact their child weight (Aslam and Kingdon 2012: 2029). On the other hand, Christiaensen and Alderman (2004) mentioned three mechanisms through which maternal education enhances child nutritional status. In the first instance, there is a direct transfer of health knowhow through regular education that enables women to be knowledgeable mothers in the future. Secondly, educational skills of literacy and numeracy enable the mothers to early detect health problems of their children. Lastly, education gives women the opportunity of exposure to modern society which makes them open to accept modern medicine. In addition to formal schooling, it is argued that

knowledge of mothers about nutrition, has a paramount importance on the level of child malnutrition in many developing countries (Christiaensen and Alderman 2004: 288&308).

Figure 1: Pathways of Malnutrition



Source: Adopted from Acosta and Fanzo (2012) - Figure 1 and page no. 11

2.3 Empirical Literature

As discussed so far, maternal health is one of the major factors for child survival, and it is a known fact that children of no mothers are more likely to die than those with mothers (McCoy 2010: 88). In fact, many empirical studies have supported this with different statistical techniques. To begin with, a systematic review of long-term impacts of maternal and child under-nutrition in villages of the five countries of Guatemala, India, Brazil, South Africa, and the Philippines showed that poor maternal health (represented by shorter height) were found to be associated with increased risk of intrauterine growth restriction and growth failure in the early years of childhood. Hence, in the empirical investigation, it was found that a one centimetre higher mother's height was associated with about 0.5 cm increase in the height of a child during his adulthood. Likewise, it was also found that mother's body size has a firm association with weight and height of new babies and those in early childhood. So, in response to an increase of maternal birth weight by 100 gram in Guatemala, it was found that baby's birth weight and height had increased by 29 gram and 0.2 centimetres respectively. Similarly, in India, the weight of the mother during pregnancy was found to be a main parameter of forecasting a baby's birth weight (Victora et al. 2008: 342&346).

Many studies have also shown that people in the lowest standard of living are primarily the ones to be in the worst health. For instance, height of children are likely to increase with household income in most of low-income communities, and children with good nutritional status have similar height across the globe excluding those in South and East Asia; where children with good livelihood have also short stature (Strauss and Thomas 1998: 772). With regard to this differential of children nutritional status; the study of Helga et al. (2011) in Peru and the region of Peruvian Andes showed that the wealth of households (a proxy for household income) has a strong relationship with the rate of stunting and child malnutrition increases while going from the upper richest quintile to the lowest poorest quintile. Meanwhile, a study undertaken in the Andean region countries' of Colombia, Peru and Bolivia on ANC and its role for child malnutrition shows that ANC services are more or less fairly distributed than wealth, so increased extending of the services without enhancing the quality has little effect on the reduction of under-nutrition. Subsequently, they concluded that household wealth had a strong direct and indirect role in dictating inequalities in child malnourishment (Ramirez et al. 2012: 15).

Similarly, Pathak and Singh (2011) studied child malnutrition in India across different regions from 1992 to 2006 and found that there had been a decline of child under-nutrition; which is however, coupled with the rising inequality in the extent of malnutrition between the poor and rich categories irrespective of the region of their residence. Therefore, there had been a wide variation of child under-nutrition among the different economic classes across the regions with the largest differences were manifested in most economically developed areas. Thus, the study concluded that much of the burden of malnutrition is on children of poor families (Pathak and Singh 2011: 576&583).

Researches also show that the employment and occupation of parents has an impact on the distribution of child nutritional status. In this regard, it had been observed that the probability of malnourishment for children whose

fathers engaged in the agricultural sector is larger than those engaged in the other sectors of the economy in Guatemala. In contrast to this, however, the analysis of Helga et al. (2011) in Peru and Peruvian Andes shows that father's engagement on any type of occupation does not have differential impact on child under-nutrition. With regards to mother's employment, the study of Seid (2013) on the role of maternal characteristics on child health shows that children with unemployed mothers are better off in terms of health and nutritional status. Similar to Seid (2013), the empirical analysis in Peru and the region of Peruvian Andes indicate children with unemployed mothers have better nutritional status than those whose mothers working on professional and service occupation, and those children whose mothers are working in agriculture are not worse off than those with mothers working in the professional and service occupations. In contrast, a study undertaken in one part of Nicaragua had showed that maternal employment has a positive impact on child health (Helga et al. 2011: 742&745).

Coming to the other socioeconomic factor of parental education; there has been a claim that education has been played a more important role to the fall in the rate of mortality than the accessibility of medical services. Besides, there is also a firm argument that mother's education is more decisive factor than the father's for the health children's health. The rationale behind this presumption is the contextual situation of developing countries which mostly allocates the responsibility of raising children in the household to the mother (Christiaensen and Alderman 2004: 2). Coming to the empirical evidences; researches conducted in Dominican Republic, Colombia and Thailand indicate that uneducated mothers are likely to have malnourished children than those educated by more than 200 percent (Helga et al. 2011: 742&745). Furthermore, the empirical works undertaken in many developing countries depict that a small amount of educational knowhow of mothers has a paramount importance for improving the survival of a child (Aslam and Kingdon 2012: 2014). With regards to this, in a study of child malnutrition in Peru and the Peruvian Andes; it was found that large gain of reducing malnutrition is associated with a small level of mothers 'education. Thus, incomplete secondary schooling or primary education was enough for a secured nutritional status of children (Helga et al. 2011: 745). So, the accrual of maternal education benefits to a child health does not require of attaining any benchmark level on the educational hierarchy (Aslam and Kingdon 2012: 2014). On the other hand, in the study of Silva (2005); even though maternal education was found to have significant relationship with child nutritional status in Ethiopia; the magnitude of the impact is found to be negligible which is likely to be attributed to the low level of school enrolment of girls.

In contrast to the above findings, Mazumdar (2012) did not find any significant relationship between long-run child malnutrition indicator (stunting) and maternal education in Egypt. Rather, care givers' health seeking behaviour, child care and feeding practices were strongly associated with child nutritional status (Mazumdar 2012: 11). Similarly, Agee (2010) emphasized that mother's knowledge regarding child care practice, nutrition and growth monitoring of children can augment the role of formal education in areas of low access to schooling and scarce community resources. In line with this, his analysis of the impact of mother's information (education) about access of health facilities and family wealth in Nigeria showed that the positive impact of accessibility of

health services and household wealth is reduced by lower maternal education or knowledge shortfall about child health and nutrition matters (Agee 2010: 1973-1974&1979). Although the study of Helga et al. (2011) did not find any significant role of father's (mother's partner) education for the nutritional status of children in Peru; a study conducted in Indonesia found that partner's education is as important as maternal education for child survival. On the other hand, some studies in Bangladesh had shown that child malnutrition is more affected by partner's (father's) education than of mother's (Aslam and Kingdon 2012: 2014). Likewise, a study in the Philippines identified father's education as one of the factors that significantly affect child health (Helga et al. 2011: 742). Potential explanation for the larger importance of father's (partner's) education could be the fact that fathers are mostly at higher level of education than mothers in the context of many developing countries. Secondly, the patriarchal social system in most developing societies praises the role of fathers' education and constrains the economic emancipation and participation of women in child health decision (Aslam and Kingdon 2012: 2014-2015).

As explained in the above empirical works, including those country-specific studies in Ethiopia explained under section 1.3, the literature seems to be consistent with respect to the impact of maternal health and household income on child malnutrition. However, the role of maternal and father's employment and their occupation, maternal schooling as well as father's education on child malnutrition is inconsistent. As also explained previously, previous literature in Ethiopia is mostly silent on the role of father's employment and parent's employment by occupation type. Motivated by the inconsistency of most of the SES indicators and the gap in Ethiopia, the current study foresee for potential explanations in the SES paradox in combination with examining the role of maternal health status on child malnutrition.

Chapter 3 : Methodology

3.1 Source of Data

The present study uses the 2011 Ethiopian Demographic Health Survey (EDHS) data, which is obtained from the Ethiopian Central Statistical Agency (CSA). This recent survey is the third country-wide demographic and health survey following the first in 2000 and the second in 2005. The EDHS form part of the global MEASURE DHS project and have been undertaken through the financial support of the United States Agency for International Development (USAID). The survey included nationwide representatives of 17,817 households and interviewed 14,110 men of age 15-59 and 16,515 women of age 15-49. Based on the administrative stratum of the country and the 2007 Ethiopian census, the 2011 EDHS sample was selected using a stratified sampling technique. In the administrative system of Ethiopia, regions in Ethiopia are classified into zones, zones are then divided to lower administrative units named weredas, and every wereda is further classified into the lowest administrative units known as kebeles. Thus, following the 2007 census partitioning of each kebele into census Enumeration Areas (EAs); two-stage cluster design was used in the 2011 EDHS survey. Following this sample strategy, EAs were the sampling units for the first stage and households comprised the second stage of sampling. Following this, the survey has included information for all the nine regional states and the two city administrations on child health, household characteristics, mother's health and women empowerment. In addition, anthropometric measurements for children under five and women of age 15-49 were also included in the EDHS survey (CSA and ICF International 2012: XV, 7&156).

In the 2011 EDHS, around 11,152 under five children were found to be eligible for height and weight measurement. However, measurement results are available for 10,480 children; of whom 5.6% have missing information, more than 3% has weight or height measurements which are out of plausible limits and around 1% have incorrect age information (CSA and ICF International 2012: 8-9). Thus, after adjusting the sample data to exclude outliers and those with missing information; a total of 9,611 children are included in the present study.

Unlike the two previous DHS surveys; the 2011 EDHS had used a new WHO standard for measuring the nutritional status of children that was published in 2006 (CSA and ICF International 2012). In view of this, the usage of the previous child growth standard was criticized since its reference group was drawn from USA population that dominantly consists of formula-fed babies (Seid 2013: 191). This new standard was developed based on the WHO Multicentre Growth Reference Study which comprised of 8440 Children from the six countries of United States, Norway, India, Brazil, Ghana and Oman. As such, the new WHO growth standard of children is a better reference for monitoring the growth of children on the globe under optimum condition irrespective of the feeding practices, ethnic origin and socioeconomic conditions (CSA and ICF International 2012: 156).

3.2 Modelling Child Health and Nutritional Status

Cross-sectional analysis of the 2011 EDHS is employed to analyse the correlation of child malnutrition with maternal health and socioeconomic status. In line with this, theoretical arguments indicate that some health indicators like height are more or less static and do not show considerable change during adulthood (Strauss and Thomas 1998: 784). Similarly, it can be argued that there is no a marked change in the education level of parents in many circumstances in the context of Ethiopia. Hence, a cross-sectional analysis is partly justified from theoretical perspective.

As indicated in the theoretical framework, child health outcome is formulated as a function of marketed and non-marketed goods, socio-demographic as well as various environmental factors in the works of Grossman (1972) and Strauss and Thomas (1998). Nonetheless, estimating the child health production function needs a wide range of data on the price of inputs, the technology and quality of medical care service for identifying the various endogenous inputs. However, information on these issues is not available in most experiences. Thus, in the absence of complete information, many studies accustomed to use the reduced (quasi-reduced) form of child health demand function (Handa 1999: 423). Although the reduced demand equation cannot help to identify the marginal productivity of endogenous inputs; it is still helpful in providing parameter estimates and predictions that are essential for policy purpose (Handa 1999, Rosenzweig and Schultz 1983: 726, Seid 2013). Based on this framework, the current study follows the work of Seid (2013) for functional specification of child nutritional outcome. Thus, our functional specification assumes nutritional status of a child as a function of household, parental, child and environmental characteristics. The quasi-reduced linear child nutritional production function can be written as follows:

$$\mathrm{N_i} = \beta_0 + \beta_1 \mathrm{X_i} + \beta_2 \mathrm{SES_i} + \beta_3 \mathrm{MH_i} + v_i$$

The response variable $(\mathrm{N_i})$ in the equation refers to nutritional status of child i, which is measured by the three anthropometric measurements. The covariate $\mathrm{X_i}$ stands for a vector of child, parental, household, and environmental exogenous characteristics for individual i. $\mathrm{SES_i}$ refers to socioeconomic status associated with child, which is measured by education, employment status and household income. $\mathrm{MH_i}$ is maternal health for mother i, which is measured by the anthropometric indicators. Further, v_i is the random error term and it is assumed to be identically and independently distributed(iid). Since the Nutritional and Health status indicators of height-for-age (HAZ), weight-for-height (WHZ) and weight-for-age (WAZ) are continuous variables, as contrary to discrete indicators (Ramirez et al. 2012: 5); this equation is estimated using OLS estimation method. Moreover, our nutritional function is specified under chapter using the Quantile regression (QR) on the basis of the OLS.

3.3 Description of Variables

3.3.1 Dependent Variable

Rate of stunting, wasting and underweight among children less than five years of age are the commonly used anthropometric indicators of malnutrition, which refer to height-for-age (HAZ), weight-for-height (WHZ) and weight-for-age (WAZ) respectively (CSA and ICF International 2012: 156). Stunting is an indicator of long-term chronic malnutrition which shows the cumulative deficit and retardation on children's growth. Thus, it is not responsive to dietary intakes in the short-run; rather, it is aggravated by severe and repeated sickness. So, stunted children have lower height compared to children of the same age in the reference category as measured by HAZ. Wasting, on the other hand is a state of short-run acute malnutrition due to recent food shortage and illness, but can be reversed by adjusting current dietary intakes. Hence, children who are wasted have lower weight for their height, so have lesser WHZ index than the WHO reference category. In most cases, there is no high degree of association between stunting and wasting. Similarly, underweighted children have lower WAZ either because they are stunted or wasted or else both. In view of this, WAZ is a combination of the two indexes of WHZ and HAZ; correspondingly, WAZ is regarded as a general indicator of the nutritional condition of the population (CSA and ICF International 2012: 156-157, Rajkumar et al. 2012: XXII-XXIII&XXV).

In line with these framework of standards for child malnutrition; children whose HAZ, WAZ and WHZ scores are below -2 standard deviations (SD) from the median of the WHO reference population are considered stunted, underweighted and wasted respectively and those with -3 SD are considered severely stunted, underweighted and wasted respectively (CSA and ICF International 2012: 156-157). So, for the purpose of the present analysis; the short-term (HAZ) and long-term (WHZ) nutritional indicators of child malnutrition are taken as our dependent variable.

3.3.2 Priority Variables

The health of the mother is captured by the two anthropometric indices of Body-Mass-Index (BMI) and height[3] (height-for-age Z (HAZ) score) which represent their current and long-term health status respectively. BMI[4] of a mother represents her weight in kilograms divided by the height in metre squared (kg/m^2) (CSA and ICF International 2012: 180). And as a measurement of obesity or thinness, BMI can be used to indicate current health of mothers since it depicts the availability of food in the household in the short-run and also as protein malnutrition of mothers (CSA and ICF International 2012: 180, Müller and Jahn 2009: 6, Silva 2005). The HAZ score index of the mother represents the difference in SD from the median of the reference population of female adults. As identified in the introduction and

[3] A woman is regarded to be at risk of health factors in child bearing age if her height is below 145 cm (CSA and ICF 2012: 180).

[4] A BMI less than 18.5 indicates thinness or acute undernutrition and if it is below 17 kg/m2; it shows severe undernutrition but a BMI of 25.0 or above exhibits overweight or obesity (ibid).

literature; maternal health, expressed in terms of height of a mother largely influences the nutritional status of children. In light of this, Silva (2005) used maternal height to proxy endowment of a children's gene. Besides, HAZ index of the mother can possibly capture the long-run maternal health status since shorter height indicates low level of socioeconomic status and malnutrition starting from childhood (CSA and ICF International 2012: 180). In view of this, it is highlighted that the main advantage of using height as it manifests the contextual socioeconomic condition on which individuals were brought-up (Strauss and Thomas 1998: 770).

Household income is measured by the wealth index since the DHS dataset has no variable on level of income or household expenditure. Provided that the wealth index is constructed from the assets of the households; it can used as a measure of the level of income and expenditure of a household (CSA and ICF International 2012: 41). Education of parents in our model is captured by the number of years of schooling and their employment status is represented by a dummy variable showing whether the parents were employed during the time of the survey or the previous year. In addition, employment status of parents by their occupation is captured in the model by the different occupational classifications of their work.

3.3.3 Control Variables

The analysis has controlled for various factors at the household and individual level. At the household level; number of the household members, age and sex of the household head, birth order, and a variable for the presence of twins are included. In addition, area of residence of the household is represented using urban-rural dummy. At the individual level, age and sex of the child as well as age of the mother are also included. With respect to cultural factors, it is argued that religious beliefs and cultural norms might have the possibility to affect child nutrition positively or negatively (Seid 2013). So, an attempt is made to capture cultural and feeding practices using religion and regional dummies. In the context of Ethiopia, there is more similarity in terms of diet and feeding practices at regional level and the difference across ethnicity is not as such significant. Thus, in the framework of this study, regional representations are preferred than ethnicity categorization. Other than these factors, variables to capture the accessibility of health facility are also included, and the first is ANC. Beyond its positive role on mother's health, ANC is important and for help children to attain their latent physical and cognitive potential (Ramirez et al. 2012: 4). Besides of this, the number of ANC visits of the mother can serve as a proxy for access to health facility services (Girma and Genebo 2002: 25). Secondly, information on the problem of accessing health facility because of distance (for women) is controlled in the model since community infrastructure and healthy environment provide better health benefits to the child as well (Aslam and Kingdon 2012: 2017).

Table 3-1: Measurement and expected sign of covariates used in the analysis

Variable	Measurement	Expected Sign
Priority Variables		
Maternal long-term health status	Height-for-age Z-score	+
Maternal long-term health status	Body Mass Index (BMI)	+
Parental education	Total years of completed schooling	+
Maternal Employment status	Dummy 1= employed 0= unemployed	+ (-)
Father's Employment status	Dummy 1= employed, 0= unemployed	+
Parental Occupation	Dummy 0= unemployed, 1 otherwise	
Wealth Quintiles	Dummy 0= the poorest Base category, 1 otherwise	+
Control Variables		
Women's age	Years	+
Age of household head	years	+
Size of the household	Number of household members	-
Sex of the child	Dummy 1=Male, 0=female	-
Age of the child	Dummy 0= 0-6 months cohort, 1 for other age cohorts	
Birth Order	Order of the child based on birth (1^{st} 2^{nd} up to the 18^{th} child)	-
Multiple Birth (Twins)	Dummy 1= multiple and 0=singletons	
Sex of the household head	Dummy 1=male and 0=female	+
Antenatal Care	Number of ANC visits	+
Difficulty of accessing health facility because of distance (proxy for community health facility)	Dummy 1= not a big problem, 0= big problem	+
Frequency of watching television, listening to radio and reading newspapers	Dummy 0= not at all, 1otherwise	+
Area of Residence	Dummy 1= Urban and 0 otherwise	+
Regions	Dummy 0= Addis Ababa, 1 for the other regions	+(-)
Religion	Dummy 0= Orthodox Christianity, 1 otherwise	+(-)

Source: Author's expectation from CSA & ICF International (2012)

3.4 The Issue of Endogenity and Bias in Child Health Functions

The issue of bias in health production function is widely acknowledged starting from the earlier works of Strauss and Thomas (1998). To begin with, the first source of bias could be the innate health of the individual (the child in the present study); which is unobserved but correlated with child health outcomes (Strauss and Thomas 1998). This bias is closely related to the intergenerational or hereditary effect which is captured in the current study by mother's height as suggested by Silva (2005) and the literatures discussed. The second source of bias could be from parental education. In this regard, the argument forwarded is the possibility that both child health and parental education can have correlation to unobservable in the model which could be like parental time allocation (Doyle et.al 2005: 3). However, having the presumption that child caring in most developing countries is the main responsibility of mothers from the literature; partner's (father's) education in this study is taken as exogenous as the previous works. However, maternal schooling is strongly argued to be endogenous on many studies, especially in the work of Glewwe (1999). Furthermore, Seid (2013) argued that despite maternal schooling has positive implication on the health status of children; maternal schooling is endogenous if the mother's

unobserved time preference is correlated with mother's schooling as well as child nutrition (Seid 2013: 190).

Angrist and Pischke (2009) suggested the use of alternative schooling benefits and costs as well as institutional laws as instruments for education since schooling decisions depend on them. In regards to this, Doyle et.al (2005) used grandparental smoking history and educational policy in order to instrument parental education while Lindeboom et.al (2008) used educational reform in child health functions. Glewwe (1999) on the other hand, used the presence of married siblings as one potential variable to instrument maternal health knowledge. However, even though the presence of grandparents and maternal siblings can be potential instruments for our work, information on these variables is not available on the EDHS dataset. Meanwhile, Seid (2013) used forced marriage and schooling reform as instruments for maternal education in Ethiopia. Nonetheless, the schooling reform constructed by Seid (2013) on the 2005 EDHS dataset does not seem to be plausible in the context of Ethiopia since it is not directly related to schooling age (as the case of developed countries) which increases school enrolment ratio as in the works of Doyle et.al (2005) and Lindeboom et.al (2008). Rather, the reform only promoted teaching by mother tongue which is not directly linked to increasing the rate of school enrolment. Furthermore, the other variable used by Seid (2013) in the 2005 EDHS dataset; forced marriage, is unfortunately excluded in the 2011 EDHS. Therefore, in the absence of valid instruments; the current study preferred to include potential variables in the dataset that are correlated with maternal schooling. Corresponding to this, Aslam and Kingdon (2012) identified that exposure to media is one of the causal pathways through which parental schooling impacts child health. In line with this, variables regarding frequency of reading newspapers, listening to radio and watching television are included as proxies for maternal exposure to media. Therefore, even though these variables may not entirely address the endogenity problem, it is sought that they are likely capable of reducing bias associated with maternal schooling.

The Durbin_ Watson (DW) test is undertaken in order to investigate the bias before the inclusion and after the inclusion of these media exposure variables. The P- value for the DW test without the inclusion of these media variables reflects the presence of endogenity on maternal education. However, with the inclusion of the media variables the DW test yields a P- value of 13% and 11% in the HAZ and WHZ models respectively, which indicates the potential decline of the bias coming from maternal education.

3.5 Summary Statistics

Descriptive statistics on child malnutrition indicators and variables used in the analysis is presented in table 3-2, 3-3 and table 1 in the appendix. Summary of the data shows that the average HAZ and WAZ score of children are -1.6 and -1.4 respectively; which are near to the benchmark figure for the presence of stunting and underweight (-2 SD). On the case of wasting, average WHZ score of -0.6 seems to indicate that wasting is not a prominent form of child malnutrition in Ethiopia (as illustrated in the introduction). Coming to maternal health, the BMI of mothers (20.4 kg/m^2) indicates that the current health condition of mothers in the survey sample is not worse. However, a Z-score of -1.1 for height-for-age shows that their long-run health status is not

satisfactory. With respect to gender proportion, female children comprise around 52% of the sample.

Regarding women employment, the survey data shows that around 51% of the women were employed in the last 12 months or has job during the survey, and the largest portion of them are working in the agricultural sector. In contrast, more than 98% men or partners were working during the time of the survey and more than 75 were employed in agriculture. Around 76 percent of the women did not have any formal education, 20 percent had primary education and the remaining 4 percent has either secondary education or higher education in the survey time. But education level of men was relatively better, although 59 percent of them had not attended any formal education. However, 32 percent have primary education and the rest 8% had secondary or higher level of education. Around 78% of the households are male headed and the rest are headed by females. The wealth index variable, which is used to proximate for household income shows that more than 30 percent of the households were found in the poorest category, 18% in the poorer, 19% percent in the upper richest class, around 17% are middle income households and the rest are in the lower richer category.

Average age of children in the sample is around 30 months and more than 60 percent of them are 2-5 years old. Average age of women in the sample is around 35 years, and is equal to the median age. Coming to ANC, from all women who were interviewed; information on ANC was collected from mothers who have live birth in the last five years and exclusively for only the most recent pregnancy (CSA and ICF International 2012: 120). Therefore, the average number of ANC visit of mother for the latest pregnancy is 1.8 (around two times). From the total of these 7737 mothers, 55% had not received any kind of ANC service. Clustering by area of residence; 60 percent of the rural women did not receive any ANC compared to the 21 percent of urban dwelling women. Regarding the problem of accessing health facility; 74% of the women reported that it is a big problem for them to get medical help for themselves due to the distance and the rest 26% reported they did not face big difficulty of reaching the health post.

Table 3-2: Descriptive statistics for Continuous Variables used in the analysis

Variable	Mean	Median	Standard deviation
Anthropometric Indices of Children			
Height-for-age Z-score (HAZ)	-1.61	-1.68	1.7
Weight-for-age Z-score (WAZ)	-1.36	-1.35	1.3
Weight-for-Height Z-score (WHZ)	-0.62	-0.59	1.2
Maternal Health Indicators			
Body Mass Index (BMI) of Mothers	20.4	19.87	3.3
Height-for-age Z-score (HAZ) of Mothers	-1.1	-1.12	1.06
Parental Education			
Total years of completed schooling (Women)	1.2	0	2.8
Total years of completed schooling (Men)	4.8	0	1.5
Household, Child and women Characteristics			
Age of a child (in Months)	29.1	29	17.2
Women's age in years	35.2	35	7.7
Age of household head	42.8		11.9
Number of household members	6.4	6	2.5
Number of ANC visits	1.8	0	2.6

Source: Extracted from CSA and ICF International (2012)

Table 3-3: Nutritional Status of Children by Region[5]

Regions	Height-for-age (HAZ) Score	Weight-for-age Z-score (WAZ)	Weight-for-Height (WHZ) Score
Tigray	-2.01	-1.61	-0.66
Affar	-1.9	-1.7	-0.904
Amhara	-2.02	-1.57	-0.59
Oromiya	-1.52	-1.24	-0.53
Somali	-1.12	-1.37	-1.1
Benishangul Gumuz	-2.0	-1.57	-0.64
Southern Nations Nationalities and Peoples (SNNP)	-1.71	-1.24	-0.348
Gambella	-0.94	-1.12	-0.87
Harari	-1.1	-0.96	-0.48
Addis Ababa	-0.86	-0.49	0.012
Dire Dawa	-1.45	-1.32	-0.69

Source: Extracted from CSA and ICF International (2012)

Regional decomposition of the indicators of child nutritional status in table 3 shows that stunting is more severe in Tigray, Amhara and Benishangul

[5] Regional classifications are presented according to their order number, for example: Tigray is region 1, Affar is region 2 and so on. But the two cities of Addis Ababa and Dire Dawa are separate city Adminstrations.

Gumuz regions as shown by HAZ score of 2 and above SD from the median reference category. On the other hand, Addis Ababa (the capital) and Gambella are the regions which have relatively better long-run nutritional status of children (HAZ score). In contrast to stunting, wasting is not as such severe in all regions but its prevalence is higher (lower WHZ score) in Affar, Gambella, Dire Dawa and Tigray respectively. The overall indicator of child nutritional status, i.e. - WAZ, shows that the prevalence of malnutrition is higher in the regions which have higher rate of stunting (lower HAZ score).

Descriptive statistics on child malnutrition indicators by gender, age cohorts and area of residence is attached in appendix 1 under table 4. It is shown in this table that boys are more likely to have a lower nutritional status represented by HAZ (-1.7) and WAZ (-1.4) score than girls (with -1.6 and -1.3 HAZ and WAZ respectively). Moreover, it can be seen from the table that children in rural areas have lower HAZ, WAZ and WHZ scores (nutritional status) than those in urban areas. Furthermore, children in upper age cohorts have higher possibility of being stunted than those in the lower category. But, in the case of wasting, the possibility of being wasted increases up to the 19 months but after the 20^{th} month onwards; the upper cohorts have a better WHZ score or better short-run nutritional status.

Chapter 4 : Results and Discussion

4.1 Ordinary Least Square Estimates

OLS results are displayed in table 4-1 and 4-2. Table 4-1 shows the results of the analysis without categorizing the employment status of parents by occupation groups while table 6 has the categorization. Columns 2 and 4 of both tables have ANC as a control variable among the other controls. The reason for undertaking the analysis with and without ANC is due to the significant changes in the estimates of the priority variables that are discussed in the later sections of this chapter. As mentioned in the previous chapter; information on ANC was exclusively collected on the latest birth of women who had live births in the last five years before the DHS survey. So, regression results including ANC have many missing values as can be seen from the reduction of the number of observations in the tables. In view of this, estimates which include ANC need to be interpreted with caution. The link-test model specification test has indicated the need of squared term (nonlinearity) in the WHZ model. Thus, in order to account for proper model specification; BMI^2 is included in the WHZ models. This is of course in line with the theoretical argument which states:

> *"Biomedical evidence suggests that, in some instances, links between health inputs and outputs are nonlinear. For example, it has been argued that higher calorie intakes have no beneficial effect above some threshold but are associated with improved health below the threshold."*- (Strauss and Thomas 1998: 777).

In this study, the nonlinear relationship is obtained for the anthropometric indicator of BMI. Given that BMI is closely related to availability of food in the household (Silva 2005); which is mostly attached with high calorie intake; it can be presumed that its relationship with WHZ can be nonlinear. Further, since a higher BMI (say 25 kg/m^2) has the risk of increasing pregnancy and delivery complications (Black et al. 2008: 244); it is evident that it has also negative impact on child growth and nutrition. So, based on these perspectives, it is reasonable to account for nonlinearity of BMI in our WHZ model.

4.1.1 The Role of Maternal Health on Child Nutritional Status

The results of our regression analysis show that the short and long-term maternal health status (represented by BMI and HAZ score of mothers respectively) significantly affect the short and long-term nutritional status of children measured by WHZ and HAZ scores respectively. So, a one standard deviation increase of the HAZ score of mothers have the tendency to increase the HAZ score of children by around 0.265 and 0.271 standard deviations (SD) in the models of without ANC and with ANC respectively. Similarly, an increase of the BMI of a mother by $1kg/m^2$ seems to increase the HAZ score of the child by 0.038 and 0.034 SD (with/without ANC model respectively). With respect to the WHZ model, a one standard deviation increase of HAZ score of mothers seems to increase the WHZ score of children by 0.026 and 0.029 in the without and with ANC versions of the model respectively. Similarly, an increase of the BMI of mothers by $1kg/m^2$ tend to increase the WHZ score of children by 0.23 and 0.25 SD in both versions of the model.

The squared term on the WHZ models is strongly significant and shows a marginal decline of the WHZ score of a child after some threshold of mother's BMI. The magnitudes of the coefficients on maternal health variables show that the short-run maternal health status has greater impact on the short-run child nutritional status (WHZ) than the long-term (HAZ). In the same token, long-term maternal health status has stronger correlation with the long-term child nutritional status (HAZ) than with the short-run (WHZ). When comparing the coefficients on maternal health variables on both versions of the models; it is shown that the coefficients on the models which include ANC as a control variable are larger in most cases. This shows that the positive impact of ANC is further transferred to better child health and nutritional status beyond its role of improving the health of mothers. A look on the size of the coefficients on maternal health variables show that a 1 unit increase of the BMI/HAZ of mothers has an impact of approaching the international reference population by average of 0.25 SD which can be considered as a relatively large magnitude. This implies that emphasis on the health of women in all age groups have a large role on determining the rate and distribution of child malnutrition since they are the current as well as future mothers of the present and future generations.

4.1.2 The Impact of Socioeconomic Status (SES) and Child Nutritional Status

Estimates on the wealth index quintiles depict the importance of household wealth for the nutritional status of children. In both versions of the HAZ model, it is shown that children whose parents are in the middle, rich and richer quintiles have better long-run nutritional status than those in the poorest base category. Therefore, it seems that the long-run burden of child malnutrition falls in the two poor categories. Meanwhile, in the WHZ model, it is observed that short-run child nutritional status is indifferent for households in the poorest, poorer and middle class categories (without ANC model). But in the second version of the WHZ model (with ANC), only children of the richest quintile have better nutritional status than those in the poorest category. This may be due to the reason that only children with mothers in the richest class are able to use ANC intensively which may decrease the role of wealth on the richer fourth quintile. As the case of maternal health, the magnitudes of the coefficients on the wealth quintiles in the models which also control for ANC are larger; which may exhibit mothers' use of ANC as per level of their household wealth. In the case of Ethiopia, the problem to use ANC is more related to absence of reliable and cheap transport system and the household living condition than to the cost of medical services. So, it is likely for mothers in a better household wealth condition to have more number of ANC visits which in turn has a positive effect on child nutritional status. The role of household wealth seems to have more impact on the HAZ score of children since starting from the middle quintile households, long-term nutritional status of children is considerably larger than those in the poorest quintile. On the other hand, wealth seems to a strong impact on the children in the richest and richer households. Thus, the distribution of HAZ and WHZ score of children based on household wealth indicates that children in the poorest and second poor quintile have carried both the short and long-run burden of child malnutrition. Indeed our results on wealth index is in accordance with the

distribution mortality rate of under five children in Ethiopia where children in the poorest quintile have 32% higher death rate than those in the richest as discussed in FMOH (2005: 18).

Indicators of parental education show that partner's/father's schooling is not significantly related to long-run nutritional status of children (HAZ). In the case of the WHZ model, significant correlation of father's education (mother's partner)[6] and short-run nutritional status is obtained (without ANC model), though the magnitude of the impact is relatively small. Potential explanations for this could be more educated fathers are more likely to be concerned about the hygiene of the child which can reduce the incidence of diarrhoea, thus decrease the probability of being underweighted child. In addition, higher education can be related to better income and improve the skill of obtaining and managing income as well, which increases the availability of food in the household in the short-run. With regards to maternal schooling, it is found that an additional year of maternal schooling is associated with an increase of HAZ score of children by 0.018 SD (without ANC) and 0.019 SD in the ANC version of the model. In this regard, the coefficients on maternal schooling in the HAZ models excluding the exposure to media variables (attached in the appendix 2 table 4) are upward biased by 31% and 10% on with/out ANC versions respectively. Hence the inclusion of these variables has somehow helped to decrease the bias associated with maternal schooling. Likewise, in both types of WHZ models, an additional year of maternal schooling is associated with an increase of the WHZ score of children by 0.021 (with ANC) and 0.018 (without ANC) SD. In contrast to the HAZ model, the coefficients on maternal schooling excluding the exposure of media on both versions of the WHZ model show that they are downward biased by 31% on the first (without ANC) and 39% on the second version of the model which supports our method of including the media variables as a means of resolving the bias. The results on schooling covariates indicate that mother's education is equally important (as shown by the coefficients) for the short and long-run nutritional status of children and father's (partner's) schooling has only a role for their short-run nutritional status. Moreover, it can be seen in the HAZ model with ANC that the impact of maternal schooling is larger than the other version of the model since a higher level of mothers' schooling is likely to be associated with intensive use of ANC services which further contributes to better child health. Provided that 76% of the women has no any formal education in the EDHS data and only 20% have primary level schooling; an increase of the HAZ and WHZ score of children with an average SD of 0.02 for a one additional year of schooling shows the large gain associated with educational enrolment of girls for decreasing the extent of child malnutrition.

[6] Mother's husband (partner) or the child's father is : the current or most recent husband or partner of a mother for women who are married, living with a partner, widowed, divorced, separated (during the survey) and those who have lived with a partner (but are not now living with a partner). Thus, the sample excludes those who have not been in any form of union. In this regard, information on education, employment and occupation on EDHS was collected for only the latest husband or partner. From the total women, 83% were married during the survey and only 0.3 percent of them were never in union (CSA and ICF 2012).

Regarding employment status of parents; partner's employment is found to be insignificant except in the WHZ model (without ANC). Hence, children having fathers that were employed during or previous year of the survey have a larger WHZ score than those with unemployed fathers by about 0.169 SD. In this regard, the role of partners' (fathers') may be particularly important for short-run nutritional status of children since the main responsible person for the day to day household food expenditure in Ethiopia is the father. So, provided that children's WHZ score also depends on household food availability; the significance of father's employment status seems to be plausible. However, when ANC is included in the model, father's employment status turned to be insignificant and the possible explanation could be excelled or substituted by the positive role of ANC on child health.

Regarding maternal employment status, our results seem to indicate that it has no significant relationship to child nutritional status in both models. Nonetheless, an expectation as per the review of related literature was to find a significant impact of maternal employment status on child health and nutrition either negatively or positively. Similarly, Girma and Genebo (2002) found that there is no effect of mother's employment status on the nutritional status of children in Ethiopia. So, our results seem to indicate that the nutritional status of employed as well as unemployed mothers is similar. In reference of Girma and Genebo (2002), the possible reason could be the fact that most of the mothers in the developing world are participated in low-status and informal sector jobs; so, the low income obtained from these type of works may not be translated to better nutritious-food intake and health care of children because of the prevalence of extreme poverty. Thus, the impact of mother's employment would be very small and cannot reverse the possibility of child malnutrition (Girma and Genebo 2002: 21). The 2011 EDHS data also confirms that the majority of the women were working in the agricultural sector which is mainly for subsistence in the context of many Ethiopian households and the proportion of mothers working in professional high-status jobs was less than 1%. Besides, although 52% of these mothers were self-employed, still the majority of them (59%) were participating in seasonal or occasional jobs during the time of the survey (CSA and ICF International 2012). Therefore, the temporary nature of the employment is most likely to have considerable effect on the nutritional status of children. Further, provided that most of the mothers are agricultural workers; it may be possible for them to take their children to the farm; so, there may not be significant change on the child's nutrition.

Furthermore, Engle (1991) emphasized that studies which had found significant effects of maternal employment on child health had not had the necessary control variables which for instance indicate the extent of poverty level in the household (Engle 1991: 954). In this regard, the present study has controlled for various demographic and socioeconomic factors. In addition, he argued that the reason for the absence of consistent results among different empirical studies on child nutritional issues is the simplicity of the theoretical procedures adopted in many empirical studies. Thus, researches have mainly considered maternal employment as a dichotomous variable (Employed vs. unemployed). Rather, empirical considerations need to account for the type of employment, working hours and the quality of the alternative caregiver as well as developmental changes in children's needs. Following this, some evidences

have shown that the impact of maternal employment for earnings had relied on the type of work and hours of work. In view of this, the type of employment can be a proxy for earning since engaging with a higher rate of income would increase the possible advantages for children (Engle 1991: 954-955). Accordingly, even though our dataset has no information on working hours, other care givers and so on; we proceed our next analysis with the consideration of parental employment status by occupation in the next section.

Table 4-1: Nutritional Status of Children: OLS estimates for Priority variables

	HAZ		WHZ	
	(1)	(2)	(3)	(4)
Maternal Health				
Height-for-age Z (HAZ) score	0.265***(0.0157)	0.271***(0.019)	0.026**(0.012)	0.029* (0.015)
Body-Mass index (BMI)	0.0381***(0.0059)	0.0335***(0.0071)	0.23***(0.032)	0.246***(0.036)
Body-Mass index² (BMI)²			-0.003***(0.0007)	-0.004***(0.0008)
Parental Employment Status				
Father's/Partner's employment status	-0.134(0.113)	-0.134(0.142)	0.169**(0.08)	0.161 (0.1)
Mother's employment status	0.00011(0.0346)	0.0001(0.042)	-0.013(0.026)	-0.031(0.032)
Parental Education				
Total Years of Partner's schooling	0.0006(0.0015)	-0.0003(0.002)	0.0022**(0.0012)	0.002(0.002)
Total Years of Mother's schooling	0.0175**(0.008)	0.0185*(0.0091)	0.021***(0.006)	0.018 **(0.007)
Wealth status (Base Category: Poorest quintile)				
Poorer(2nd quintile)	0.0528(0.0479)	0.086(0.0594)	0.01 (0.04)	0.018 (0.048)
Middle quintile	0.117**(0.0504)	0.133**(0.062)	0.042(0.038)	0.019(0.048)
Richer (4th quintile)	0.154*** (0.052)	0.188***(0.064)	0.09** (0.039)	0.039(0.049)
Richest quintile	0.275***(0.0754)	0.306***(0.0924)	0.214***(0.056)	0.241***(0.069)

Significance level: ***1% **5% *10%
Robust standard errors in Parenthesis

Source: Author's computation from CSA & ICF International (2012)

4.1.3 Estimates for Control Variables

Our results for control variables are presented in table 2 of appendix 2. The age of a child represented by different age cohorts depict that most of the cohorts are significantly correlated with child nutritional status. As seen in the two HAZ models, children in the older age cohorts are in lower long-run nutritional status than those in the base category (on the age cohort of 0-6 months). This can be attributed to weaning and the sensitivity of children to feeding practices, care and infection as their age increases; which further contributes to the increase in the rate of stunting along with the age (Girma and Genebo 2002: 4). Coming to the WHZ models, children in the medium and upper cohorts (from the 20th month onwards) have higher short-run nutritional status than those in the base category (< 6 months). This may be partly related to the child feeding practice in Ethiopia since children as old as 20 months begin to participate in the day to day food consumption of the

household with among other family members. Hence, their competition and participation on dietary intake among other family members secure their nutrition status in the short-run. However, the WHZ model with ANC shows that the two age cohorts (41-49 months and 50-59 months) are insignificant which shows that ANC has no role for the short-term nutritional status of children once the children are above 30 months old. Boys have also higher rate of prevalence of stunting and wasting as compared to girls and twins/multiples have also lower nutritional status than single births.

Estimates for birth order variable show that it is only significantly related to the long-run nutritional status (HAZ) of children in the model which excludes ANC. So an increase of birth order by one is associated with a decrease of the HAZ score of a child by 0.03 SD. In reference to Fentaw et al. (2013), this is probably related to diversion of mother's attention to younger child since he needs more attention than his elders. Similarly, age of mothers is found to have a positive effect (though at 10%) on the long-run nutritional status of children (without ANC model) but not to their short-run nutritional condition. So, the significant positive estimate supports the argument that older mothers are better for caring children than younger mothers (Seid 2013: 193). On the other hand, urban/rural residence seems to have impact only on the short-term nutritional status. But the striking finding on this urban/rural variable is that children living in urban areas have lower short-run nutritional status than those in rural areas even though the summary statistics shows the reverse. However, controlling for other potential factors of child malnutrition, our regression results indicate that this difference does not persist.

Results for ANC depict the significant effect of ANC on child nutritional status; so a one additional ANC visit is associated with an increase of the HAZ and WHZ score of children by 0.051 and 0.016 SD respectively. Similarly, the proxy variable for community health facility shows that children of mothers who can access health facility without big difficulty have better long-run nutritional status (HAZ score) than those with mothers who face big difficulty of accessing health facility because of the distance. The age of the household head does not seem to matter for child nutritional status while sex of the household is a significant factor (without ANC models) for their short and long-term nutritional status. So, children living in male headed households seem to have a better nutritional status than those living in female headed households which may be ascribed to the fact that more than 75% of the households in the Ethiopian DHS survey are male headed. In addition, the empowerment of women in Ethiopia is low as the case of other developing countries which decreases their potential capability of improving the health of their children when they are playing the role as the head of household. Likewise, the number of household members also seems to have a positive impact on the long-term nutritional status of children (without ANC model). This may be due to the sharing of child care responsibility among the members of the household which decreases the burden of household task on the mother.

With regards to religion indicators; it seems that children from protestant and traditional religion parents have better long-term nutritional status than those with orthodox Christian families (with ANC model). In the same token, children of Muslim parents have lower long-run nutritional status than of those with orthodox parents (with ANC model). In the case of WHZ

model, those children from Muslim parents are in lower short-run nutritional status than those in the base i.e. orthodox Christian families in both versions of the model. Possible explanation for the low short-term nutritional status of children with Muslim families could be that, Muslim dominated areas of Affar and Somali regions for instance, are the most vulnerable and affected by drought and famine resulting in high reports of under-nutrition of children.

On the other hand, the variables for the regional variations of child malnutrition show that the long-run nutritional status of children living in Tigray, Amhara, SNNP and Benishangul Gumuz regions is lower than those living in Addis Ababa (the capital) while those living in Harari, Gambella and Somali regions have a better long-run health status than those living in Addis Ababa (in the model without ANC). However, in the model with ANC, estimates on Gambella and SNNP turned to be insignificant, and this may be due to the negative aspects of these regions for child nutrition may be refuted by the positive impact of ANC use. Thus children in these regions are not worse off than those in Addis. But the regional estimates for Oromiya and Dire Dawa exhibit are not significant on both versions of the HAZ model, implying that children in these areas are not worse off than those in Addis. In this regard, potential explanations could be the resourceful nature of Oromiya region in terms of agriculture and animal husbandry; and Dire Dawa is one of the earliest border cities in the country where the people have a better feeding practice accustomed from the various foreign nationalities that had settled in the city in the earlier times. On the WHZ model, all regions except Oromiya and SNNP seem to have lower nutritional status of children than Addis Ababa (in the model without ANC). Estimates on these regional variables when including ANC brings about insignificant coefficients for some of the regions which include Amhara, Benishangual Gumuz and Harari regions that may be explained as in the case of HAZ model by the potential complementing role of ANC for negative factors in these areas, which does let the children not to be worse off than those in Addis.

4.1.4 Exploring the Role of Parental Occupation on Child Nutritional Status

In reference to Engle (1991), this section proceeds by disaggregating the employment status of parents by occupation type. However; our regression results still seem to indicate that there is no significant effect of mother's employment on the long-run nutritional status of children except for those mothers who are engaged in the skilled manual work in the ANC version of the HAZ model. In this regard, children of mothers working in this skilled manual sector have lower nutritional status than those with unemployed mothers. Coming to the WHZ model, children of mothers who were engaged on unskilled manual jobs have better short-run nutritional status than those children with unemployed mothers on both versions of the model and the magnitude of the effect is larger than any of the father's occupation impacts. This may be attributed to the current participation of women on the booming urban and road construction work (as daily labourers) which has increased the demand for labour and has given women the opportunity to earn a relatively good sum of money for the day to day food consumption of their children. Supporting argument for this claim could be the usage of mother's earning for providing the basic necessities of children than of father's earning (Engle 1991:

963). Besides, these jobs are mostly in the nearby villages and do not consume much time on travelling using the poor transportation system beyond their maximum 8 hours of work. Further, there are possibilities of working by shift while engaging on these unskilled manual jobs which gave mothers some free times to care for their children. As in the case of the HAZ model, children with mothers working on the skilled manual jobs have less short-run nutritional status than those children with mothers that are not participating in the labour force. Similarly, men's employment status by occupation type does not seem to have any association with the HAZ score of children. However, in the WHZ model; children with fathers' (partners') working on unskilled manual, skilled manual, agriculture and sales occupations have better short-term nutritional status than children with unemployed fathers (in the model without ANC). For fathers working on unskilled and skilled manual jobs; partial explanation could be the bloomed construction sector which has increased the demand for skilled and unskilled manual labourers. This in turn has raised the wage rate of labourers which have given fathers the opportunity to somehow secure the nutritional need of children. But navigating to the WHZ model with ANC, children with fathers working on agriculture seem to have equal nutritional status with those having unemployed fathers.

Table 4-2: Child Nutritional Status (by Parental Occupation Types): OLS Estimates (some priority variables)

	HAZ		WHZ	
	(1)	(2)	(3)	(4)
Maternal Health				
Height-for –age Z-score (HAZ) of mothers	0.266***(0.0158)	0.272***(0.0193)	0.027** (0.012)	0.029**(0.015)
Body Mass Index of mothers (BMI)	0.0370***(0.006)	0.033***(0.0072)	0.0224***(0.028)	0.24***(0.035)
			-0.0033***(0.0006)	-0.004***(0.0008)
Parental Education				
Total years of mothers' schooling	0.0172*(0.008)	0.019(0.0098)	0.021***(0.006)	0.021***(0.008)
Total years of partner's schooling	0.0007(0.002)	-0.0002(0.0019)	0.002*(0.001)	0.002(0.001)
Partner's Employment Status by ccupation (Base category: Not employed)				
Unskilled Manual	-0.265(0.192)	-0.221(0.229)	0.314**(0.146)	0.301*(0.179)
Skilled Manual	-0.217(0.133)	-0.204(0.165)	0.168*(0.101)	0.138(0.129)
Services	-0.017(0.155)	-0.033(0.189)	0.147(0.118)	0.145(0.145)
Agricultural work	-0.120(0.115)	-0.106(0.145)	0.141*(0.088)	0.139(0.113)
Sales	-0.19(0.123)	-0.268*(0.154)	0.315***(0.093)	0.302**(0.12)
Clerical works	-0.315(0.204)	-0.351(0.236)	-0.03(0.155)	-0.087(0.184)
Professional work	-0.222(0.137)	-0.196(0.17)	0.094(0.104)	0.104(0.132)
Mothers Employment Status by Occupation (Base Category: Not employed)				
Other works	1.32(1.52)	1.46(1.53)	-0.202(1.15)	-0.12(1.9)
Unskilled Manual	-0.194(0.244)	-0.206(0.264)	0.483**(0.19)	0.393*(0.206)
Skilled Manual	-0.134*(0.0659)	-0.0925(0.078)	-0.02(0.05)	-0.048*(0.061)
Services	-0.221(0.21)	-0.253(0.238)	0.180 (0.16)	0.196(0.186)
Agricultural sector	0.0483(0.0462)	0.0132(0.056)	-0.026(0.035)	-0.044(0.061)
Sales	0.009(0.048)	0.0296(0.058)	-0.015(0.036)	-0.027(0.045)
Clerical works	0.281(0.218)	0.261(0.239)	0.102(0.165)	0.081(0.186)
Professional work	0.110(0.191)	-0.0293(0.211)	0.022(0.145)	-0.089(0.165)

Significance level: ***1% **5% *10%
Robust standard errors in Parenthesis

Source: Author's computation from CSA & ICF International (2012)

4.2 Quantile regression (QR) Results

As shown earlier, the OLS model estimates show the average effect of the independent variables on the nutritional status of children based on the conditional mean function $E(y|X)$. However, since this OLS provides a partial relationship, we go for QR which models the relation between a set of independent variables and specific quantiles of nutritional status of children (rather than the average HAZ/WHZ score)..

In case of dummy dependent variable, OLS estimation represents the entire distribution, but if it is continuous, like in our case, the impact of the independent variables can change across its distribution (Angrist and Pischke 2009: 269). Thus, QR helps to examine the change in the dependent variable across the entire distribution Following Cameron and Trividi (2009), the quantile functional form of our child nutritional equation is described as follows:

The qth quantile regression estimator $\widehat{\beta_q}$ minimizes over β_q in the objective function:

$$Q(\beta) = \sum_{i=N_i \geq Z_i'\beta}^{n} q\left|N_i - Z_i'\beta_q\right| + \sum_{i=N_i < Z_i'\beta}^{n} (1-q)\left|N_i - Z_i'\beta_q\right|$$

Where $0 < q < 1$ and β_q indicates that different choices of q estimate at different values of β. The special case q = ½ is equivalent to median regression. The remaining notations: N_i and Z_i are the nutritional status of children and a covariate matrix of priority and control variables respectively as described in the case of our OLS equation.

4.2.1 The Impact of Maternal health and SES on Short-term Child Nutritional Status

Table 4-3 shows the quantile regression results of the WHZ model. As can be seen from the table, long-term maternal health status has a larger positive impact on the lower and median quantiles of nutritional status of children (those with median and lower WHZ score). The coefficient on the median quantile (50^{th}) of the distribution (0.025) is similar of the OLS estimate (0.026). However in the upper 75^{th} and 90^{th} quantile of the WHZ distribution, maternal long-term health status does not seem to have any impact on the child's short-term health condition, which has been compressed as a significant estimate in OLS's average estimate. This can have relevant implication for policy in a way that investing on maternal health and children with median and less WHZ score may yield higher returns in cost-effective way. On the other hand, similar to the OLS results, maternal short-term health status as measured by BMI index is found to be associated positively with WHZ score of children across all quantiles. Besides, the sizes of the estimated coefficients on BMI are mostly comparable across quantiles and also with the OLS estimate. Though the coefficients on BMI are similar, the F-test result confirms that the coefficients are not equal.

Remarkably, coefficients on maternal employment in the 10^{th} and 25^{th} quantiles of the distribution of the WHZ score shows that children who live with employed mothers are likely to have better nutritional status than children

living with unemployed mothers. This is a point of dispatch from OLS estimate which shows the positive role of maternal employment because of income for relatively malnourished children. Contrary to this, maternal employment is found to be negatively associated with short-term nutritional status of children at the upper 90th quantile. This may be related to women who has a better standard of living are in the labor force had managed to be employed at the expense of their children's nutritional status. The OLS regression results, however, underestimates these effects and yield insignificant results. Father's employment status, on the other hand, seems to have significant effect on the median quantile of the WHZ score distribution and the magnitude of the coefficient (0.164) is almost equal to the OLS estimate (0.169). The impact of father's education is only found to be significant (similar to OLS) on the lower quantile of the WHZ distribution which can be related to education can make father responsible to the health of their children when they are found to be at relatively low growth level. Similarly, the effect of maternal education on nutritional status is positive and statistically different from zero at each of the reported quantiles and the magnitudes are larger than the OLS estimate in most quantiles. This reveals that the WHZ score of children increases with maternal education across its conditional distribution. Looking at the results on wealth status, in contrast to the insignificant OLS estimate, the coefficient in the median quantile of WHZ score is significant for children living in the middle income households. As the OLS estimates, our estimated coefficients for children's living in the richer and richest households is significant in the lower 10th quantile and all quantiles of the WHZ distribution (except on the upper 90th) respectively.

Table 4-3: Quantile Regression Estimates for Short-term Nutritional Status of Children (Priority Variables)

	Weight-for-height (WHZ) score				
	q10	q25	q50	q75	q90
Maternal Health					
Height-for-age Z (HAZ) score	0.0427**(0.0215)	0.0445***(0.016)	0.0245*(0.014)	0.0233(0.016)	0.0138(0.0254)
Body-Mass index (BMI)	0.262***(0.045)	0.301***(0.035)	0.266***(0.041)	0.227***(0.041)	0.179***(0.048)
Body-Mass index (BMI^2)	-0.00414***(0.001)	-0.0049***(0.001)	-0.0042***(0.0009)	-0.0034***(0.001)	-0.0021*(0.00113)
Parental Employment Status					
Father's/Partner's employment status	0.129(0.139)	0.156(0.103)	0.164***(0.058)	0.167(0.107)	0.129 (0.105)
Mother's employment status	0.06*(0.037)	0.0615***(0.021)	-0.0053(0.0324)	-0.057(0.042)	-0.115**(0.054)
Parental Education					
Total number of Mother's schooling	0.0214*(0.012)	0.0212***(0.007)	0.0242***(0.0054)	0.0173**(0.007)	0.028*(0.015)
Total number of Father's/Partner's schooling	0.003*(0.002)	0.0017(0.001)	0.0002(0.001)	-0.0007(0.002)	0.0032(0.004)
Household Wealth (Base category: poorest quantile)					
Poorer (2nd quintile)	0.022(0.093)	0.043(0.061)	0.0248 (0.046)	-0.0125(0.039)	-0.042(0.06)
Middle Quintile	0.087(0.093)	0.066(0.047)	0.114**(0.056)	0.018 (0.053)	-0.026(0.073)
Richer (4th Quintile)	0.094(0.113)	0.0993**(0.047)	0.054(0.051)	0.112(0.069)	0.065(0.082)
Richest Quintile	0.231*(0.131)	0.292***(0.066)	0.279***(0.073)	0.236***(0.0495)	0.121(0.134)

Significance level: ***1% **5% *10%
Bootstrapped and robust standard errors in Parenthesis

Source: Author's computation from CSA & ICF International (2012)

4.2.2 The Correlation between Long- term Child Nutritional Status, Maternal Health and SES

The Quantile regression results for the long-term nutritional status of children are presented in table 4-4. The effect of long-term maternal health on child nutrition is found to be slightly different in the HAZ distribution. As indicated in the table 9, the result of the estimated coefficients varies from 0.257 to 0.303 between the 10^{th} and 90^{th} quantiles and F-test shows that they height-for-age of mothers have different level of impact across the HAZ distribution. This indicates that the estimated OLS result is not representative of the effect of maternal health on nutritional status at all points. Contrary to this, though the effect of short-term maternal health on child nutrition is found to be significant across all quantiles; the magnitude is larger in the lower part of the HAZ distribution than at the top end of the distribution. So, estimates on maternal health shows that relying on average indicators may mislead the area of policy interventions.

Moving to the employment status of parents, partner's employment is found to be significant for children having a HAZ score in the median quantile of the distribution; but with a negative sign, in contrast to the OLS estimate. This implies that children having employed fathers have lower long-run nutritional status than those with unemployed fathers which is unexpected as per our review of literature. Mother's employment status is neutral to long-term child nutritional status as the OLS estimate. Moving to parents' education, father's (partner's) education is not significant in all quantiles of the HAZ model, similar to the OLS estimation. Nonetheless, mother's schooling seems to have a significant effect on the median and 75^{th} quantile of the HAZ distribution, which is concealed in the OLS estimation. This may be due to the substituting role of employment and income at the lower and upper quantile of the HAZ distribution.

The result of wealth status on long-term child nutritional status is slightly stronger than the results observed on WHZ model. Besides, the QR results corroborate the OLS results obtained earlier. In line with this, children living in the medium class families have better long-term nutritional status than the poorest base category on the median distribution of the HAZ score of children but estimates on other quantiles are not significant. But our inspection based on F-test contrasts this and implies that the impact of wealth for medium class children is the same throughout the HAZ distribution. Meanwhile, in richer class households' children, significant estimate is obtained on the lower 25^{th} quantile. Interestingly, in the richest household categories, it is noticed that the results are higher in the bottom end of the distribution and tend to decrease as we go further to the top end of the distribution, showing higher returns of children's HAZ score for an increase in wealth status.

Table 4-4: Quantile Regression Estimates for Long-term Nutritional Status of Children (Priority Variables)

	Height-for-age (HAZ) score of Children				
	q10	q25	q50	q75	q90
Maternal Health					
Height-for-age Z (HAZM) score	0.257***(0.0237)	0.266***(0.022)	0.303***(0.0169)	0.274***(0.026)	0.258***(0.029)
Body-Mass index (BMI)	0.0447***(0.009)	0.0386***(0.01)	0.0389***(0.0067)	0.0398***(0.007)	0.0318***(0.008)
Employment Status of Parents					
Father's/Partner's employment status	-0.336(0.224)	-0.0364 (0.13)	-0.196*(0.113)	-0.0227(0.148)	-0.179(0.259)
Mother's employment status	0.0336(0.066)	0.0191(0.0514)	-0.009 (0.034)	-0.0414 (0.0415)	-0.0164(0.069)
Education of Parents					
Total years of completed schooling (Men)	-0.0022 (0.004)	0.002(0.0023)	0.0006(0.0018)	0.00047(0.0031)	0.00102(0.0025)
Total years of completed schooling (Women)	0.0182(0.0174)	0.0138(0.0097)	0.0213**(0.0086)	0.0146*(0.0079)	0.010 (0.016)
Household Wealth status (Base: Poorest Quantile)					
Poorer (2nd Quantile)	0.076(0.082)	0.051(0.0623)	0.086(0.071)	-0.0302(0.044)	-0.012 (0.083)
Middle Quantile	0.0662(0.095)	0.087(0.079)	0.149** (0.075)	0.150*** (0.056)	0.114 (0.092)
Richer (4th Quantile)	0.267*(0.14)	0.251***(0.059)	0.207***(0.059)	0.0976*(0.053)	0.0238 (0.113)
Richest Quantile	0.44***(0.114)	0.319***(0.089)	0.38***(0.087)	0.194***(0.0543)	0.0725(0.128)

Significance level: ***1% **5% *10%
Bootstrapped and robust standard errors in Parenthesis

Source: Author's computation from CSA & ICF International (2012).

In sum, our QR results indicate that the role played by SES factors and maternal health to certain extent varies depending on the child's level of nutritional status. Thus, policy makers need to consider the relevant health and poverty intervention for dealing the different levels of child malnutrition.

Lastly, our econometric analysis shows that maternal health, and more than half of the socioeconomic factors determine child malnutrition in Ethiopia In this regard, provided that maternal and child-health centred as well as nutrition-focused interventions have been formulated since 2005; the review of child health and malnutrition programs would help to shade light for making policy recommendation based on our findings. Indeed; the improvement in child malnutrition from 50.7% of stunted children in 2005 (WHO 2013) to 43% in the 2011 (CSA and ICF International 2012) requires the review of the policy measures which has been taken place in the arena of child health and nutrition. Thus, we try to discuss briefly some of the relevant policies and interventions in the next section.

Chapter 5 : Review of the Child Malnutrition Strategies and Programs in Ethiopia

5.1 The Setting, Review and Focus of Previous and Current Malnutrition Programs in Ethiopia

Ethiopia is ranked in the sixth position in terms of child mortality from all the countries in the globe. Around 472,000 children die annually before the age of five, with the rate of mortality varying across regions. From 100 children, 14 are not able to reach the age of five, around ten are not able to live until their first birthday and five are not alive after the first 30 days of life. Malnutrition account for 57% of the underlying causes of the deaths followed by HIV AIDS which forms 11 percent of these underlying child mortality causes. In order to address the wellbeing of the society, Ethiopia has been formulating a sector wide health programs, policies and strategies since 1997. The National Health Sector Development Program (HSDP); which has been adopted in the country since 1997 and is still ongoing in the country. HSDP, however, did not explicitly address the issue of child survival in its first two five-year phases. Similarly, the Accelerated Expansion of Primary Health Care (PHC) Facilities in Ethiopia had not planned to specifically focus on child survival in its stay from 2005-2009 (FMOH 2005: 1, 6, 9-10, 20-21). Similarly, although many programs have been running in the country that have the capacity of tackling malnutrition; only few of them have the objective of decreasing malnutrition as one of their primary objectives. Rather their main objectives focus on asset creation, education, environmental conservation, household food security, water supply and sanitation services, improving income and employment, reduce food prices, providing basic necessities for displaced and refugees, expanding health care to rural areas, immunization and providing health information on family planning, maternal and infant mortality, sanitation, nutrition and reproductive health. (Rajkumar et al. 2012: 49). Although malnutrition in most regions of Ethiopia is closely related to food security and improper feeding customs (FMOH 2005: 10), the interventions that concentrate on enhancing food security have the possibility of advancing the nutritional status of the targeted area if the various causes of malnutrition are assessed and tackled simultaneously (Rajkumar et al. 2012: 7).

Most of the programs start earlier than 2005 and provide their support in three different forms. The first kind is programs which provide food or cash for food. Some of these programs are the Productive Safety Net Program (PSNP), Emergency Food Aid, Protracted Relief and Recovery Operation, the Government Food Security Program and the Targeted Supplementary Food Security Program (TSFP) and program for Treatment of Severe Acute Malnutrition (TSAM). These programs are mainly financed by the Government of Ethiopia, World Food Program (WFP) and UNICEF and target populations include food-insecure households, children under five years of age, pregnant and lactating women, refugees and those that are vulnerable to shocks. Among these programs, TSFP and TSAM is primarily intended to reduce the extent of malnutrition as a sole objective and with specific target population of under five children and pregnant mothers (Rajkumar et al. 2012).

The second type of programs do not provide food or cash, rather they focus on immunization of children and mothers, providing health information and treatment, providing sanitation and water supply, nutrition services, shelter for the displaced and technical supports for households to diversify their income and build assets. Among these programs, the Enhanced Outreach Strategy for Child Survival (EOS) and Health Extension Program (HEP) have made a paramount importance on the reduction of malnutrition and have targeted children less than five years of age and mothers. The programs started in 2004 and EOS has used combined clinical, preventive as well as community outreach services and screens malnourished children for treatment at feeding and health facilities. Likewise, HEP used similar health care approaches and exclusively focused on addressing health care to rural Ethiopia. Similar programs under this category include Water supply, Sanitation and Hygiene Program, Expanded Program on Immunization, Emergency Non-food Aid Program and Household Asset Building Program (ibid).

The third type of the programs is those that centre on strong community volunteer focus. The volunteers accomplish their tasks through creating awareness on the society regarding health issues, contraceptives, sanitation, maternal health, neonatal and child health, nutritional education and developing the capacity of the community to assess the problems of malnutrition and improve nutritional status of the society. Some of the programs such as Community- Based Nutrition Program, Community – based therapeutic care and Child Growth Promotion component of Food Security Project have mainly focused on reducing child malnutrition in selected areas of the country. Other programs include Community- Based Reproductive Health Agents and Integrated Family Health programs and most of the programs under this category have started after 2005. But above all, the Essential Services for Health in Ethiopia (ESHE) had transferred essential health information and impacted the health and nutritional status of children through training of volunteers with enhanced public health knowledge (ibid).

5.2 A Diversion from Previous Approaches: The Child Health Survival and National Nutrition Strategies in Ethiopia

One of the main responsibility of government is to ensure the supply of public goods that are not provided by the private sector. Having this view, nutritional services specefically and creating the access for health services generally are among those public goods which provide the economic framework of government's investment to reduce malnutrition (Benson et al. 2005: 8). On the basis of this justification and taking a lesson from previous strategies on the need to address child health explicitly and effectively on the policy arena, the Ethiopian Federal Ministry of Health adopted the National Strategy for child survival in 2005 which was planned to span for a period of 10 years. The program is initiated with the vision that more than 65 percent of child deaths can be prevented with low cost effective interventions. Indeed, the child survival strategy mainly focuses on preventive and promotive approaches rather than curative aspects. The HEP served as the basis for the formulation and implementation of this child health strategy in the attempt to address the issue of child mortality deep in to the community. So, in line with this, the

strategy focused on the three types of service delivery methods and these are community based care, population outreach services and clinical care (FMOH 2005: 1-3).

In an attempt to address child deaths coming from malnutrition, the interventions have been implemented at three levels ranging from community health post, then to health centre and at last in the nearby district hospital. At the community level, the health extension workers promote exclusive breast feeding and evaluate the feeding practices of children and sort out the problems in dietary system and give appropriate feeding advice. In addition, growth follow up of children has been addressed through measuring those who are below three years of age. Furthermore, based on the follow up, children who are less malnourished have been treated through counselling and others who are severely malnourished are treated in the health centre and district hospital according to the level of severity. Besides to these, the child survival strategy has focused on the training of health extension workers and health centre staffs on nutritional education which has served as a sustainable way of transferring health knowledge to parents and to the community in general. Beyond their impact on reducing child malnutrition, the interventions under this child health survival strategy are sought to contribute to the reduction of maternal mortality rate by 23% in the first phase and 37% in the second phase (FMOH 2005: 2,31-32, 53&57). In addition to the child health survival strategy, complementary strategy of Reproductive Health has also sought to reduce mortality rate of neonatal and new-born children until 2015.The strategies for the reduction of deaths include secure access to neonatal health services and making the environment supportive and safe to new babies' health (FMOH 2006: VIII). Indeed, it is widely acknowledged that the maternal health services of antenatal, pre-conception, intra-partum and postnatal bring benefits to all of mothers, new babies and children. These in turn are decisive for the reduction of malnutrition and neonatal mortality rates (McCoy 2010: 88).

Although the efforts made by the above and other programs are encouraging; they could not stand by their own as an effective way of enhancing nutrition because of the lack of coordination at sector levels and administrative units. In response to this, the Federal Ministry of Health has launched the National Nutrition Strategy (NNS) in 2008. The NNS stressed coordination of various nutritional programs, a system for early warning of acute malnutrition and targeting the vulnerable groups of the country among its main objectives (Benson et al. 2005:2, EHNRI 2010, FMOH 2008: 6). The nutritionally vulnerable people are children of in the age of less than two, HIV/AIDS affected people, pregnant and lactating mothers, displaced people and individuals with extreme food insecurity risk. In order to implement the NNS, the Federal Ministry of Health of Ethiopia with the Ethiopian Health Nutrition Institute adopted the National Nutritional Program (NNP) in 2010. The NNP designed a framework for the integration and enhancing of the ongoing nutrition interventions with special emphasis on community-based and high impact interventions unlike the previous medical-based approach of dealing malnutrition in the health sector alone. So, for the purpose of creating this overall framework of addressing malnutrition, the NNP focused on harmonizing the programs and assistance of donors, NGOs and government strategies (EHNRI 2010: 3-4). Following the NNP, there have been a launch

of collaboration among some interventions and the one that has been strengthened between PSNP and the nutrition focused programs could be an illustration in this regard (Rajkumar et al. 2012: 120)

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Chapter 6: Conclusions and Policy Recommendations

The Government of Ethiopia has been giving special emphasis on maternal and child health. In spite of these efforts, Ethiopia is still one of main countries with the worst rate of maternal and child mortality accompanied by severe malnutrition. Basing on the imperative that proper nutrition is a moral obligation; the Government of Ethiopia has included the right to proper nutrition as a basic human right in the constitution of the country (Benson et al. 2005: iii) and has been launching various programs and interventions. However, the rate of malnutrition is still the highest in the world arena which furthur requires policy makers to assess the major policy areas that need to be addressed which otherwise may leave lasting imprint on the overall social, human and economic development of Ethiopia. In the current study, we made some effort to analyse the impact of maternal health and SES on the health and nutritional status of the children and some concluding remarks are made in the next section.

6.2 Concluding Remarks on the Correlation between Maternal Health, SES and Child Nutritional Status

. The analysis indicates that maternal health status; both short-term and long-term is positively and significantly correlated with child nutritional status. Our results on household income (captured by household wealth) shows that household wealth (income) has a strong positive association with child nutrition, especially for children living in relatively richer and richest households. On the other hand, parental education; mainly mother's education, plays a positive role for child nutritional status. Employment status of the parents on the other hand; seems to have no association with long-term child health. Similarly, short-term nutritional status, father's employment is found to have a positive role. While mother's employment status seems to have a mixed impact on short-term child nutritional condition: positive association if the child has low short-term nutritional status and negative correlation if the child has higher level of nutritional status. But on average estimation of these impacts shows no correlation between maternal employment and child short-term nutritional status. Coming to parent's occupation; it was found that father's employment on any type of occupation has no role for long-run nutritional status of children. However, maternal occupation on one of the low-paid skilled manual jobs is negatively correlated with nutritional status of children. Nonetheless, mother's engagement on unskilled manual jobs is found to be positively associated with child's short-term nutritional status. Also, father's engagement on the occupations of skilled and unskilled manual works, sales, services and agriculture jobs have a positive impact on short-run nutritional status of children. So, even though the results on employment and occupation seem to be less strong, it can be concluded that the level of maternal health and SES factors have close association with child health and nutritional status. Thus, these health inequalities are not just but avertable, which otherwise expose households to the prevailing social patterns, economic condition, political and legal frameworks (Spencer 2010: 157).

6.2 Policy Recommendations

Even though it is difficult to make causal inferences using cross-sectional data, certain highlights can be made from the results of our analysis for future policy interventions on the issues of child health and malnutrition. Firstly, the present analysis came up with strong evidence on the need of further efforts from policy makers in order to improve health of mothers, girls as well as their education because of their far-reaching impact on child health and nutrition throughout generations. In addition, given that the weak association of partner's education and short-term child nutritional status; efforts need to be made to translate their education to better nutritional status. Providing knowledge on public health, nutrition and gender through media, besides the provision this health information to mothers could be some areas of awareness creation. On the other hand, it was also indicated in the analysis that children who are most affected by malnutrition are those who live in the households under poor categories and children in the middle class categories are not also well off when considering the short-term nutritional status of children. So, this inequality of nutritional status requires the inclusion of child malnutrition as one of the main objectives in the policies that deal with eradication of poverty, hunger and household food security in the country.

Coming to the issue of maternal employment, our analysis indicates that maternal employment is beneficial for the short-term nutritional condition for relatively malnourished children, especially on unskilled occupations; but no significant association is observed for their long-run nutritional status which is far important. So, policies should also consider the need to address the participation of women in the labour force and especially in high-status or professional jobs in collaboration with educational policies. In relation to this, Girma and Genebo (2002) argue that the neutrality of child nutritional status to employed and unemployed mothers may be related to maternal time constraints which compensate the care of the child when she gets employed. Thus, strategies which are focusing on women's empowerment should also concern on the ways to enhance women's productivity per unit of time on paid jobs as well as on household production. These in turn can benefit the women to improve their earning without the expense of additional time, child welfare and even their own health. In this regard, potential interventions may encompass deploying traditional and modern appropriate technologies that can augment income-earning opportunities and mitigate time constraints for self-improvement, child care and community participation (Girma and Genebo 2002: 25).

Having said on areas that need further emphasis by policy makers; our opinion on the current child malnutrition related policies in Ethiopia is as follows. First, it is widely acknowledged in the child health survival strategy and NNS that even though their current practice is limited to the health and agriculture issues affecting child health; the long-run returns from these strategies are materialized depending on the enhancement of other sectors like education, empowerment of women, infrastructure, micro-lending and the accessibility to the services of sanitation and water (FMOH 2005: 2, Rajkumar et al. 2012: 121). However, despite the acknowledgment of the need for coordination of different sectors for eradicating child malnutrition, the current practices are still lagged for making collaboration except on some aspect of

agricultural and health programs as discussed by Rajkumar et al. (2012). Hence, we would like to point out the need for practical and immediate actions for founding corporate governance since the negative impacts of today's child malnutrition cannot be reversed tomorrow. Secondly, our review of child-malnutrition focused interventions in the work of Rajkumar et al. (2012) shows that most of these programs are in the regions of SNNP, Amhara, Tigray and Oromiya. But our regression results show that in addition to the first three of these regions (since our results for Oromiya is insignificant); all the other regions and specially Affar, Somalia, Benishangul Gumuz and Gambella need sooner interventions of reducing malnutrition.

However, the study is not free some limitations. Firstly, the cross-sectional nature of the 2011 EDHS data does not allow tracing the changes in child health with respect changes to maternal health and SES which is not helpful to draw some causal inferences. Secondly, because of the endogenous nature of most of the household health variables; our results are likely to bias due to the absence of valid instruments in our EDHS dataset; even though efforts are made in the study by including relevant variables. Lastly, this study and most of the empirical studies on child malnutrition focus on either the underlying or the immediate determinants. Therefore, further studies on child malnutrition on the basic determinants like governance, institutions and potential resources of the society are badly needed, which can help to fix the problems from the ground.

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Appendices

Appendix I: Nutritional status of Children by gender, area of residence and age

	Height-for-age (HAZ) score	Weight-for-age (WAZ) score	Weight-for-height (WHZ) score
By gender wise			
Female	-1.6	-1.3	-0.56
Male	-1.7	-1.4	-0.69
Area of Residence			
Rural	-1.71	-1.5	-0.7
Urban	-1.1	-0.9	-0.38
Age Cohorts			
0-6 months	0.09	-0.49	-0.681
6-12 months	-0.84	-1.2	-0.91
13-19 months	-1.59	-1.37	-0.82
20-30 months	-2.2	-1.54	-0.59
31-41 months	-2.11	-1.54	-0.47
41-49 months	-2.04	-1.6	-0.51
50-59 months	-1.9	-1.54	-0.58

Appendix II:: Nutritional Status of Children: OLS estimates for Control Variables

	HAZ		WHZ	
	(1)	**(2)**	**(3)**	**(4)**
Child Age (Base cohort: 0-6 months)				
7-12 months	-0.852***(0.067)	-0.868***(0.068)	-0.22***(0.059)	-0.22***(0.059)
13-19 months	-1.633***(0.0641)	-1.677***(0.066)	-0.09*(0.049)	-0.091*(0.051)
20-30 months	-2.188***(0.059)	-2.286***(0.0623)	0.12**(0.051)	0.09*(0.053)
31-41 months	-2.163***(0.059)	-2.322***(0.0682)	0.216***(0.05)	0.195***(0.06)
41-49 months	-2.085***(0.0619)	-2.218***(0.083)	0.177***(0.05)	0.105(0.064)
50-59 months	-1.957***(0.0604)	-2.029***(0.089)	0.111**(0.05)	0.106(0.069)
Religions (Base Category: Orthodox Christianity)				
Catholic	0.222(0.172)	0.202(0.199)	0.023(0.121)	0.089(0.143)
Protestant	0.0544(0.065)	0.138*(0.076)	-0.08(0.048)	-0.061(0.059)
Muslim	-0.0785(0.0532)	-0.065 (0.0619)	-0.112***(0.04)	-0.122**(0.047)
Traditional	0.178(0.181)	0.432**(0.224)	0.043(0.127)	0.126 (0.164)
Other	-0.094(0.154)	-0.128(0.189)	-0.09(0.12)	-0.113(0.157)
Regions (Base category: Addis Ababa)				
Tigray	-0.417***(0.112)	-0.416***(0.127)	-0.432***(0.115)	-0.216**(0.1)
Affar	-0.114(0.117)	-0.0052(0.135)	-0.283***(0.09)	-0.31***(0.112)
Amhara	-0.343***(0.113)	-0.241*(0.129)	-0.208**(0.087	-0.131(0.103)
Oromiya	-0.0404(0.108)	0.026(0.124)	-0.113(0.084)	-0.06(0.1)
Somali	0.233**(0.118)	0.312*(0.141)	-0.594***(0.091)	-0.438***(0.113)
Benishangul Gumuz	-0.347**(0.115)	-0.260*(0.132)	-0.161*(0.087)	-0.12(0.105)
SNNP	-0.227**(0.115)	-0.162(0.132)	0.04(0.089)	0.09(0.105)
Gambella	0.261**(0.126)	0.209(0.142)	-0.328***(0.095)	-0.288***(0.110
Harari	0.221*(0.119)	0.281**(0.137)	-0.167*(0.092)	-0.135(0.109)
Dire Dawa	-0.103(0.116)	-0.0272(0.133)	-0.327***(0.09)	-0.311***(0.106)
Multiple birth	-0.651***(0.104)	-0.694***(0.161)	-0.254***(0.081)	-0.429***(0.128)
Birth Order	-0.0286**(0.0113)	-0.0001(0.014)	-0.0056(0.009)	0.005(0.011)
Sex of a child	-0.0846***(0.0313)	-0.13***(0.038)	-0.129***(0.024)	-0.158***(0.03)
Antenatal Care (ANC)		0.0513***(0.0097)		0.0155**(0.0072)
Women's age in years	0.0083*(0.004)	0.0024(0.0051)	0.0008(0.0032)	-0.004(0.004)
Sex of the household head	0.0915**(0.043)	0.0494(0.051)	0.054*(0.033)	0.0404(0.04)
Age of household head	-0.0018(0.0016)	-0.0008(0.0019)	-0.0015(0.0012)	-0.0007(0.0014)
Number of Household members	0.0168*(0.009)	0.0006(0.011)	0.006(0.007)	0.0012(0.008)
Area of Residence(Rural/Urban)	0.0672(0.071)	0.0191(0.085)	-0.103*(0.053)	-0.1(0.065)
Difficulty to access health facility because of distance	0.0682* (0.0399)	0.099**(0.048)	0.031(0.03)	0.04(0.038)
Frequency of reading Newspaper (Base category: Not at all)				
At least once a week	0.224(0.148)	0.112(0.163)	-0.18(0.122)	-0.19 (0.14)
Less than Once a week	0.0577(0.0793)	-0.0345(0.091)	-0.11*(0.06)	-0.09(0.07)

Frequency of listening Radio (Base category: Not at all)				
At least once a week	-0.0331(0.0496)	-0.0399(0.0598)	0.048(0.038)	0.019(0.047)
Less than once a week	-0.062(0.039)	-0.0522(0.048)	0.044(0.029)	0.038(0.037)
Frequency of watching television (Base category: Not at all)				
At least once a week	0.199***(0.0703)	0.145*(0.083)	0.047(0.051)	0.012(0.062)
Less than once a week	0.0431(0.0444)	0.0294(0.054)	0.071*(0.033)	0.083**(0.04)
Number of Observations	9407	6434	9407	6434
R^2	0.259	0.309	0.096	0.095

*** Significant at 1% level robust standard errors in parenthesis
** Significant at 5% level
*significant at 10% level

Source: computed from 2011 EDHS database of CSA and ICF International (2012)

Appendix III: Child Nutritional Status (by Parental Occupation Types): OLS Estimates for household wealth and control variables

	HAZ		WHZ	
Household Wealth Index Category (Base category: poorest quintile)				
Poorer (2nd Quintile)	0.0531(0.048)	0.083(0.06)	0.012(0.037)	0.017(0.047)
Middle Quintile	0.121*(0.051)	0.136*(0.063)	0.036 (0.039)	0.01(0.049)
Richer (4th Quintile)	0.167** (0.052)	0.199**(0.065)	0.074*(0.04)	0.025(0.051)
Richest Quintile	0.323***(0.078)	0.352***(0.096)	0.172*** (0.06)	0.205***(0.075)
Child Age Cohorts (Base category: 0-6 months)				
7-12 months	-0.858***(0.0673)	-0.873***(0.068)	-0.226***(0.051)	-0.228***(0.053)
13-19 months	-1.632***(0.0645)	-1.677***(0.066)	-0.1**(0.049)	-0.097*(0.052)
20-30 months	-2.192***(0.0589)	-2.290***(0.063)	0.114**(0.045)	0.081*(0.049)
31-41 months	-2.159***(0.059)	-2.316***(0.069)	0.201***(0.045)	0.19***(0.054)
41-49 months	-2.082***(0.0623)	-2.215***(0.084)	0.164***(0.047)	0.091(0.065)
50-59 months	-1.956***(0.061)	-2.026***(0.089)	0.098*(0.046)	0.09(0.069)
Religion (Base Category: Orthodox Christianity)				
Catholic	0.201(0.172)	0.029(0.131)	0.193(0.200)	0.096(0.156)
Protestant	0.0475(0.065)	-0.078(0.05)	0.138(0.077)	-0.062 (0.06)
Muslim	-0.089 *(0.054)	-0.123***(0.041)	-0.075(0.063)	-0.129**(0.049)
Traditional	0.169(0.181)	0.04(0.138)	0.43(0.225)	0.123(0.175)
Other	-0.11(0.155)	-0.091(0.117)	-0.139(0.189)	-0.11(0.148)
Regions (Base Category: Addis Ababa)				
Tigray	-0.432***(0.115)	-0.237**(0.087)	-0.401**(0.13)	-0.189*(0.101)
Affar	-0.103(0.12)	-0.258***(0.091)	0.0172(0.139)	-0.285***(0.108)
Amhara	-0.362***(0.115)	-0.18**(0.088)	-0.238(0.132)	-0.103(0.103)
Oromiya	-0.0504(0.11)	-0.086(0.084)	0.023(0.126)	-0.034(0.1)
Somali	0.254*(0.12)	-0.58***(0.091)	0.337*(0.143)	-0.42***(0.112)
Benishangul Gumuz	-0.343***(0.117)	-0.133(0.089)	-0.248(0.134)	-0.093(0.105)
SNNP	-0.218*(0.117)	0.054(0.089)	-0.151(0.134)	0.11(0.104)
Gambella	0.297**(0.128)	-0.31***(0.098)	0.251(0.146)	-0.271**(0.114)
Harari	0.21*(0.121)	-0.142(0.092)	0.279*(0.139)	-0.113(0.109)
Dire Dawa	-0.098(0.118)	-0.31***(0.089)	-0.007(0.135)	-0.293***(0.105)
Child Characteristics				
Multiple birth	-0.64***(0.104)	-0.25***(0.079)	-0.681***(0.162)	-0.43***(0.126)
Birth Order	-0.027*(0.0114)	-0.007(0.009)	0.0018(0.014)	0.004(0.011)
Sex of a child	-0.0825**(0.0314)	-0.133***(0.024)	-0.128***(0.038)	-0.163***(0.03)
Household and Women's characteristics				
Women's age in years	0.007(0.0043)	0.0013(0.003)	0.0008(0.0051)	-0.003(0.004)
Antenatal care			0.0519***(0.0098)	0.015**(0.008)
Sex of the household head	0.0833*(0.044)	0.064* (0.033)	0.0413(0.052)	0.054(0.04)

Age of household head	-0.002(0.0016)	-0.0014(0.001)	-0.0007(0.0019)	-0.0005(0.002)
Number of Household members	0.0162*(0.01)	0.006(0.007)	0.00028(0.011)	-0.0002(0.0083)
Difficulty to access health facility because of distance	0.072*(0.0402)	0.021(0.031)	0.101*(0.049)	0.031(0.038)
Area of Residence(Rural/Urban)	0.097(0.074)	-0.138**(0.056)	0.064(0.089)	-0.129*(0.069)
Exposure to Media				
Frequency of reading Newspaper (Base category: Not at all)				
At least once a week	0.183 (0.15)	-0.145(0.114)	0.088(0.164)	-0.151(0.128)
Less than Once a week	0.051(0.0797)	-0.095(0.061)	-0.039(0.0912)	-0.084(0.071)
Frequency of listening radio (Base category: Not at all)				
At least once a week	-0.036(0.050)	0.048(0.038)	-0.0413(0.0604)	0.022(0.047)
Less than once a week	-0.0615(0.039)	0.047(0.03)	-0.051(0.048)	0.043(0.037)
Frequency of watching television (Base category: Not at all)				
At least once a week	0.202**(0.071)	0.054(0.054)	0.15(0.084)	0.018(0.066)
Less than once a week	0.0484(0.0447)	0.08**(0.034)	0.038(0.054)	0.091**(0.042) .

*** Significant at 1% level
** Significant at 5% level
*significant at 10% level

Robust standard errors in parenthesis

Source: computed from 2011 EDHS data of CSA and ICF International (2012)

Appendix IV: OLS Estimates Excluding Media Variables

	(1)	(2)	(3)	(4)
	HAZ	WHZ	HAZ	WHZ
Height-for-age Z (HAZM) score	0.271***(0.0191)	0.025*(0.015)	0.264***(0.0157)	0.0219*(0.012)
Body-Mass index (BMI)	0.0348***(0.00709)	0.0737***(0.0056)	0.0395***(0.00583)	0.0757***(0.00445)
Body-Mass index² (BMI)²		-0.0035***(0.0006)		-0.004***(0.0008)
Father's/Partner's employment status	-0.121 (0.141)	0.177 (0.111)	-0.120(0.113)	0.182**(0.086)
Mother's employment status	-0.00293 (0.0416)	-0.0221(0.0326)	-0.00105(0.0344)	-0.005(0.0262)
Wealth status				
Poorer (2nd Quintile)	0.0835(0.0592)	0.031(0.0463)	0.0515(0.0477)	0.0248(0.0363)
Middle Quintile	0.129**(0.0616)	0.0349(0.0482)	0.112**(0.0500)	0.058(0.0381)
Richer (4th Quintile)	0.184*** (0.0627)	0.067(0.0490)	0.146**(0.0506)	0.116*** (0.039)
Richest Quintile	0.348***(0.0895)	0.271***(0.070)	0.326***(0.073)	0.255***(0.055)
Parent's schooling				
Total years of completed schooling (Men)	0.0008(0.002)	0.002*(0.001)	0.00005(0.002)	0.0016(0.0014)
Total years of completed schooling (Women)	0.026***(0.006)	0.016***(0.005)	0.021***(0.008)	0.013** (0.006)
Age Cohorts				
7-12 months	-0.870***(0.0678)	-0.230***(0.053)	-0.855***(0.067)	-0.225***(0.0509)
13-19 months	-1.673***(0.066)	-0.107**(0.0512)	-1.630***(0.064)	-0.101**(0.0488)
20-30 months	-2.283***(0.062)	0.073(0.049)	-2.182***(0.059)	0.108**(0.045)
31-41 months	-2.319***(0.0681)	0.186***(0.0532)	-2.161***(0.059)	0.208***(0.045)
41-49 months	-2.211***(0.0828)	0.092 (0.065)	-2.082***(0.062)	0.168***(0.047)
50-59 months	-2.015***(0.089)	0.0963 (0.0692)	-1.949***(0.0603)	0.101** (0.046)
Religions				
Catholic	0.211 (0.199)	0.101(0.156)	0.227 (0.172)	0.0334(0.131)
Protestant	0.131*(0.076)	-0.0532 (0.0595)	0.0458(0.064)	-0.0719(0.049)
Muslim	-0.0684(0.062)	-0.128*** (0.048)	-0.0844(0.053)	-0.124*** (0.041)
Traditional	0.433*(0.224)	0.112(0.175)	0.17(0.181)	0.0323(0.138)
Other	-0.116(0.189)	-0.115(0.148)	-0.083(0.154)	-0.094(0.117)
Regions				
Tigray	-0.401**(0.127)	-0.216**(0.099)	-0.421***(0.112)	-0.278***(0.085)
Affar	-0.0125 (0.135)	-0.334***(0.105)	-0.133(0.116)	-0.311***(0.089)
Amhara	-0.23* (0.128)	-0.122(0.100)	-0.353***(0.112)	-0.213**(0.086)
Oromiya	0.0163(0.124)	-0.0539(0.097)	-0.063(0.108)	-0.117(0.082)
Somali	0.310**(0.140)	-0.469***(0.110)	0.207*(0.117)	-0.631***(0.0893)
Benishangul Gumuz	-0.261** (0.132)	-0.127 (0.103)	-0.366***(0.114)	-0.177**(0.0872)
SNNP	-0.161(0.131)	0.0953(0.103)	-0.239**(0.115)	0.0301(0.0874)
Gambella	0.198(0.141)	-0.311*** (0.111)	0.226*(0.124)	-0.366***(0.095)

Harari	0.298**(0.137)	-0.131(0.107)	0.228*(0.119)	-0.167*(0.091)
Dire Dawa	-0.0193(0.132)	-0.331***(0.104)	-0.109(0.115)	-0.351***(0.088)
Antenatal care	**0.0537***(0.0096)**	**0.0171**(0.0075)**		
Multiple birth	-0.694***(0.161)	-0.437***(0.126)	-0.652***(0.104)	-0.258***(0.079)
Birth Order	-0.0001(0.014)	0.00531 (0.0108)	-0.0288**(0.0113)	-0.006(0.009)
Sex of a child	-0.133***(0.0381)	-0.157***(0.0298)	-0.0874***(0.0313)	-0.128***(0.0238)
Women's age in years	0.00207(0.005)	-0.0043(0.004)	0.0081*(0.004)	0.0007(0.0032)
Sex of the household head	0.0526(0.0509)	0.0412(0.0398)	0.0919* (0.0430)	0.057*(0.0328)
Age of household head	-0.0004(0.002)	-0.00097(0.0015)	-0.0015(0.002)	-0.0018(0.0012)
Number of Household members	0.0003(0.0101)	-0.00014(0.008)	0.0167*(0.009)	0.0042(0.007)
Difficulty to access health facility because of distance	0.073*(0.04)	0.033(0.03)	0.098** (0.048)	0.042(0.037)
Area of Residence(Rural/Urban)	0.0611(0.084)	-0.107(0.07)	0.113(0.07)	-0.114*(0.053)
Number of Observations	6446	6446	9424	9424
R^2	0.31	0.09	0.26	0.10

*** Significant at 1% level
** Significant at 5% level
*significant at 10% level

Robust standard errors in parenthesis

Source: computed from 2011 EDHS data of CSA and ICF International (2012)

Appendix V: Quantile Regression Estimates for Short-term Nutritional Status of Children for control variables

Weight-for-height (WHZ) score					
	q10	q25	q50	q75	q90
Child Age (Base cohort: 0-6 months)					
7-12 months	-0.035(0.141)	-0.161*(0.0882)	-0.14***(0.0463)	-0.351***(0.041)	-0.443***(0.101)
13-19 months	0.165 (0.104)	0.0133(0.0755)	-0.0244(0.0628)	-0.198**(0.0812)	-0.277***(0.0783)
20-30 months	0.480***(0.116)	0.252***(0.054)	0.124***(0.0462)	-0.0406(0.058)	-0.201**(0.0967)
31-41 months	0.645***(0.107)	0.441***(0.0642)	0.241***(0.0521)	-0.00344 (0.0702)	-0.157(0.119)
41-49 months	0.666***(0.104)	0.391***(0.0584)	0.171*** (0.0622)	-0.0700 (0.0584)	-0.282***(0.0935)
50-59 months	0.617***(0.0993)	0.285***(0.0592)	0.122***(0.0457)	-0.123*(0.0662)	-0.351***(0.0917)
Religions (Base: Orthodox Christainity)					
Catholic	0.213 (0.314)	0.175(0.167)	-0.0062(0.13)	0.110(0.187)	0.067(0.195)
Protestant	-0.042(0.098)	0.021 (0.051)	-0.056(0.058)	-0.092(0.085)	-0.166*(0.094)
Muslim	-0.052 (0.062)	-0.0494(0.042)	-0.0926**(0.0387)	-0.163***(0.057)	-0.195***(0.053)
Traditional	0.314*(0.171)	0.132(0.174)	0.111(0.099)	-0.112 (0.133)	-0.117(0.243)
Other	-0.384 *(0.22)	-0.133(0.195)	-0.038(0.144)	0.054 (0.101)	-0.169 (0.171)
Regions (Base: Addis Ababa)					
Tigray	-0.119(0.127)	-0.112(0.08)	-0.215***(0.076)	-0.359***(0.097)	-0.538** (0.246)
Affar	-0.577***(0.142)	-0.331***(0.075)	-0.298***(0.103)	-0.129(0.16)	-0.31(0.234)
Amhara	-0.253**(0.125)	-0.134 (0.106)	-0.16*(0.091)	-0.186(0.109)	-0.41*(0.242)
Oromiya	-0.098(0.123)	-0.0623(0.098)	-0.095(0.096)	-0.11(0.11)	-0.34(0.223)
Somali	-0.651***(0.178)	-0.537***(0.098)	-0.604***(0.119)	-0.546***(0.11)	-0.764***(0.185)
Benishangul Gumuz	-0.068(0.146)	-0.086(0.100)	-0.129 (0.092)	-0.196(0.123)	-0.284(0.241)
SNNP	0.076(0.146)	0.14(0.098)	0.052(0.082)	-0.04(0.105)	-0.208(0.224)
Gambella	-0.138(0.109)	-0.215*(0.115)	-0.32***(0.109)	-0.395***(0.098)	-0.609***(0.205)
Harari	-0.186 (0.138)	-0.108(0.092)	-0.203(0.133)	-0.137(0.116)	-0.30(0.23)
Dire Dawa	-0.311**(0.128)	-0.275**(0.09)	-0.331***(0.109)	-0.254**(0.122)	-0.525**(0.224)
Household, Child and Women Characterstics					
Multiple birth	-0.326*(0.193)	-0.302***(0.087)	-0.113(0.076)	-0.178**(0.074)	-0.201(0.135)
Birth Order	-0.0022(0.015)	-0.0102(0.0113)	-0.008 (0.012)	-0.0014(0.0104)	-0.019(0.015)
Sex of a child	-0.171***(0.066)	-0.15***(0.037)	-0.0903***(0.029)	-0.081**(0.035)	-0.114***(0.042)
Women's age in years	0.0013(0.006)	0.0016 (0.0041)	0.0016(0.005)	0.002(0.005)	0.01(0.008)
Sex of the household head	0.055(0.049)	0.076*(0.041)	0.0264(0.044)	0.077(0.050)	0.133**(0.065)
Age of household head	0.0006(0.002)	-0.002(0.0014)	-0.0011(0.0013)	-0.0023**(0.0012)	-0.0038(0.0023)
Number of Household members	-0.0006(0.015)	0.008(0.008)	0.0053(0.007)	0.002 (0.005)	-0.0001(0.008)
Area of Residence(Rural/Urban)	-0.081(0.123)	-0.066 (0.082)	-0.109*(0.061)	-0.136**(0.062)	-0.189*(0.101)
Difficulty of distance to access health facility	0.06 (0.06)	-0.013 (0.046)	0.022(0.024)	0.0418(0.029)	-0.001(0.049)
Frequency of Reading Newspapers (Base: Not at all)					
At least once a week	-0.376*(0.21)	-0.333(0.219)	-0.108(0.13)	-0.16 *(0.098)	-0.151(0.302)
Less than Once a week	0.0382(0.096)	-0.076(0.068)	-0.131*(0.067)	-0.113(0.065)	-0.14(0.114)

Frequency of Listening to Radio (Base: Not at all)					
At least once a week	0.017 (0.0604)	0.07(0.052)	0.0324(0.042)	0.0533(0.052)	0.064(0.082)
Less than Once a week	0.037(0.049)	0.0429(0.036)	0.017(0.026)	0.0444(0.041)	0.016(0.047)
Frequency of Listening to Television (Base category: not at all)					
At least once a week	0.0047(0.084)	0.0245(0.074)	-0.0166(0.046)	0.0382 (0.068)	0.0011(0.134)
Less than Once a week	0.067(0.066)	0.085*(0.05)	0.057(0.038)	0.0878** (0.038)	0.0626(0.056)
Pseudo R^2	0.08	0.07	0.06	0.05	0.05
Number of Observations					9407

*** Significant at 1% level
** Significant at 5% level
*significant at 10% level
Bootstrapped and robust standard errors in Parenthesis

Source: computed from 2011 EDHS data of CSA and ICF International (2012)

Appendix VI: Quantile Regression Estimates for Long-run Nutritional Status of Children for control variables

	Height-for-age (HAZ) score of Children				
	q10	q25	q50	q75	q90
Child Age (Base Cohort: 0-6 months)					
7-12 months	-1.093***(0.087)	-0.98***(0.085)	-0.775***(0.082)	-0.803***(0.105)	-0.88***(0.191)
13-19 months	-1.712***(0.121)	-1.704***(0.09)	-1.59***(0.084)	-1.653***(0.079)	-1.746***(0.168)
20-30 months	-2.337***(0.113)	-2.241***(0.0801)	-2.09***(0.086)	-2.122***(0.077)	-2.242***(0.138)
31-41 months	-2.189***(0.092)	-2.087***(0.0752)	-2.091***(0.0714)	-2.111***(0.060)	-2.303***(0.133)
41-49 months	-2.069***(0.098)	-2.101***(0.091)	-1.944***(0.0762)	-2.025***(0.079)	-2.249***(0.105)
50-59 months	-1.819***(0.075)	-1.856***(0.062)	-1.835***(0.052)	-1.994***(0.071)	-2.222***(0.142)
Religions (Base: Orthodox Christainity)					
Catholic	-0.247(0.381)	-0.085(0.197)	0.116(0.197)	0.463(0.316)	0.716*(0.423)
Protestant	-0.101(0.085)	-0.01 (0.101)	0.058(0.06)	-0.0197(0.078)	0.159(0.102)
Muslim	-0.177* (0.0981)	-0.11 (0.0879)	-0.068(0.0492)	-0.0795(0.053)	0.018(0.121)
Traditional	0.32* (0.211)	0.0844(0.188)	-0.0822(0.271)	0.125(0.339)	0.703(0.585)
Other	-0.489(0.314)	-0.168(0.245)	-0.055(0.236)	0.165(0.246)	0.457 (0.296)
Regions (Base: Addis Ababa)					
Tigray	-0.267(0.196)	-0.223(0.153)	-0.253**(0.127)	-0.477***(0.137)	-0.76***(0.222)
Affar	-0.539***(0.207)	-0.343**(0.147)	-0.114(0.119)	0.101(0.139)	0.164(0.213)
Amhara	-0.443**(0.225)	-0.225(0.139)	-0.179*(0.103)	-0.352**(0.155)	-0.57**(0.224)
Oromiya	-0.0492(0.212)	-0.039(0.143)	-0.034(0.106)	0.069(0.156)	-0.106(0.202)
Somali	-0.0482(0.231)	0.173(0.16)	0.289***(0.095)	0.450***(0.162)	0.244(0.247)
Benishangul Gumuz	-0.558***(0.189)	-0.352***(0.123)	-0.166 (0.117)	-0.26*(0.153)	-0.473**(0.233)
SNNP	-0.495** (0.212)	-0.207(0.151)	-0.123(0.131)	-0.109(0.172)	-0.208(0.213)
Gambella	0.175(0.208)	0.383**(0.169)	0.294**(0.134)	0.421***(0.147)	0.157(0.208)
Harari	0.12(0.231)	0.231*(0.134)	0.269***(0.103)	0.233(0.151)	0.175(0.263)
Dire Dawa	-0.338*(0.254)	-0.095(0.145)	-0.0196(0.149)	0.025(0.165)	-0.226(0.202)
Household, Women and Child Characterstics					
Multiple birth	-0.80***(0.204)	-0.80***(0.12)	-0.58***(0.145)	-0.667***(0.13)	-0.211(0.259)
Birth Order	-0.069***(0.0203)	-0.0554**(0.024)	-0.0364***(0.014)	-0.0061(0.014)	0.0308(0.022)
Sex of a child	-0.104* (0.0516)	-0.135***(0.048)	-0.087***(0.0306)	-0.0297(0.0413)	-0.031(0.066)
Women's age in years	0.0157**(0.0065)	0.0103(0.0084)	0.0114**(0.0047)	0.00203(0.005)	-0.0025(0.0101)
Sex of the household head	0.101(0.069)	0.118** (0.059)	0.118**(0.046)	0.132*** (0.0415)	0.0127(0.066)
Age of household head	-0.00233 (0.0023)	-0.0023(0.0021)	-0.0028(0.002)	-0.0025(0.0018)	0.0018(0.0031)
Number of Household members	0.0133(0.0145)	0.016(0.015)	0.0176(0.011)	0.0125(0.0113)	0.0051(0.0133)
Area of Residence(Rural/Urban)	0.084(0.124)	0.188*(0.103)	0.0802(0.0796)	0.0651(0.093)	-0.0164(0.136)

Difficulty of distance to access health facility	0.0502 (0.0601)	0.0537(0.051)	0.0604(0.0375)	0.0794**(0.036)	0.0692(0.077)
Exposure to Media					
Frequency of Reading Newspapers (Base: Not at all)					
At least once a week	0.164(0.238)	0.131(0.136)	0.22(0.188)	0.307(0.218)	0.294(0.31)
Less than Once a week	0.179(0.164)	0.107(0.078)	-0.0119(0.098)	-0.0042(0.081)	0.0483(0.196)
Frequency of Listening to Radio (Base: Not at all)					
At least once a week	-0.0156(0.118)	0.054(0.0431)	-0.0243(0.043)	-0.087*(0.0512)	-0.153(0.111)
Less than Once a week	-0.086(0.0675)	-0.0264 (0.0527)	-0.0195(0.056)	-0.065(0.0428)	-0.072(0.0665)
Frequency of Watching Television (Base: Not at all)					
At least once a week	0.144 (0.111)	0.158*(0.083)	0.146* (0.0744)	0.201**(0.091)	0.436**(0.181)
Less than Once a week	0.0726 (0.0704)	0.0278(0.056)	0.0066(0.056)	0.017(0.0602)	0.037(0.07)
Pseudo R^2	0.13	0.14	0.16	0.17	0.18
Number of Observations					9407

*** Significant at 1% level
** Significant at 5% level
*significant at 10% level
Bootstrapped and robust standard errors in Parenthesis

Source: computed from 2011 EDHS data of CSA and ICF International (2012)